ISSN 1305–3124

PERINATAL JOURNAL

www.perinataljournal.com

Volume 25 | Issue 1 | April 2017

The Official Publication of
Perinatal Medicine Foundation
Turkish Perinatology Society
Turkish Society of Ultrasound in Obstetrics and Gynecology

deomed®

PERINATAL JOURNAL

www.perinataljournal.com

**The Official Publication of Perinatal Medicine Foundation,
Turkish Perinatology Society and
Turkish Society of Ultrasound in Obstetrics and Gynecology**

Description

Perinatal Journal, the Official Publication of Perinatal Medicine Foundation, Turkish Perinatology Society and Turkish Society of Ultrasound in Obstetrics and Gynecology, is an international online open access peer-reviewed scientific journal (e-ISSN: 1305-3124) published triannually in English. The manuscripts which are accepted for publication in the Perinatal Journal are published as a parallel publication of Turkish version in "Perinatoloji Dergisi" (p-ISSN:1300-5251, e-ISSN:1305-3132). Translation into Turkish language is provided by the publisher as free of charge for authors. This is automatically accepted by the authors of manuscripts at the time of submission.

The journal mainly includes original clinical and experimental research articles, case reports, reviews, editorial and opinion articles, and a letters column. Perinatal Journal can be read by perinatologists, obstetricians, gynecologists, radiologists, pediatricians, sonographers, midwives, radiographers, and scientific members of other related areas.

Aim and Scope

Perinatal Journal aims to create an interdisciplinary scientific platform for sharing and discussing topics on perinatal medicine and to share its experience with international scientific community.

Copyright

Conflicts of Interest

The authors should disclose all issues concerning financial relationship, conflicts of interest, and competing interest that may potentially influence the results of the research or scientific judgment. All financial contributions or sponsorship, financial relations, and areas of conflicts of interest should be clearly explained in the relevant step of the submission process, with full assurance that any related document will be submitted to the journal when requested.

Publication Ethics and Malpractice Statement

For the details of journal's "Publication Ethics and Malpractice Statement" please visit www.perinataljournal.com.

Publication Info

Ownership: On behalf of the Perinatal Medicine Foundation, Cihat Şen

Managing Editor: Murat Yayla

Administrative Office: Cumhuriyet Cad. 30/5 Elmadağ, Taksim 34367 İstanbul

Due the Press Law of Turkish Republic dated as June 26, 2004 and numbered as 5187, this publication is classified as a local periodical. Perinatal Journal is published by Deomed Publishing (Copyright © 2017, Perinatal Medicine Foundation).

Deomed Publishing
Gür Sok., No: 7B
Kadıköy 34720 Istanbul, Turkey
Telefon: +90 216 414 83 43 (Pbx) **Faks:** +90 216 414 83 42
e-posta: medya@deomed.com • **www.deomed.com**

Publication Coordinator: İlknur Demirel
English Editor: Fikret Yeşilyurt
Graphic Design: Tolga Erbay

deomed®

PERINATAL JOURNAL

www.perinataljournal.com

Volume 25 | Issue 1 | April 2017

The Official Publication of Perinatal Medicine Foundation, Turkish Perinatology Society and Turkish Society of Ultrasound in Obstetrics and Gynecology

Correspondence: Perinatal Journal, Perinatal Medicine Foundation,
Cumhuriyet Cad. 30/5 Elmadağ, Taksim 34367 İstanbul, Turkey
Phone: (0212) 225 52 15 • **Fax:** (0212) 225 23 22 **e-mail:** editor@perinataljournal.com
www.perinataljournal.com

deomed®

PERINATAL
JOURNAL

Coverage

The manuscripts should be prepared for one of the following article categories which are peer-reviewed:

- Original Article
- Case Report
- Technical Note
- Letter to the Editor

In addition, the journal includes article categories which do not require a peer review process but are prepared by the Editorial Board or consist of invited articles, titled as:

- Editorial
- Opinion
- Review
- Report
- Clinical Guidelines
- Abstracts
- Announcements
- Erratum

Manuscript Evaluation

All submissions to Perinatal Journal must be original, unpublished, and not under the review of any other publication. This is recorded by the system automatically with the IP number, the date and time of submission. On behalf of all authors the corresponding author should state that all authors are responsible for the manuscripts. The name, date, and place of the relevant meeting should be stated if the submission is a work that was previously presented at a scientific meeting.

Following the initial review, manuscripts which have been accepted for consideration are reviewed by at least three referees under double-blind peer review process. The Editors of the journal decide to accept or reject the manuscript considering the comments of the reviewers. They are authorized to reject or revise the manuscript, to suggest required corrections and changes upon the comments and suggestions of reviewers, and/or to correct or condense the text by permission of the corresponding author. They may send the manuscript for the statistical evaluation to Statistical Advisor if necessary as well. They have also the right to reject a manuscript after authors' revision. Author(s) should provide additional relevant data, documents, or information upon the editorial request if necessary.

Ethical Issues

All manuscripts presenting data obtained from studies involving human subjects must include a statement that the written informed consent of the participants was obtained and that the study was approved by an institutional ethics board or an equivalent body. This institutional approval should be submitted with the manuscript. Authors of case reports must submit the written informed consent of the subject(s) of the report or of the patient's legal representatives for the publication of the manuscript. All studies should be carried out in accordance with the World Medical Association Declaration of Helsinki, covering the latest revision date. Patient confidentiality must be protected according to the universally accepted guidelines and rules. Manuscripts reporting the results of experimental studies on animals must include a statement that the study protocol was approved by the animal ethics committee of the institution and that the study was conducted in accordance with the internationally accepted guidelines, including the Universal Declaration of Animal Rights, European Convention for the Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes, Principles of Laboratory Animal Science, and the Handbook for the Care and Utilization of Laboratory Animals. The authors are strongly requested to send the approval of the ethics committee together with the manuscript. In addition, manuscripts on human and animal studies should describe procedures indicating the steps taken to eliminate pain and suffering.

The authors should also disclose all issues concerning financial relationship, conflicts of interest, and competing interest that may potentially influence the results of the research or scientific judgment. All financial contributions or sponsorship, financial relations, and areas of conflicts of interest should be clearly explained in the relevant step of the submission process, with full assurance that any related document will be submitted to the journal when requested.

Perinatal Journal is committed to upholding the highest standards of publication ethics and observes the following principles of Publication Ethics and Malpractice Statement which is based on the recommendations and guidelines for journal editors developed by the Committee on Publication Ethics (COPE), Council of Science Editors (CSE), World Association of Medical Editors (WAME) and International Committee of Medical Journal Editors (ICMJE). For the details of journal's "Publication Ethics and Malpractice Statement" please visit www.perinataljournal.com.

Manuscript Preparation

In addition to the rules listed below, manuscripts to be published in Perinatal Journal should be in compliance with the Uniform Requirements for Manuscripts Submitted to Biomedical Journals published by International Committee of Medical Journal Editors (ICMJE) of which latest version is available at www.icmje.org.

Authors are requested to ensure that their manuscript follows the appropriate guidelines such as CONSORT for randomized controlled trials, STROBE for observational studies, STARD for diagnostic accuracy studies, and PRISMA for systematic reviews and meta-analyses, for the study design and reporting if applicable.

Authorship and Length of Texts

The author(s) must declare that they were involved in at least 3 of the 5 stages of the study stated in the "Acknowledgement of Authorship and Transfer of Copyright Agreement" as "designing the study", "collecting the data", "analyzing the data", "writing the manuscript" and "confirming the accuracy of the data and the analyses". Those who do not fulfill this prerequisite should not be stated as an author.

Original Research Articles base on clinical or experimental studies. The main text should not exceed 2500 words (max. 16 pages), and a maximum of six authors is advisable.

Case Reports should illustrate interesting cases including their treatment options. The main text should not exceed 2000 words (max. 8 pages), and a maximum of five authors is advisable.

Opinion Articles: Only by invitation and should be no more than 2000 words long (max. 8 pages).

Review Articles: Only by invitation and should be no more than 4000–5000 words long (max. 20 pages).

Technical Notes aims to present a newly diagnostic or therapeutic method. They should not exceed 2000 words (max. 8 pages) and include a maximum of 10 references.

Letters to the Editor should be no more than 500 words long (max. 2 pages) and include a maximum of 10 references.

Sections in the Manuscripts

Manuscripts should be designed in the following order: title, abstract, main text, references, and appendix (tables, figures, drawings, pictures, videos, patient forms, surveys etc.).

Title

The title of the manuscript should be carefully chosen to better reflect the contents of the study. No anusual abbreviations should be used in the title of the manuscript.

Abstract

Abstracts should not contain any abbreviation and references. They should be prepared under following designs.

— Abstracts of ***Original Research Articles*** should be max. 250 words

and structured in four paragraphs using the following subtitles: Objective, Methods, Results, and Conclusion. Following the abstract, each abstract should include max. 5 key words separated with comma and written in lower cases.

— Abstracts of ***Case Reports*** should be max. 125 words and structured in three paragraphs using the following subtitles: Objective, Case, Conclusion. Following the abstract, each abstract should include max. 3 key words separated with comma and written in lower cases.

— Abstracts of ***Review Articles*** should be max. 300 words and presented not structured in one paragraph. Following the abstract, each abstract should include max. 5 key words separated with comma and written in lower cases.

— Abstracts of ***Technical Notes*** should be max. 125 words and structured in three paragraphs using the following subtitles: Objective, Technique, Conclusion. Following the abstract, each abstract should include max. 3 key words separated with comma and written in lower cases.

Main text

The sections in main text are defined according to the manuscript type.

— In ***Original Research Articles,*** main text should consist of sections titled as "Introduction, Methods, Results, Discussion and Conclusion". Each title may have subtitles. The categories of subtitles should be clearly defined.

The *Introduction* section should include a brief summary of the base of the work and clearly states the purpose of the study.

The *Methods* section should contain a detailed description of the material, the study design and clinical and laboratory tests, and statistical methods used. A statement regarding the ethical issues should also be given in this section.

The *Results* section should provide the main findings of the study. Data should be concisely presented, preferably in tables or graphs.

The *Discussion* section should mainly rely on the results derived from the study, with relevant citations from the most recent literature.

The *Conclusion* section should briefly and claearly present the conclusions derived from the results of the study. It should be in compliance with the aim of the work and and point out its application in clinical practice.

— In ***Case Reports,*** main text should be divided with the titles "Introduction, Case(s), Discussion". Reported case(s) should be introduced clearly including the case story, and the results of laboratory tests should be given in table format as far as possible.

— The text of the ***Review Articles*** should follow the "Introduction" and be organized under subtitles which should clearly define the text's context categorization. The reviews are expected to include wide surveying of literature and reflect the author's personal experiences as far as possible.

— The text of the ***Technical Note*** type of articles should be divided into "Introduction, Technic, Discussion". The presented technic should be defined briefly under the related title, and include illustrations or figures as soon as possible.

— ***Letters to the Editor*** should not have titled sections. If there is a citation about a formerly published article within the text, reference(s) should be provided.

References

References used in the text should be directly related to the topic, as recent as possible and in enough numbers. They should be numbered in square brackets in the order in which they are mentioned in the text including Tables and Figures. Citation order should be checked carefully.

Only published articles or articles in press can be used in references. Unpublished data including conference papers or personal communications should not be used. Papers published in only electronic journals or in the preprint or online first issues of the electronic versions of conventional periodicals should be absolutely presented with DOI (digital object identifier) numbers.

Journal titles should be abbreviated according to the Index Medicus. All authors if six or fewer should be listed; otherwise, the first six and "et al." should be written.

Direct use of references is strongly recommended and the authors may be asked to provide the first and last pages of certain references. Publication of the manuscript will be suspended until this request is fulfilled by the author(s).

The style and punctuation should follow the formats outlined below:

— ***Standard journal article:*** Hammerman C, Bin-Nun A, Kaplan M. Managing the patent ductus arteriosus in the premature neonate: a new look at what we thought we knew. Semin Perinatol 2012;36:130–8.

— ***Article published in an only electronic journal:*** Lee J, Romero R, Xu Y, Kim JS, Topping V, Yoo W, et al. A signature of maternal anti-fetal rejection in spontaneous preterm birth: chronic chorioamnionitis, anti-human leukocyte antigen antibodies, and C4d. PLoS One 2011;6:e16806. doi:10.1371/journal.pone.0011846

— ***Book:*** Jones KL. Practical perinatology. New York, NY: Springer; 1990. p. 112–9.

— ***Chapter in a book:*** Moore TR, Hauguel-De Mouzon S, Catalano P. Diabetes in pregnancy. In: Creasy RK, Resnik R, Greene MF, Iams JD, Lockwood CJ, Moore TR, editors. Creasy and Resnik's maternal-fetal medicine: principles and practice. 7th ed. Philadelphia, PA: Saunders-Elsevier; 2014. p. 988–1021.

Figures and tables

All illustrations (photographs, graphics, drawings, etc.) accompanying the manuscript should be referred to as "figure". All figures should be numbered consecutively and mentioned in the text. Figure legends should be added at the end of the text as a separate section. Each figure should be prepared as a separate digital file in "jpeg" format, with a minimum 300 dpi or better resolution. All illustrations should be original. Illustrations published elsewhere should be submitted with the written permission of the original copyright holder. For recognizable photographs of human subjects, written permission signed by the patient or his/her legal representative should be submitted; otherwise, patient names or eyes must be blocked out to prevent identification. Microscopic photographs should include information on staining and magnification.

Each table should be prepared on a separate page with table heading on top of the table. Table heading should be added to the main text file on a separate page when a table is submitted as a supplementary file.

Submission

For a swift peer review, Perinatal Journal operates a web-based submission, peer review and manuscript tracking system. Authors are required to submit their articles online. Details of how to submit online can be found at www.perinataljournal.com.

Submission Checklist

The following list will be useful during the final check of a manuscript before submission:

1. Manuscript length (max. 4000 words for original research articles)
2. Number of authors (max. 6 authors for original research articles)
3. Title (no anusual abbreviations)
4. Abstracts (max. 250 words for original research articles)
5. Key words (max. 5 keys for original research articles)
6. Main text (subtitles)
7. References (listed according to the rules of ICMJE)
8. Appendices such as tables, figures, drawings, pictures, videos, patient forms, surveys etc. (numbering; legends and headings; copyright info/permission)
9. Acknowledgement of Authorship and Transfer of Copyright Agreement
10. Conflicts of Interest Disclosure Statement (if necessary)

PERINATAL JOURNAL

Contents

Volume 25, Issue 1, April 2017
www.perinataljournal.com

Original Article

Case Report

PERINATAL JOURNAL

Original Article

Perinatal Journal 2017;25(1):1–5

The outcomes of extending uterine incision transversely or cephalocaudally in patients with previous cesarean section: a prospective randomized controlled study

Selin Dikmen[1], Berna Aslan Çetin[1], Ali Gedikbaşı[2], Hüseyin Kıyak[1], Nadiye Köroğlu[1]

[1]*Gynecology and Obstetrics Clinic, Kanuni Sultan Süleyman Training and Research Hospital, İstanbul, Turkey*
[2]*Perinatology Clinic, Kanuni Sultan Süleyman Training and Research Hospital, İstanbul, Turkey*

Abstract

Objective: The comparison of intraoperative and postoperative outcomes of extending uterine incision transversely or cephalocaudally in patients with previous cesarean section.

Methods: In our prospective randomized controlled study, we divided patients who undergone cesarean section in our hospital due to repeated cesarean indication between July 2014 and June 2015 into two groups according to the cephalocaudal or transverse extension of uterine incision. We recorded the demographic characteristics and intraoperative and postoperative data of all patients included in the study. We assessed the differences between cephalocaudal and transverse extensions of uterine incision as well as statistical data obtained.

Results: We did not found any statistically significant difference between the groups in terms of bleeding volume, transfusion need, uterine artery damage, bladder damage, and atony development. We found that the incision extension was significantly low in those with cephalocaudally extended Kerr incision compared to the transverse group ($p<0.05$). Accordingly, we found that additional suture need was significantly lower ($p<0.05$).

Conclusion: Extension on incision line and additional suture need are higher in the group with transversely extended uterine incision.

Keywords: Cesarean section, uterine incision, cephalocaudal, transverse.

Özet: Geçirilmiş sezaryeni olan hastalarda uterus insizyonunun transvers veya sefalokaudal genişletilmesinin sonuçları: Prospektif randomize kontrollü çalışma

Amaç: Daha önce sezaryen operasyonu geçirmiş hastalarda sezaryen sırasında uterusa uygulanan insizyonunun transvers veya sefalokaudal yönde genişletilmesinin intraoperatif ve postoperatif sonuçlarının karşılaştırılması.

Yöntem: Prospektif randomize kontrollü çalışmamızda, hastanemizde Temmuz 2014 – Haziran 2015 tarihleri arasında, tekrarlayan sezaryen endikasyonuyla sezaryen yapılan hastalar uterus insizyonunun sefalokaudal veya transvers olarak genişletilmesine göre iki gruba ayrıldı. Çalışmaya dahil edilen tüm hastaların demografik özellikleri, intraoperatif ve postoperatif verileri kaydedildi. Elde edilen istatistik verileri ile birlikte uterus insizyonunun sefalokaudal veya transvers genişletilmesi arasındaki farklılıklar değerlendirildi.

Bulgular: Her iki grup arasında kanama miktarı, transfüzyon ihtiyacı, uterin arter hasarı, mesane hasarı, atoni gelişmesi açısından istatistiksel açıdan anlamlı fark saptamadık. Kerr insizyonu sefalokaudal genişletilenlerde transvers gruba göre insizyon hattında uzamayı anlamlı oranda düşük bulduk ($p<0.05$). Bu duruma bağlı olarak ek sütür gereksinimini anlamlı olarak daha az saptadık ($p<0.05$).

Sonuç: Uterus insizyonu transvers genişletilen grupta insizyon hattında uzama ve ek sütür gereksinimini daha fazladır.

Anahtar sözcükler: Sezaryen, uterin insizyon, sefalokaudal, transvers.

Correspondence: Berna Aslan Çetin, MD. Gynecology and Obstetrics Clinic, Kanuni Sultan Süleyman Training and Research Hospital, İstanbul, Turkey. e-mail: bernaaslan14@hotmail.com

Received: January 3, 2017; **Accepted:** January 29, 2017

Please cite this article as: Dikmen S, Aslan Çetin B, Gedikbaşı A, Kıyak H, Köroğlu N. The outcomes of extending uterine incision transversely or cephalocaudally in patients with previous cesarean section: a prospective randomized controlled study. Perinatal Journal 2017;25(1):1–5.

Available online at:
www.perinataljournal.com/20170251001
doi:10.2399/prn.17.0251001
QR (Quick Response) Code:

deomed

Introduction

Cesarean section is the most frequent surgical procedure performed on fertile women.[1,2] Compared to vaginal delivery, maternal morbidity and mortality risks are higher.[3] With the increase in the rates of delivery by cesarean section, the rates of uterine rupture, scar pregnancy, placental insertion anomalies and hospitalization period also have increased.[4] The severity of these complications necessitated to evaluate cesarean techniques and to investigate the most appropriate method where maternal and fetal well-being are preserved.

The lower segment transverse cesarean section was first defined by Kerr in 1926.[5] The cesarean section is a procedure involving skin incision, access to the abdomen, uterine incision, delivery of baby, closing uterine, closing abdomen and skin saturation. There are various techniques applied during these steps.[6]

In our study, we compared the intraoperative and postoperative outcomes of transverse and cephalocaudal extension of Kerr incision applied to uterine during cesarean section in patients with previous cesarean section. Our purpose was to investigate cesarean technique which will cause less bleeding and injury.

Methods

Our study was a prospective randomized controlled study performed on patients who undergone cesarean section in our hospital due to repeated cesarean indications between July 2014 and June 2015. The approval of ethics committee was obtained from our hospital with the document no. KAEK/2014/6/6. All patients included in the study were informed about the procedure and the informed consent forms were obtained. Cases with placenta previa, cases with placental abruption, patients with coagulation disorder, pregnant women at less than 34 weeks of gestation, delivery cases with anomalies, multiple pregnancies and primary cesarean cases were excluded from the study.

Before the procedure, the technique to be used for extending Kerr incision during cesarean section was determined with a simple randomization. The decision for performing general or regional anesthesia was made by anesthesia team.

After Pfannenstiel incision, subcutaneous tissues were opened bluntly from medial to lateral. The fascia was opened through a transverse incision by scalpel and extended laterally.

The parietal peritoneum was opened bluntly. When necessary, vesical flap was produced. Uterine incision was opened for 1–2 cm with scalpel at lower segment on midline and the cavity was opened bluntly by entering with finger tip. Then, in the transverse extension group, the incision was extended by index finger upwards from medial and towards lateral. In the cephalocaudal group, the incision was bluntly extended from midline to cephalocaudal direction with index and middle fingers of the operator. After the delivery of fetus, it was ensured that placenta was separated spontaneously. Afterwards, the cavity was checked. The uterine was closed continuously as a single layer without locking by no. 1 polyglactin (vicryl). After abdominal cleaning, the fascia was closed continuously without locking by no. 1 polyglactin. The skin was intracutaneously sutured with 2-0 polyglactin (rapid-vicryl).

Maternal demographic characteristics, anesthesia type and intraoperative details were recorded. Hospitalization indications, numbers and types of previous deliveries, maternal age, maternal height and weight, week of gestation and the presence of any unknown disease in mother and baby were recorded for all patients included in the study. Hemogram, blood type analysis, coagulation test and full urinalysis were requested from all patients before the cesarean section. Patients who needed additional suture during uterine incision were noted. After the delivery of fetus, 30 units of oxytocin in 1000 cc normal saline were applied as to be consumed in 30 minutes in order to prevent atony. Those with additional uterotonic needs were noted. Intraoperative bladder damage, opening T incision, presence of uterine artery damage and extended incision findings were noted. Hemoglobin and hematocrit values checked on postoperative day 1 were compared with the initial hemoglobin and hematocrit values. The patients who needed blood transfusion were determined. The extension of incision was defined as the formation of any wall defect in cervix or uterine vertically or towards the inside of uterine vessel group laterally.

The analysis of the data was done by SPSS for Windows 16.0 (SPSS Inc., Chicago, IL, USA). Whether the distribution of continuous variables was close to the normal values or not was investigated with Shapiro-Wilk test. Continuous variables were shown with mean ± standard deviation while nominal variations were shown with case number and percentage (%). Student's t test and

Mann-Whitney U test were used to determine the presence of significant difference between the groups in terms mean and medium values, respectively. Nominal variables were evaluated with chi square test. The value $p<0.05$ was considered statistically significant.

Results

A total of 183 patients, who had cesarean section in our hospital due to repeated cesarean indications between July 2014 and June 2015, were included in our study. Cephalocaudal method was applied in 93 patients included in the study and transverse method in 90 patients (**Fig. 1**). The methods were assigned to the patients by computerized randomization.

The cephalocaudal and transverse groups were compared by demographic and clinical data such as age, gravida, parity, week of gestation, weight, height, body mass index, initial systolic and diastolic tension, initial hemoglobin and hematocrit values, systemic disease (thyroid dysfunction, chronic hypertension and diabetes mellitus) and cervical dilation, and no significant difference was observed between two groups in terms of distribution (**Table 1**).

There was no significant difference between two groups in terms of operation periods and intraoperative complications such as uterine artery damage, bladder damage, opening T incision and uterotonic need. Extension in Kerr incision and additional suture need were higher in transverse group than cephalocaudal group (**Table 2**).

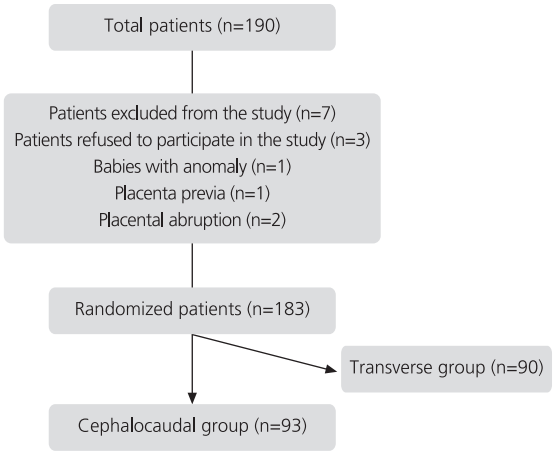

Fig. 1. Distribution of patients participated in the study.

No significant difference was found between cephalocaudal and transverse groups when transfusion need, postoperative hemoglobin and hematocrit values and decreases were compared (**Table 3**).

Table 1. Comparison of the demographic and clinical data of the patients.

	Cephalocaudal (n=93)	Transverse (n=90)	p
Age	29.46±5.69	30.01±5.76	0.518
Gravida	3.1±1.23	3±1.08	0.5
Parity	1.72±0.89	1.62±0.82	0.441
Week of gestation	38.59±1.45	38.48±1.87	0.648
Weight (kg)	75.98±12.56	77.6±14.62	0.422
Height (cm)	159±6.84	159±6.09	0.844
Body mass index (kg/m^2)	30.17±4.62	30.7±5.3	0.475
Initial systolic blood pressure (mmHg)	126±15.92	126±15.71	0.944
Initial diastolic blood pressure (mmHg)	78.23±12.61	78.51±11.04	0.871
Cervical dilation >3 cm	19 (%20.43)	23 (%25.55)	0.410
Patients in active phase	16 (%17.20)	16 (%17.77)	0.918
Systemic disease	21 (%22.58)	19 (%21.11)	0.810
Previous cesarean sections more than one	40 (%43.01)	33 (%36.66)	0.381
Initial hemoglobin (mg/dl)	11.85±1.44	12.16±1.33	0.135
Initial hematocrit (%)	36.1±3.55	37.03±3.52	0.770

Table 2. Comparison of the intraoperative data of the groups.

	Cephalocaudal (n=93)	Transverse (n=90)	p
Fetal birth weight (g)	3287.5±503.13	3269.3±524.51	0.810
Fetal birth weight >4000 g	10 (%10.75)	8 (%8.88)	0.672
Operation duration (minute)	30.26±6.97	32.22±10	0.126
Regional anesthesia	8 (%8.60)	6 (%6.66)	0.622
Extension in Kerr incision	7 (%7.52)	19 (%21.11)	**0.008**
Additional suture need	8 (%8.60)	26 (%28.88)	**<0.001**
Uterine artery damage	2 (%2.15)	4 (%4.44)	0.383
Bladder damage	0	0	1
T incision	1 (%1.07)	3 (%3.33)	0.296
Atony	1 (%1.07)	1 (%1.11)	0.981
Additional uterotonic need	2 (%2.15)	3 (%3.33)	0.623

Table 3. Comparison of the postoperative data of the patients.

	Cephalocaudal (n=93)	Transverse (n=90)	p
Postoperative hemoglobin (mg/dl)	10.6±1.41	10.85±1.57	0.263
Postoperative hematocrit (%)	32.14±3.85	32.74±4.3	0.320
Hemoglobin reduction (mg/dl)	1.26±0.76	1.44±0.86	0.147
Hematocrit reduction (%)	3.4±2.26	4.5±2.47	0.158
Transfusion need	0	2 (%2.22)	0.148

Discussion

Cesarean is the most common major abdominal operation today.[7] Compared to the vaginal delivery, there are more bleeding and complications during cesarean section. Various techniques are applied to reduce these complications.[8,9]

In the studies performed on uterine incision, the risk for uterine artery damage was found high due to the fact that the extension from medial to lateral might be uncontrollably excessive.[6,10] The tissue resistance produced against the cephalocaudal extension of incision up to uterine arteries prevents tissue damage by applying counter-force. Further, it is considered that current tissue resistance prevents uncontrolled extension even in the thinned lower segments. In our study, we found that the uncontrolled extensions that may occur in the lower segment when applying cephalocaudal method were significantly lower than the transverse method. In cephalocaudal extension, additional suture need for hemostasis after closing uterine incision was lower which was statistically significant.

Muscle fibers in the lower segment of uterine lie transversely. Even though Kerr incision is extended towards cephalocaudal direction, the dissection of myometrium occurs according to the anatomy, and therefore undesired extensions towards distal direction are prevented. Similar to our study, Cromi et al. observed in their studies performed in 2008 that undesired extension was more frequent in the transverse group than the cephalocaudal group.[11] Accordingly, transverse group had more additional suture need. If the extension by transverse and blunt technique is performed with index fingers towards lateral direction in an uncontrolled manner, the arterial damage would be inevitable.[12,13] Cephalocaudal extension may prevent this problem by preserving parametrial and uterine arteries.

In our study, we did not find any significant difference between cephalocaudal and transverse groups in terms of bleeding. We excluded cases with placenta previa, multiple pregnancy, coagulation disorders and placental abruption, which might increase bleeding, from the study. We did not observe uterine inversion, uterine rupture, gastrointestinal system damages and urinary system damages in both groups. Unlike Cromi et al., we did not include etiological factors which may increase bleeding in our study.[11] In our study, we did not find any significant difference between transverse group and cephalocaudal group in terms of hemoglobin and hematocrit values, transfusion need and bleeding volume.

Our first condition in our patient groups was the performance of cesarean section with repeated cesarean indication. In previous studies, the cephalocaudal group and transverse group consisted of primary cesarean cases chosen substantially from nulliparous patients. Maybe, the patients with previous scar line on the lower segment of uterine might prevent any significant difference between the two groups in terms of bleeding volume. The lack of significant difference in bleeding volume might be caused by the changes in the vascularization of uterine incision line due to previous scar. However, further studies with wider population are needed to clarify this matter.

One of the most important concerns in cephalocaudal extension is bladder damage. However, we found out that cephalocaudal extension applied to thinned previous scar line due to the pain during the incision of lower segment uterine had no adverse effect causing bladder damage.

In a study performed in 2015 on 112 patients, 55 patients underwent cephalocaudal extension and 57 patients underwent transverse extension. The blood loss and the extension of Kerr incision were evaluated in both groups. The reduction in preoperative and postoperative hemoglobin and hematocrit values and estimated blood loss of the patients were prominently lower in the cephalocaudal group in comparison to the transverse group.[14,15] Unlike other study, they found that uterine artery damage was higher in the transverse group.

Conclusion

In conclusion, the extension of Kerr incision and additional suture needs are higher in patients who undergo cesarean section due to repeated cesarean indications when Kerr incision is extended transversely. Whether cephalopelvic or transverse extension should be preferred for Kerr incision should be decided according to the condition of patient and experience of surgeon.

Conflicts of Interest: No conflicts declared.

References

1. Kara M, Şentürk Ş, Yılmaz E. Ağrı ilinde gebelerdeki sezaryen oranları ve demografik özellikler. Zeynep Kamil Tıp Bülteni 2009;40:131–4.
2. Chu K, Cortier H, Maldonado F, Mashant T, Ford N, Trelles M. Cesarean section rates and indications in sub-Saharan Africa: a multi-country study from medecins sans frontieres. PLoS One 2012;7:e44484.
3. De Cherney AH, Nathan L. Cesarean section. In: De Cherney AH, Nathan L, editors. Current obstetric and gynecologic diagnosis and treatment. 9th ed. New York, NY: McGraw-Hill; 2003. p. 518–29.
4. Seiler CM, Deckert A, Diener MK, Diener MK, Knaebel HP, Weigand MA, Victor N, et al. Midline versus transverse incision in major abdominal surgery: a randomised, double-blind equivalence trial (POVATI: ISRCT 60734227). Ann Surg 2009;249:913–20.
5. Kerr JMM. The technique of cesarean section, with special reference to the lower uterine segment incision. Am J Obstet Gynecol 1926;12:729–34.
6. Abuhamad A, O'Sullivan MJ. Operative techniques for cesarean section. In: Planche WC, Morrison JC, O'Sullivan MJ, editors. Surgical obstetrics. Philadelphia, PA: Saunders; 1992. p. 417–29.
7. World Health Organization. Monitoring emergency obstetric care: a handbook. Geneva: World Health Organization; 2009.
8. MacDorman, MF, Menacker F, Declercq, E. Cesarean birth in the United States: epidemiology, trends, and outcomes. Clin Perinatol 2008;35:293–307.
9. Field CS. Surgical techniques for cesarean section. Obstet Gynecol Clin North Am 1988;15:657–72.
10. Clark SL. Cesarean section. In: Hankins GDV, Clark SL, Cunningham FG, Gilstrap LC, editors. Operative obstetrics. Norwalk, CT: Appleton & Lange 1995. p. 301–32.
11. Cromi A, Ghezzi F, Di Naro E, Siesto G, Loverro G, Bolis P. Blunt expansion of the low transverse uterine incision at cesarean delivery: a randomized comparison of 2 techniques. Am J Obstet Gynecol 2008;199:292.e1–6.
12. Magann EF, Chauhan SP, Bufkin L, Field K, Roberts WE, Martin JN Jr. Intraoperative haemorrhage by blunt versus sharp expansion of the uterine incision at caesarean delivery: a randomised clinical trial. BJOG 2002;109:448–52.
13. Saad AF, Rahman M, Costantine MM, Saade GR. Blunt versus sharp uterine incision expansion during low transverse cesarean delivery: a metaanalysis. Am J Obstet Gynecol 2014;211:684.e1–11.
14. Xodo S, Saccone G, Cromi A, Ozcan P, Spagnolo E, Berghella V. Cephalad-caudad versus transverse blunt expansion of the low transverse uterine insicion during cesarean delivery. Eur J Obstet Gynecol Reprod Biol 2016;202:75–80.
15. Özcan P, Ateş S, Can MG, Batmaz G, Kılıç G, Yardımcı AS. Is cephalad-caudad blunt expansion really associated with less uncontrolled extensions to decrease intra-operative blood loss? A prospective randomized-controlled trial. J Matern Fetal Neonatal Med 2016;29:1952–6.

PERINATAL JOURNAL

Original Article

Perinatal Journal 2017;25(1):6–10

The association between anemia prevalence, maternal age and parity in term pregnancies in our city

Ebru Çelik Kavak, Salih Burçin Kavak

Department of Obstetrics and Gynecology, Faculty of Medicine, Fırat University, Elazığ, Turkey

Abstract

Objective: Although anemia is a quite common problem in all age groups and sexes in the world, it is particularly important in pregnant women as it may lead to poor maternal and perinatal outcomes. In this study, we aimed to determine anemia prevalence, the impact of parity on anemia prevalence and the severity of anemia in term pregnancies in our region.

Methods: A total of 426 pregnant women who admitted to Obstetrics and Gynecology Department of Fırat University between June 1, 2016 and December 31, 2016 and who were at 37 weeks of gestation and above without any additional pathologies such as preeclampsia, HELLP syndrome and placental abruption were included in the study. The demographic characteristics and hemoglobin values of pregnant women were evaluated retrospectively.

Results: The anemia prevalence was 18.7% in nulliparous patients and 21.9% in those with parity between 1 and 4, and it was 46.2% in grand multiparous patients. The severities of all diagnosed anemia cases were mild to moderate. Severe and very severe anemia was not found in any patient.

Conclusion: When compared to nulliparous patients, the prevalence of anemia is higher in multiparous and grand multiparous patients. Iron deficiency anemia is seen at a high rate despite preventive medicine activities.

Keywords: Term pregnancy, labor, anemia.

Özet: İlimizde term gebeliklerde anemi sıklığı ve maternal yaş ile parite ilişkisi

Amaç: Anemi tüm dünyada her yaş grubunda ve cinsiyette son derece yaygın olarak izlenen bir sorun olmasına rağmen özellikle gebelerde kötü maternal ve perinatal sonuçlara neden olabilmesi açısından farklı bir öneme sahiptir. Bu çalışmada yöremizdeki term gebelerde anemi sıklığını, paritenin anemi sıklığına etkisini ve aneminin şiddetini tespit etmeyi amaçladık.

Yöntem: Çalışmaya 1 Haziran 2016 ile 31 Aralık 2016 tarihleri arasında Fırat Üniversitesi Kadın Hastalıkları ve Doğum Kliniğine doğum için başvuran 37 hafta ve üzerinde olan ve preeklampsi, HELLP sendromu, dekolman plasenta gibi ek patolojileri olmayan 426 gebe dahil edildi. Gebelerin demografik özellikleri ve hemoglobin değerleri retrospektif olarak incelendi.

Bulgular: Nullipar hastalarda anemi prevalansı %18.7, paritesi 1–4 arasında olanlarda %21.9, grand multipar hastalarda ise %46.2 olarak tespit edildi. Tanı konulan tüm anemiler hafif ve orta şiddette anemi şeklindeydi. Hiçbir hastada şiddetli ve çok şiddetli anemi tespit edilmedi.

Sonuç: Nullipar hastalar ile karşılaştırıldığında multipar ve grand multipar hastalarda anemi prevalansı daha fazladır. Demir eksikliği anemisi, önleyici hekimlik faaliyetlerine rağmen yüksek oranda görülmeye devam etmektedir.

Anahtar sözcükler: Term gebelik, travay, anemi.

Introduction

Anemia develops during pregnancy in more than half of the women in the world.[1] Anemia is the condition where red blood cell count is lower than the number to meet the physiological needs of body in order to carry sufficient amount of oxygen. In clinical practice, anemia is determined by measuring hemoglobin (Hb) or hematocrit (Htc) values in blood.[2] Beginning from the first trimester of pregnancy, the increase in plasma volume is followed up until 24–32 weeks of gestation.

Yazışma adresi: Ebru Çelik Kavak, MD. Department of Obstetrics and Gynecology, Faculty of Medicine, Fırat University, Elazığ, Turkey. e-mail: eckavak@gmail.com

Received: January 30, 2017; **Accepted:** February 20, 2017

Please cite this article as: Çelik Kavak E, Kavak SB. The association between anemia prevalence, maternal age and parity in term pregnancies in our city. Perinatal Journal 2017;25(1):6–10.

Available online at:
www.perinataljournal.com/20170251002
doi:10.2399/prn.17.0251002
QR (Quick Response) Code:

deomed

Although elevated red blood cell count accompanies it, this increase is relatively less and hemodilution-associated physiological anemia also develops. In 1968, the study group of World Health Organization (WHO) defined the values for the diagnosis of anemia for different populations, and these values defined for pregnant women still prevail today.[3] WHO advices to keep hemoglobin value above 11.0 g/dl, and below 10.5 g/dl during second trimester. Also, according to WHO guidelines, hemoglobin values between 10–10.9 g/dl are considered as mild anemia, between 7–9.9 g/dl as moderate anemia, below 7 g/dl as severe anemia, and below 4 g/dl as very severe.[4]

The most common type of anemia developing during pregnancy is iron deficiency anemia. In order to meet the needs and losses during pregnancy and labor, women need approximately 1130 mg total iron during this period.[5] Knowing that iron need increases during pregnancy is significant for follow-up purposes. While the iron need is 0.8 mg/day during first trimester, it reaches to 7.5 mg/day during third trimester.[6]

Anemia during pregnancy is significant since it may lead to severe complications in terms of maternal and perinatal outcomes. Various studies showed that anemia increases the risks for preterm labor, newborn with low birth weight and fetal mortality.[7,8] The association of severe anemia with poor maternal outcomes such as cardiac failure, hemorrhage and infection is known.

In order to prevent the complications which may develop due to anemia, which is a serious threat for maternal and newborn health, iron support program for pregnant women was initiated in Turkey in November 01, 2005. With this program, it was recommended to provide iron support to all pregnant women without exception, except the cases where iron cannot be administered, as the lack of iron stores is of high rates in Turkey and external iron support is already required during pregnancy.

With this study, we aimed to determine hemoglobin values, of term pregnant women who admitted to Obstetrics and Gynecology Department of Fırat University, just before the delivery and therefore to identify the prevalence of anemia in term pregnancies in our region which may lead to serious maternal and newborn morbidity and mortality, and to determine the distribution of anemia according to parity and age.

Methods

A total of 426 term pregnant women (at and above 37 weeks of gestation), who admitted to the Obstetrics and Gynecology Department of Fırat University between June 1, 2016 and December 31, 2016, were included in the study. Age, number of gravidity and full blood count parameters at the time of entrance to the delivery room were retrospectively evaluated and recorded. Patients with hematological disease or prominent hemorrhage, preterm pregnant women, those with multiple pregnancies, and patients diagnosed with placental abruption, pre/eclampsia and HELLP syndrome were excluded from the study.

According to WHO recommendations, pregnant women with hemoglobin values below 11 g/dl were considered anemic and they were classified as mild (10–10.9 g/dl), moderate (7–9.9 g/dl), severe (below 7 g/dl) and very severe anemic (below 4 g/dl). Nulliparous cases were included in Group I, cases with parity between 1 and 4 were included in Group II and cases with parity above 5 were included in Group III and distribution of hemoglobin values according to parity was assessed.

In order to assess the impact of age on the prevalence of anemia, the pregnant women were classified into age groups which were 19-year-old and below (also known as adolescent pregnancy), 20–35-year-old and 35-year-old and above, and the prevalence of anemia was investigated in each age group.

For the statistical analysis, SPSS 21.0 (IBM Corp., Armonk, NY, USA) was used in the analysis of variables. Conformity of the data to normal distribution was evaluated by Shapiro-Wilk test, and variance homogeneity was evaluated with Levene's test. For the comparison of more than two groups according to the quantitative data, one-way ANOVA and Kruskal-Wallis H tests were used. For the comparison of categorical variables with each other, Pearson chi-square test was used. Quantitative variables were shown in the tables as mean ± standard deviation / range (maximum–minimum) and median range (maximum–minimum), and categorical variables shown as n (%). The variables were analyzed via 95% confidence interval, and p value less than 0.05 was considered significant.

Results

The ages of patients included in the study were between 18 and 44 years, and the mean age was 30.0±6.1 years. Of

Table 1. Comparison of age and hemoglobin values of patients between the groups.

	GI=Parity 0 (n=144)	GII=Parity 1–4 (n=269)	GIII=Parity >5 (n=13)	Total (n=426)		Double comparison of groups		
	Mean±SD/ (Max–Min)	Mean±SD/ (Max–Min)	Mean±SD/ (Max–Min)	Mean±SD/ (Max–Min)	p value	GI–I	GI–III	GII–III
Age	26.21±15.76/ (44–18)	31.75±5.42/ (42–18)	36.15±4.14/ (43–29)	30.01±6.17/ (44–18)	<0.001	<0.001	<0.001	<0.005
	Mean (Max–Min)	Mean (Max–Min)	Mean (Max–Min)	Mean (Max–Min)	p value	GI–I	GI–III	GII–III
Hemoglobin	12 (15–8)	12 (14–7)	11 (13–8)	12 (14–7)	0.036	0.020	0.010	0.391

GI: Group I, **GII:** Group II, **GIII:** Group III.

the pregnant women admitted for delivery, 2.6% (n=11) of them were below 19-year-old, 76.3% (n=325) of them were between 20 and 35 years old, and 21.1% (n=90) of them were above 35-year-old. Of these patients, 144 of them were nulliparous, 269 of them were multiparous and 13 of them were grand multiparous.

When Groups I, II and III were evaluated in terms of age and hemoglobin levels, it was found that there was statistically significant difference between Groups I and II and Groups I and III in terms of ages and Hb levels of cases ($p<0.05$). While there was significant difference between Groups II and III in terms of the ages of cases, there was no statistically significant difference between Hb levels ($p>0.05$). The relationship between ages and hemoglobin levels of Groups I, II and III are presented in **Table 1**.

Hemoglobin values were within normal limits in 81.3% of nulliparous cases, in 78.1% of cases with parity between 1 and 4, and in 53.8% of cases with parity above 5. The anemia incidence of nulliparous cases was 18.7% (n=27). In this group, 9.7% (n=14) of cases had mild anemia and 9.0% (n=13) of cases had moderate anemia. Of case with parity between 1 and 4, 21.9% (n=59) had anemia. In these cases, 12.6% (n=34) of them had mild anemia and 9.3% (n=25) of them had moderate anemia. In grand multiparous cases, anemia incidence was 46.2% (n=6). In this patient group, 7.7% (n=1) of the cases had mild anemia and 38.5% (n=5) had moderate anemia. Severe and very severe anemia was not found in any patient.

Anemia incidence was 18.2% in pregnant women who were below 19-year-old, which was considered as adolescent pregnancy. The severity of anemia in this group was mild. The anemia prevalence in pregnant women between 20 and 35 years old was 18.7%. While 10.4% of anemic pregnant women had mild anemia, 8.3% of them had moderate anemia. Hb values were within normal limit in 81.3% of pregnant women in this age group. Anemia prevalence was 28.1% in pregnant women who were above 35-year-old. While 11.2% of anemic pregnant women had mild anemia, 16.9% of them had moderate anemia. Hb values were within normal limit in 71.9% of pregnant women in this age group. The distribution of ages and parities of cases according to their anemia severities is shown in **Table 2**.

Discussion

In "2011 Global Anemia Prevalence" report of the World Health Organization, anemia prevalence during pregnancy was reported as 38%, and it is estimated that this rate corresponds to 32 million pregnant women in the world. The same report states that anemia prevalence during pregnancy is 17% in the USA, 28% in Turkey and 54% in India, and it exceeds 60% in many

Table 2. Evaluation of anemia levels according to age and parity of cases.

Status	Normal (Hb≥11) n (%)	Mild anemia (Hb 10–10.9) n (%)	Moderate anemia (Hb 7–9.9) n (%)	Severe anemia (Hb <7) n (%)
Nulliparous	117 (27.4)	14 (3.3)	13 (3.0)	-
Parity 1–4	210 (49.4)	34 (8.0)	25 (5.9)	-
Parity ≥5	7 (1.7)	1 (0.2)	5 (1.1)	-
≤19 years old	9 (2.1)	2 (0.4)	-	-
20–35 years old	265 (62.3)	34 (8.0)	27 (6.3)	-
>35 years old	64 (15.0)	10 (2.4)	15 (3.5)	-

Hb: Hemoglobin

African countries. The prevalence of severe anemia, which is more significant in terms of complications, is reported as 0% in the USA, 0.3% in Turkey, 1.3% in India and it reaches 2.8% in many African countries.[9]

Anemia is the most common hematologic disorder encountered during pregnancy. The most frequent reason for anemia during pregnancy is iron deficiency. It is known that many factors such as socioeconomic condition, education level, age, parity etc. affect the hemoglobin level of pregnant women. Many studies were performed on anemia in Turkey and the incidence was reported between 35 and 56%.[10,11]

Anemia prevalence was reported 50.3% in a study performed on term pregnant women in Eastern Black Sea Region.[12] In the study of Beştepe et al., anemia prevalence in Afyon city was found 29.4%.[13] In the study of Erdem et al. performed in Diyarbakır, the authors found anemia in 23.1% of the cases and they reported increased rate of iron deficiency anemia in women with high gravida and parity. While gravida was 3 and less in 26.7% of anemic patients, it was over 3 in 73.3%[14] of them. In their study, Karaoğlu et al. reported the prevalence of anemia in pregnant women living in Malatya as 27.2%.[15] In the study of Atabay et al. conducted on term pregnant women with low incomes, the authors reported anemia prevalence as 52.3%.[16]

According to the study of Pirinççi et al., anemia prevalence was 42.4% in pregnant women living in the city center of Elazığ.[17] In our study that we performed on anemia prevalence in pregnant women in our region after a period of 15 years, we found the prevalence 21.6% in term pregnant women. We revealed in our study that there was a significant decrease in the anemia prevalence within 15 years. The anemia prevalence in our region was below 28%, which was the rate stated for Turkey in "2011 Global Anemia Prevalence" report.

Although there are no distinct data on the threshold values indicating any increase in maternal morbidity and mortality, the data collected from India, Nigeria and many other regions show that maternal morbidity and mortality increase when Hb decreases to levels below 8 g/dl and 5 g/dl, respectively.[18] The lack of severe and very severe anemia in any of our patients in our study is a pleasing result. Since anemia during pregnancy may have adverse effects on maternal, fetal and newborn health, utmost care should be exercised for the diagnosis and treatment of anemia in all pregnant women, especially in those with high rates of parity.

Conclusion

Despite the availability of health policies for the prevention of anemia during pregnancy, iron deficiency anemia has a high prevalence. Our study is retrospective and limited number of cases is a restriction. Through wide prospective studies planned, more successful steps can be taken to prevent iron deficiency anemia during pregnancy by identifying failed steps in practices carried out to prevent iron deficiency and focusing on these failed steps.

Conflicts of Interest: No conflicts declared.

References

1. Scholl TO. Iron status during pregnancy: setting the stage for mother and infant. Am J Clin Nutr 2005;81:1218S–1222S.
2. Haznedaroğlu İC. Erişkinlerde demir eksikliği anemisi. Hacettepe Tıp Dergisi 1998;29:79–81.
3. Nutritional anaemias. Report of a WHO scientific group. WHO Technical Report Series, No. 405. Geneva: World Health Organization; 1968.
4. World Health Organization. Prevention and management of severe anemia in pregnancy. Report of a Technical Working Group, Geneva, 20–22 May 1991. Maternal Health and Safe Motherhood Programme. Geneva: World Health Organization; 1993.
5. Cogswell ME, Parvanta I, Ickes L, Yip R, Brittenham GM. Iron supplementation during pregnancy, anemia, and birth weight: a randomized controlled trial. Am J Clin Nutr 2003; 78:773–81.
6. Svanberg B. Absorption of iron in pregnancy. Acta Obstet Gynecol Scand Suppl 1975;48:17.
7. Garn SM, Ridella SA, Petzold AS, Falkner F. Maternal hematologic levels and pregnancy outcomes. Semin Perinatol 1981;5:155–62.
8. Murphy JF, O'Riordan J, Newcombe RG, Coles EC, Pearson JF. Relation of haemoglobin levels in first and second trimesters to outcome of pregnancy. Lancet 1986;1(8488): 992–5.
9. WHO. The global prevalence of anemia in 2011. Geneva: World Health Organization; 2015. p. 1–19.
10. Yalaz Y. Gebelerde demir eksikliği anemisi ve serum demir bağlama kapasitesi üzerine bir çalışma. İ.Ü. İstanbul Tıp Fakültesi İç Hastalıkları Uzmanlık Tezi, İstanbul, 1972.
11. Üner A, Kazancıoğlu TA, Oğuz R. Incidence of iron deficiency anemia during pregnancy. J Fam Pract 1997;1:1–5.
12. Balık G, Şentürk Ş, Güven ES, Kağıtçı M, Şahin F. Doğu Karadeniz bölgesindeki miadında gebe kadınlarda anemi sıklığı

ve bazı hematolojik parametrelerin analizi. Medeniyet Medical Journal 2015;30:8–12.

13. Beştepe G, Bilgin N. Afyon ili 2 ve 4 No'lu sağlık ocaklarındaki gebelerde anemi prevalansı ve anemiyi etkileyen bazı faktörlerin incelenmesi. Sağlık ve Toplum 2002;12:43–53.
14. Erdem Ö, Bucaktepe G, Kara İ.H. Aile hekimliği polikliniğine başvuran kadınlarda demir eksikliği anemisi ve gestasyon öyküsü ilişkisi. Dicle Tıp Dergisi 2009;36:123–6.
15. Karaoglu L, Pehlivan E, Egri M, Deprem C, Gunes G, Genc MF, Temel I. The prevalence of nutritional anemia in pregnancy in an east Anatolian province, Turkey. BMC Public Health 2010;10:329.
16. Atabay B, Gül A, Yaprak I. Iron status in low-income pregnant Turkish women at term. Turkish Journal of Hematology 2005;22(Suppl 3):226–7.
17. Pirinççi E, Açık Y, Bostancı M, Eren S, Beritanlı H. Elazığ il merkezinde yaşayan gebelerde anemi prevalansı. Fırat Üniversitesi Sağlık Bilimleri Tıp Dergisi 2001;15:449–54.
18. Prema K, Neela Kumari S, Ramalakshmi BA. Anaemia and adverse obstetric out come. Nutr Rep Int 1981;23:637–43.

PERINATAL JOURNAL

Original Article

Perinatal Journal 2017;25(1):11–18

Comparison of high and low doses of oxytocin protocols in multiparous pregnant women in terms of labor durations and fetal-maternal complications

Kadriye Erdoğan, Elif Gül Yapar Eyi

Gynecology and Obstetrics Clinic, Zekai Tahir Burak Women's Health Training and Research Hospital, Ankara, Turkey

Abstract

Objective: Our aim is to compare high and low doses of oxytocin protocol applied during labor induction in terms of reliability and efficacy in multiparous pregnant women with Bishop score ≥6.

Methods: Pregnant women between 37 and 41 weeks of gestation who had singleton and alive fetuses in vertex presentation, whose labor did not start spontaneously, who had no history of uterine surgery and no fetal congenital anomaly, who had Bishop score 6 and higher were included in this single center, randomized, prospective study with the indications of Category II trace, oligohydramnios and rational/psychosocial factor after obtaining their informed consent forms. A total of 164 multiparous pregnant women were separated into two groups during admission by simple randomization with opaque envelopes according to onset and increasing doses of oxytocin. In the groups which received low and high doses of oxytocin, labor durations, delivery types, newborn measurements, meconium presence, the presence of cord on neck, blood gas analyses, placental weights, maternal complications (postpartum bleeding, need for postpartum transfusion, puerperal fever, grades III–IV perineal lacerations and uterine rupture) and early newborn morbidity (respiratory distress, birth trauma, shoulder dystocia and neonatal hyperbilirubinemia) were compared.

Results: When 75 pregnant women administered high doses of oxytocin and 75 pregnant women administered low doses of oxytocin were compared, no difference was observed between the groups in terms of the durations of phase I, phase II and phase III of labor, cesarean section rates, and maternal and perinatal complications (p>0.05). Although there was an increase in the rate of dark meconium by high dose induction protocol (p=0.01), the difference could not be established due to the limitations of the study in terms of intrapartum hypoxia which can be associated with 5-minute Apgar score being below 5 and acidemia in umbilical artery, pH being below 7, and base excess being 12 mmol/L and above.

Conclusion: There is no difference between high or low doses of oxytocin induction in multiparous pregnant women in terms of labor duration, cesarean section rate, and maternal and perinatal complications.

Keywords: Induction, labor, parity, oxytocin.

Özet: Multipar gebelerde yüksek ve düşük doz oksitosin protokollerinin doğum eylem süreleri ve fetal-maternal komplikasyonlar açısından karşılaştırılması

Amaç: Amacımız, doğum indüksiyonunda uygulanan yüksek ve düşük doz oksitosin protokolünün multipar, Bishop skoru 6 ve üzerinde olan gebelerde, güvenirlilik ve etkinlik açısından karşılaştırılmasıdır.

Yöntem: Tekil, canlı, verteks prezentasyonunda, doğumu kendiliğinden başlamamış, daha önce geçirilmiş uterin cerrahisi olmayan, fetal konjenital anomali saptanmayan, 37–41. gestasyonel hafta arasında, Bishop skoru 6 ve üzerinde olan gebeler bilgilendirilmiş onam sonrası Kategori II trase, oligohidramnios, rasyonel/psikososyal faktör endikasyonları ile tek merkezli, randomize, prospektif çalışmaya dahil edildi. Çalışmadaki 164 multipar gebe, oksitosin başlama ve artış dozuna göre basit randomizasyon ile opak zarflarla kabülde seçilerek iki gruba ayrıldı. Düşük ve yüksek doz oksitosin alan grupların, doğum eylemi süreleri, doğum şekli, yenidoğan ölçümleri, mekonyum varlığı, boyunda kordon mevcudiyeti, kan gazı analizleri, plasenta ağırlıkları, maternal komplikasyonları (postpartum kanama, postpartum transfüzyon gereği, puerperal ateş, III.–IV. derece perine laserasyonları ve uterin rüptür) ve erken yenidoğan morbiditesi (solunum sıkıntısı, doğum travması, omuz distosisi, neonatal hiperbilirubinemia) karşılaştırıldı.

Bulgular: Yetmiş beş yüksek doz ve 75 düşük doz oksitosin uygulanan gebe karşılaştırıldığında, doğum eyleminin I. evresi, II evresi ve III. evresinin süreleri; sezaryen doğum oranları, maternal ve perinatal komplikasyonlar açısından gruplar arasında fark izlenmedi (p>0.05). Yüksek doz indüksiyon protokolü ile koyu mekonyum oranında artış belirlense de (p=0.01), beşinci dakika Apgar skorunun 5'in altında olması ve umbilikal arterde asidemi, pH'ın 7'nin altında olması ve baz fazlasının 12 mmol/L ve üstü olması ile ilişkilendirilebilen intrapartum hipoksi açısından farklılık, çalışmanın sınırlılığı nedeni ile belirlenemedi.

Sonuç: Multipar gebelerde yüksek ya da düşük doz oksitosin indüksiyonu arasında, eylem süresi, sezaryen doğum oranı, maternal ve perinatal komplikasyonlar açısından fark yoktur.

Anahtar sözcükler: İndüksiyon, eylem, parite, oksitosin.

Correspondence: Kadriye Erdoğan, MD. Gynecology and Obstetrics Clinic, ZTB Women's Health Training and Research Hospital, Ankara, Turkey. e-mail: kadriye@rifatoglutarim.com

Received: December 22, 2016; **Accepted:** February 21, 2017

Please cite this article as: Erdoğan K, Yapar Eyi EG. Comparison of high and low doses of oxytocin protocols in multiparous pregnant women in terms of labor durations and fetal-maternal complications. Perinatal Journal 2017;25(1):11–18.

Available online at:
www.perinataljournal.com/20170251003
doi:10.2399/prn.17.0251003
QR (Quick Response) Code:

deomed

Introduction

Labor induction is the stimulation of uterine contractions through any mechanical procedure, pharmacological or non-pharmacological agents or complementary methods independent from spontaneous onset of labor or the rupture of amniotic membranes.[1] The rate of labor induction increases over the years, it increased from 9.5% in 1990 to 23.2% in 2011.[2] Families declining fetal risks by informed consent form which may occur during late term and postterm pregnancies and their induction preferences, using cervical maturing agents, increased experience of clinician on the use of induction, wide use of fetal monitorization enabling monitorization during induction and rational/psychosocial factors are among the basic reasons for the increase of labor induction rate.[3]

Although there are many pharmacologic agents involved in the labor induction, oxytocin is the most common one among them. This hormone, which is in polypeptide structure secreted in a pulsatile way from the posterior lobe of hypophysis proceeding through the axons of neurons and synthesized from the supraoptic and paraventricular nuclei of hypothalamus, was first used intravenously for labor induction by Theobald et al.[4] The use of synthetic oxytocin in labor induction is carried out by various protocols with different initial doses, incremental intervals, amounts and maximum rates. While many clinics perform their own protocols, being unable to establish a single common protocol indicates that it has been still unclear which protocol is the most appropriate and which dose minimizes perinatal and maternal complications.

Our purpose is to compare the effect of high and low doses of oxytocin induction protocols in multiparous and term pregnancies on the durations of labor phases and fetal and maternal complications.

Methods

The pregnant women at 37 and higher weeks of gestation, who were hospitalized at the Obstetrics Clinic of Zekai Tahir Burak Women's Health Training and Research Hospital between January 2012 and May 2014, who were positive for fetal cardiac activity, had no history of cesarean section or uterine surgery and no pelvic deformation, who were not established with the diagnosis of active genital herpes, at head presentation, had no comorbid disease, who were not on medication or underwent delivery yet, and who had Bishop score being 6 and higher were included in the study.[5] The week of gestation and the date of last menstrual period of pregnant women who were included in the study with Category II trace, oligohydramnios and rational/psychosocial factor indications were determined by early ultrasonographic findings. The presence of additional problems was evaluated during admission by detailed anamnesis, physical examination, laboratory examinations (complete blood count, blood glucose, urea, creatinine, alanine aminotransferase, aspartate aminotransferase, bleeding profile, blood type and complete urinalysis) and ultrasonography. In all pregnant women, cervical dilation and cervical effacement were recorded by performing vaginal examination.

Pregnant women were separated into two groups for high dose and low dose through a simple randomization by selecting from closed opaque envelopes: The low dose group was initially administered 5 units of synthetic oxytocin (Synpitan® amp. Deva, Istanbul, Turkey) intravenously in 500 cc isotonic at the dose of 2 milliunit/min (mU/min) and the dose was increased for 2 mU/min every 15 minutes and it was infused by external cardiotocography until a sample was obtained with contraction frequency once every 2–3 minutes and contraction duration for 60–90 seconds. The maximum oxytocin dose was determined as 40 mU/min. The patients were monitored by hourly vaginal palpation and continuous cardiotocography.[6,7] The high dose group was initially administered 5 units of Synpitan® amp. intravenously in 500 cc isotonic at the dose of 4 mU/min and the dose was increased for 4 mU/min every 15 minutes and it was infused by external cardiotocography until a sample was obtained with contraction frequency once every 2–3 minutes and contraction duration for 60–90 seconds. Similarly, maximum oxytocin dose was determined as 40 mU/min.[6] The patients were monitored by hourly vaginal palpation and continuous cardiotocography.

In the cardiotocographic evaluation, normal basal fetal heart rate limits were considered as 110–160 beat/min. Basal heart rate above 160 beat/min was accepted as fetal tachycardia, below 100 beat/min as fetal bradycardia, and uterine contraction more than 5 in 10 minutes within two consecutive periods or contractions starting once every minute was accepted as tachysystole. Together with tachysystole, irregularity in fetal heart beat was evaluated separately. When abnormal fetal heart trace (late deceleration, sever variable deceleration)

or abnormal uterine contraction (tachysystole) was identified, it was monitored by discontinuing oxytocin infusion first. Decelerations lower than 110 beat/min in more than 2 minutes and less than 10 minutes in fetal heart beats in the presence of Category II trace or in the presence of type I trace in the beginning, repeating decelerations and repeating variable decelerations were evaluated as "unreliable fetal condition".[8]

Hourly progress for cervical dilations of patients from 4 cm to 10 cm was marked on time graph; amniotomy was carried out after palpation if the head was located on cervix and in case of possible vasa praevia in membranes. The duration from 4 cm to 10 cm of cervical dilation was considered as phase I, the duration from 10 cm up to delivery was considered as phase II, and the period from delivery to the separation of placenta was considered as phase III and all three phases were evaluated separately. About 10–20 cm of the cord within first 10 minutes after delivery was clamped on both sides and blood samples were collected from umbilical artery by heparinized blood gas injectors and they were examined within first 30 minutes. After separated from the placenta, the newborn was weighed and the weight was recorded. Apgar score, weight, height, head circumference, and early newborn morbidity (respiratory distress, birth trauma, shoulder dystocia, neonatal hyperbilirubinemia) of the newborns were compared. Intrapartum and postpartum complications were identified and recorded. As postpartum maternal complications, hemoglobin (Hb) and hematocrit (Hct) decreases, uterine rupture, grades III–IV perineal lacerations, postpartum fever, postpartum bleeding and transfusion at prepartum and postpartum 6th hour were evaluated.

The statistical analyses of the study were performed by BM® SPSS® Statistics 20 for Mac (IBM Corp., Los Angeles, CA, USA), and the tables of the results were prepared with Microsoft® Excel® for Mac 2011 (Microsoft Corp., Santa Rosa, CA, USA). In the evaluation of the data, mean ± standard deviation was used. In the comparison of the groups for the data obtained from the measurements, t-test was used for independent groups if the data were homogenous according to Shapiro-Wilk test, which is one of the normality tests, and Mann-Whitney U test was used if they were not homogenous. In the evaluation of repeating measurements, t-test and Wilcoxon test were used for dependent groups. In the comparison of multi-groups, one-way ANOVA was used if they were distributing homogenously and Bonferroni, one of the post hoc tests, was used for double comparisons; if they were not distributing homogenously, Kruskall-Wallis test was used and Mann-Whitney U test was used for double comparisons. Chi-square test was performed for frequency comparisons between the groups. The association between continuous data was evaluated by Pearson and Spearman correlation tests. The results were evaluated within 95% confidence interval and according to $p<0.05$ significance level.

Table 1. Demographic factors of the study group.

Criteria	Groups	n	Mean	Standard deviation	p
Age	Low	75	29.40	5.33	
	High	75	28.45	4.87	0.258
	Total	150	28.93	5.11	
Height	Low	75	160.61	5.66	
	High	75	161.11	6.18	0.611
	Total	150	160.86	5.91	
Weight gained	Low	69	8.29	3.65	
	High	71	8.42	3.8	0.834
	Total	140	8.36	3.72	
BMI	Low	75	30.51	4.75	
	High	75	30.45	4.73	0.932
	Total	150	30.48	4.72	
Week of gestation	Low	75	39.42	1.21	
	High	75	39.69	1.19	0.176
	Total	150	39.56	1.2	
Ultrasonographic week of gestation	Low	75	39.37	1.17	
	High	75	39.68	1.16	0.101
	Total	150	39.53	1.17	

Results

The maternal demographic data are shown in **Table 1**. Accordingly, there was no statistically significant differ-

Table 2. The durations (minute) of the labor phases I, II and III in high- and low-dose oxytocin groups.

Phases	Groups	n	Mean	Standard deviation	p
Phase I	Low	69	227.32	136.41	
	High	71	216.25	117.27	0.607
	Total	140	221.71	126.73	
Phase II	Low	69	12.91	9.95	
	High	71	13.34	10.41	0.805
	Total	140	13.13	10.15	
Phase III	Low	69	8.29	3.65	
	High	71	8.42	3.8	0.834
	Total	140	8.35	3.71	

ence between the groups in terms of age, height, weight gained during pregnancy, body mass index (BMI) at admission and in the beginning of pregnancy, week of gestation and first trimester ultrasonographic findings.

When the association of high and low doses of induction protocols with the durations of delivery phases were evaluated, no statistically significant difference was found between two groups in terms of phase I (227.32±136.41 in low-dose group and 216.25±117.27 in high-dose group), phase II (12.91±9.95 in low dose group and 13.34±10.41 in high-dose group) and phase III (8.29±3.65 in low dose group and 8.42±3.80 in high-dose group) (**Table 2**). When the distribution of delivery type to the groups was analyzed, it was found that the rate of vaginal delivery with episiotomy was 29.3%, the rate of spontaneous vaginal delivery was 62.7% and the rate of cesarean section was 8% in the group which was applied low-dose induction while they were 42.7%, 52.0% and 5.3%, respectively, in the group which was applied high-dose induction; there was no statistically significant difference between two groups in terms of delivery type (p=0.224).

In terms of the distribution of cesarean section (C/S) indications to the groups, fetal distress was 2.6% and non-progressive labor was 5.4% in the low-dose induction group; in high-dose induction group, fetal distress was 2.65% and cephalopelvic disproportion was 2.65% as C/S indication. There was no statistically significant difference between two groups in terms of C/S indications (p=0.548). According to the values obtained by complete blood count at prepartum and postpartum 6th hour, Hb values decreased from 11.90±1.40 to 10.88±1.35 in low-dose group and from 12.01±1.46 to 11.02±1.49 in high-dose group while Hct values decreased from 35.56±3.47 to 32.91±3.38 in low-dose group and from 36.15±3.41 to 33.26±3.80 in high-dose group, indicating a significant difference (p=0.00). There was no statistically significant difference between the groups (p=0.76) (**Table 3**). Uterine rupture, grades III–IV perineal lacerations and postpartum fever were not observed as postpartum maternal complications. Due to postpartum uterine atony causing reduction in hematocrit values, a woman in low-dose oxytocin group was applied transfusion. There was no statistically significant difference between the groups in terms of maternal complications (p=0.50).

There was also no statistically significant difference between two groups in terms of placental weight, newborn weight and height, newborn's head circumference, 1-minute and 5-minute Apgar scores, cord blood gas analyses, negative logarithm of hydrogen ion concentration (pH), partial pressure of carbon dioxide (PCO_2), and

Table 3. Hemoglobin (Hb) and hematocrit (Hct) values at admission and postpartum 6th hour in high- and low-dose oxytocin induction (mean+standard deviation).

	Parameter	Status	Mean	Standard deviation
Low-dose	Hb	Admission	11.90	1.40
		6th hour	10.88	1.35
	Hct	Admission	35.56	3.47
		6th hour	32.91	3.38
High-dose	Hb	Admission	12.01	1.46
		6th hour	11.02	1.49
	Hct	Admission	36.15	3.41
		6th hour	33.26	3.80
		Final	30.45	4.73

Table 4. Placental weight and newborn's measurements and analysis results of umbilical artery blood gas in high- and low-dose oxytocin induction groups.

Criteria	Groups	N	Mean	Standard deviation	p
Placental weight (g)	Low	75	638.13	107.25	
	High	75	640.27	105.36	0.902
	Total	150	639.2	105.96	
Newborn weight (g)	Low	75	3314.27	544.35	
	High	75	3254.93	488.56	0.483
	Total	150	3284.6	516.33	
Newborn Height (cm)	Low	75	49.87	5.49	
	High	75	50.4	1.62	0.421
	Total	150	50.13	4.04	
Newborn's head circumference (cm)	Low	75	34.75	1.1	
	High	75	34.67	1.07	0.653
	Total	150	34.71	1.08	
Cord pH	Low	40	7.27	0.08	
	High	44	7.28	0.08	0.283
	Total	84	7.28	0,08	
Cord PCO_2 (mm Hg)	Low	40	47.96	11.56	
	High	44	43.97	8.35	0.071
	Total	84	45.87	10.15	
Cord PO_2 (mm Hg)	Low	40	26.14	9.3	
	High	44	24.32	6.16	0.289
	Total	84	25.19	7.82	
Cord HCO_3 (mEq/L)	Low	40	21.29	1.88	
	High	44	20.97	2.16	0.478
	Total	84	21.12	2.03	
1-minute Apgar	Low	75	7.33	0.53	
	High	75	7.35	0.48	0.872
	Total	150	7.34	0.5	
5-minute Apgar	Low	75	9.33	0.53	
	High	75	9.35	0.48	0.872
	Total	150	9.34	0.5	

bicarbonate concentration (HCO_3) (**Table 4**). There was no case with umbilical artery pH being 7 and below. The comparison of cord entanglement to the neck between the groups is summarized in **Table 5**. Accordingly, there was no statistically difference between the groups (p=0.164). When the comparison characteristics of meconium at delivery was evaluated between the groups, it was seen that 13.3% of the pregnant women in low-dose group had thin meconium and there was no dark meconium in this group, while 1.3% of the pregnant women in high-dose group had thin meconium and 1.3% of them had dark meconium. Accordingly, thin meconium was found less in high-dose group, and there was only one case with dark meconium. The difference in the rate of total amnion with meconium was found to be statistically significant (p=0.012). There was also no difference between the groups in terms of neonatal hyperbilirubinemia and birth trauma which appear as respiratory distress, cephalohematoma and clavicle fracture (**Table 5**).

Table 5. The data on meconium, cord entanglement on the neck, birth trauma and hyperbilirubinemia of newborn.

		Cord entanglement				
Group	**Number-Percentage**	**N/A**	**1 time**	**2 times**	**3 times**	**Total**
Low	Sayı	59	12	3	1	75
	Percentage	78.7	16.0	4.0	1.3	100
High	Sayı	49	19	7	0	75
	Percentage	65.3	25.3	9.3	0.0	100
Total	Sayı	108	31	10	1	150
	Percentage	72	20.7	6.7	0.7	100
Chi-square value=5.107; p=0.164						
		Meconium				
Group	**Number-Percentage**	**N/A**	**Thin**	**Dark**	**Total**	
Low	Number	65	10	0	75	
	Percentage	86.7	13.3	0.0	100.0	
High	Number	73	1	1	75	
	Percentage	97.3	1.3	1.3	100.0	
Total	Number	138	11	1	150	
	Percentage	92.0	7.3	0.7	100.0	
Chi-square value=8.827; p=0.012						
		Acidosis				
Group	**Number-Percentage**	**N/A**	**Respiratory**	**Metabolic**	**Total**	
Low	Number	36	4	0	40	
	Percentage	90.0	10.0	0.0	100.0	
High	Number	40	2	1	43	
	Percentage	93.0	4.7	2.3	100.0	
Total	Number	76	6	1	83	
	Percentage	91.6	7.2	1.2	100.0	
Chi-square value=1.771; p=0.412						

		Newborn complications					
Group	**Number-Percentage**	**N/A**	**Trauma**	**Shoulder dystocia**	**Hyperbilirubinemia**	**Respiratory distress**	**Total**
Low	Number	71	1	0	0	3	75
	Percentage	94.7	1.3	0.0	0.0	4.0	100.0
High	Number	67	4	1	3	0	75
	Percentage	89.3	5.3	1.3	4.0	0.0	100.0
Total	Number	138	5	1	3	3	150
	Percentage	92.0	3.3	0.7	2.0	2.0	100.0
Chi-square value=8.916; p=0.063							

Discussion

The purpose of labor induction is to carry out vaginal delivery and to prevent deaths at term. With the evaluation of 22 studies performed on 9383 women, comparing pregnancies at and above 41 weeks of gestation through an expectant approach, it is seen that the labor induction decreases relative risk (RR) (which is 0.31) for perinatal deaths from 0.12 to 0.88 within 95% confidence intervals;[1] however, evidence based data on the induction performed at term pregnancy up to 41 weeks of gestation could not be revealed in the presence of Category II trace, oligohydramnios, and rational/psychosocial factors. Therefore, success possibility and C/S risk should be evaluated certainly if it is planned to perform induction. The parameters referred for the risk evaluation are Bishop score, parity, vaginal delivery underwent previously, BMI, age, estimated birth weight and diabetes. By adding Bishop score being 6 and higher, which indicates that cervix is convenient for delivery, to the most significant parameter, "presence of previous delivery", which shows that further deliveries can be carried out vaginally, it was aimed to evaluate induction success and fetal maternal outcomes. Bishop score is a scale system, developed in 1964, to predict the success of elective induction in which cervical dilation, effacement, position, level and consistency are graded up to 13 points by grading from "0" to "2" or "3".[9] If Bishop score is 9 or higher, it is considered that "vaginal delivery can be achieved independent from the induction". In Bishop scoring system developed by Burnett in 1966, total score is 10 where each item can be graded up to "2" points.[5] In this system used for multiparous pregnancies, score 6 and above indicates that vaginal delivery would be achieved. Therefore, assessment with Bishop score before induction is preferred to predict the agent to be used in the induction and the success of induction.[10]

In our study, there was no statistically significant difference between two groups in terms of maternal demographics, maternal BMI at the time of oxytocin induction and gestational age. Zhang et al. reported that the ages of patients who were administered low-doses of oxytocin were significantly higher than the patients who were administered high-doses of oxytocin.[11] In this prospective randomized controlled study, multiparous pregnant women were separated into two groups, oxytocin protocol similar to the protocol in our study was used, but unlike our study, they concluded that the augmentation with high-dose of oxytocin reduced the phase I of delivery by 0.7–1.1 hours in multiparous pregnant women and that there was no difference in phase II of delivery. It was not an induction study which was used to stimulate uterine contractions before labor; it was an augmentation study which was defined as the study for increasing current contractions since cervical dilation and fetal descending were insufficient. In this augmentation study, there was no statistically significant difference between high- and low-dose of oxytocin protocols in terms of C/S rates. Patka et al. confirmed the results of Zhang et al., and they found no statistically significant difference between the groups in terms of C/S rates while reporting that labor duration was reduced in pregnant women who underwent high-dose of oxytocin induction.[12] Similar to our study, Hourvitz et al. reported no significant difference between the delivery phases of pregnant women who underwent high- and low-dose of oxytocin induction.[13] However, Hourvitz et al. used lower doses of oxytocin in their protocols. In the review of Wei et al. analyzing 10 studies, it was reported that labor duration was reduced by 1.54 hour through high-dose oxytocin augmentation.[14]

Oxytocin, which is the most common agent used in labor induction on pregnant women with appropriate Bishop score, was used in various protocols with different initial doses, incremental intervals, amounts and maximum rates. In low-dose protocol, the initial dose of oxytocin is 1 or 2 mU/min, incremental interval is 30 minutes and dose increments vary from 1 mIU to 2 mU. In low-dose protocol, the dose that labor is set is 8–12 mU/min, and maximum dose before re-evaluation is reported as 30 mU/min. For high-dose protocol, the initial dose of oxytocin is either 4 or 6 mU/min, incremental interval is 15–30 minutes and dose increment varies from 4 to 6 mU/min. The dose that labor is set is usually 8–12 mU/min and maximum dose before re-evaluation is reported as 30 mU/min in the literature.[6,7,10] It is still unclear which protocol is the most suitable for which patient and which dose minimizes fetal and maternal complications.[15] In our study, we found no statistically significant difference between high- and low-dose oxytocin protocol in terms of phases I (active phase), II and III of labor, delivery type and C/S rate.

Among the member countries of Organisation for Economic Co-operation and Development (OECD), the rates of C/S in our country are unfortunately at the third rank following Brazil and China and at the first rank in European countries.[16] About one out of two

women deliver by C/S. In our study, among multiparous pregnant women with Bishop score 6 and higher, we performed C/S to 4 (5.3%) of 75 pregnant women who underwent high-dose oxytocin and 6 (8%) of pregnant women who underwent low-dose oxytocin due to fetal distress and cephalopelvic disproportion. Satin et al. reported that cesarean section rate increased due to fetal distress indication in pregnant women who underwent high-dose oxytocin.[17] Xenakis et al. found in their study that 18.8% of pregnant women who were administered high-dose oxytocin and 20% of pregnant women who were administered low-dose oxytocin had fetal distress; contrarily, there are publications reporting that C/S rates decrease and vaginal delivery rates increase in pregnant women who were administered high-dose oxytocin.[18] In our study, we found no statistical difference between low- and high-dose oxytocin induction in terms of C/S indications. As maternal complications, we investigated postpartum bleeding (one case), postpartum transfusion need (one case), puerperal fever, grades III–IV perineal lacerations and uterine rupture, and we found no statistical difference between two groups. While one case in low-dose induction group had transfusion need during postpartum period, there was no statistical difference between the groups although hematocrit and hemoglobin levels decreased at prepartum and postpartum 6th hour in both groups. Except the postpartum transfusion need in low-dose induction group, we observed no maternal complication in both groups. Similar to our study, Xenakis et al. evaluated the parameters of postpartum bleeding and postpartum transfusion need as maternal complications and they found no statistically significant difference between two groups.[17] In the study of Zhang et al., the authors investigated grades III–IV perineal lacerations and they found no statistically significant difference between two groups.[11]

In terms amnion with meconium in high- and low-dose oxytocin groups, thin meconium was observed in 13.3% of the cases in low-dose induction group but there was no dark meconium while the rates were 1.3% and 1.3%, respectively, in the high-dose induction group. Accordingly, thin meconium was found less in high-dose group, and there was only one case with dark meconium. Statistically, total rate of amnion with meconium was significantly higher in low-dose group similar to the augmentation study of Zang et al.[11] Five-minute Apgar score below 5 which can be the indication intrapartum hypoxia that can be associated with dark meconium, pH level below 7 and base excess being 12 mmol/L and above were not found in study groups. The number of cases required for perinatal hypoxia evaluation being out of study scope was the limitation of the study. In our study, we found shoulder dystocia (1.3%) and brachial plexus injury as a result in one of the pregnant women who underwent high-dose induction, cephalohematoma in two babies, caput succedaneum in one case and clavicle fracture in case as birth trauma while we found caput succedaneum in one of the pregnant women who underwent low-dose induction; there was no statistically significant difference between two groups. Similar to our study, Xenakis et al. evaluated the parameter of shoulder dystocia as perinatal complication, and they found no statistically significant difference between high- and low-dose oxytocin induction.[18] Zhang et al. also found no statistically significant difference between high- and low-dose groups in terms of birth traumas similar to our study.[11] In our study, we observed neonatal hyperbilirubinemia in three (4%) of the pregnant women who underwent high-dose induction. We did not found neonatal hyperbilirubinemia in the pregnant women who underwent low-dose oxytocin induction. Newborns with neonatal hyperbilirubinemia did not have predisposing factors such as cephalohematoma or caput succedaneum, and they were discharged following about one-week phototherapy. In their study, Woyton et al. also categorized the relationship between oxytocin use and neonatal hyperbilirubinemia and compared these two groups.[19] Similar to Woyton et al., Johnson et al.[20] separated pregnant women into two groups, which were oxytocin and no oxytocin group, and they found no statistically significant difference between two groups. In their study, they attributed the reason for the lack of neonatal hyperbilirubinemia in pregnant women induced by oxytocin to not administering oxytocin in hypoosmolar fluids and therefore not observing hyponatremia, and erythrocytes not swelling and thereby being hemolyzed. In studies suggesting that oxytocin leads to neonatal hyperbilirubinemia, the reason is attributed to the use of hypoosmolar fluid.[19–20]

Conclusion

In multiparous pregnant women with Bishop score 6 and higher, high- and low-dose induction did not make a difference in terms of C/S rates and maternal and perinatal complications; high-dose oxytocin does not reduce delivery duration compared to the low-dose oxytocin.

Conflicts of Interest: No conflicts declared.

References

1. Gülmezoglu AM, Crowther CA, Middleton P, Heatley E. Induction of labour for improving birth outcomes for women at or beyond term. Cochrane Database Syst Rev 2012;(6): CD004945.
2. Murthy K, Grobman WA, Lee TA, Holl JL. Trends in induction of labor at early-term gestation. Am J Obstet Gynecol 2011;204:435.e1–6.
3. Rayburn WF, Zhang J. Rising rates of labor induction: present concerns and future strategies. Obstet Gynecol 2002;100:164–7.
4. Theobald G, Graham A, Campbell J, Gange PD, Drisvoll WJ. Use of post-pituitary extract in obstetrics; a preliminary report. Br Med J 1948;2(4567):123.
5. Burnett JE Jr. Preinduction scoring: an objective approach to induction of labor. Obstet Gynecol 1966;28:479–83.
6. Smith JG, Merrill DC. Oxytocin for induction of labor. Clin Obstet Gynecol 2006;49:594–608.
7. ACOG Committee on Practice Bulletins -- Obstetrics. ACOG Practice Bulletin no. 107. Induction of labor. Obstet Gynecol 2009;114:386–7.
8. Gravett C, Eckert LO, Gravett MG, Dudley DJ, Stringer EM, Mujobu TB, et al.; Brighton Collaboration Non-reassuring fetal status Working Group. Non-reassuring fetal status: Case definition & guidelines for data collection, analysis, and presentation of immunization safety data. Vaccine 2016;34:6084–92.
9. Bishop EH. Pelvic scoring for elective induction. Obstet Gynecol 1964;24;266–8.
10. Leduc D, Biringer A, Lee L, Dy J; Society of Obstetricians and Gynaecologists of Canada. SOGC Practice Guideline. Induction of labor. J Obstet Gynaecol Can 2013;35:840–57.
11. Zhang J, Branch DW, Ramirez MM, Laughon SK, Reddy U, Hoffman M, et al. Oxytocin regimen for labor augmentation, labor progression, perinatal outcomes. Obstet Gynecol 2011; 118:249–56.
12. Patka JH, Lodolce AE, Johnston AK. High-versus low-dose oxytocin for augmentation or induction of labor. Ann Pharmacother 2005;39:95–101.
13. Hourvitz AM, Alcalay M, Korach J, Lusky A, Barkai G, Seidman DS. A prospective study of high- versus low-dose oxytocin for induction of labor. Acta Obstet Gynecol Scand 1996;75:636–41.
14. Wei S-Q, Luo Z-C, Qi H-P, Xu H, Fraser WD. High-dose vs low-dose oxytocin for labor augmentation: a systematic review. Am J Obstet Gynecol 2010:203:296–304.
15. Merrill DC, Zlatnik FJ. Randomized, double-masked comparison of oxytocin dosage in induction and augmentation of labor. Obstet Gynecol 1999;94:455–63.
16. OECD. Health at a Glance 2011: OECD indicators [Internet]. Paris: OECD Publishing; 2011 Nov. Available from: http://dx.doi.org/10.1787/health_glance-2011-en
17. Satin AJ, Leveno KJ, Sherman ML, Brewster DS, Cunningham FG. High- versus low-dose oxytocin for labor stimulation. Obstet Gynecol 1992;80:111–6.
18. Xenakis EM, Langer O, Piper JM, Conway D, Berkus MD. Low-dose versus high-dose oxytocin augmentation of labor – a randomized trial. Am J Obstet Gynecol 1995;173:1874–8.
19. Woyto*f* JP, Agrawal P, Zimmer M. Evaluation of the effect of oxytocin use for labor induction on frequency of occurrence and severity of neonatal jaundice. [Article in Polish] Ginekol Pol 65:682–5.
20. Johnson JD, Aldrich M, Angelus P, Stevenson DK, Smith DW, Herschel MJ, et al. Oxytocin and neonatal hyperbilirubinemia: studies of bilirubin production. Am J Dis Child 1984; 138:1047–50.

PERINATAL JOURNAL

Original Article

Perinatal Journal 2017;25(1):19–25

The effects of amniotomy on labor duration, cesarean section rates, and maternal and fetal outcomes

Ayşegül Baylas Şahin, Elif Gül Yapar Eyi

Gynecology and Obstetrics Clinic, Zekai Tahir Burak Women's Health Training and Research Hospital, Ankara, Turkey

Abstract

Objective: We aimed to investigate the effects of amniotomy during spontaneous labor on the durations of labor stages, cesarean section (C/S) rates, and maternal and fetal outcomes.

Methods: This prospective study was performed through basic randomization to investigate the effects of amniotomy on labor duration, delivery type, morbidity/mortality rates during puerperal period and premature newborn outcomes in pregnant women with low risk who admitted to Obstetrics Clinic of Zekai Tahir Burak Women's Health Training and Research Hospital and delivered at our hospital.

Results: There was no statistically significant difference between pregnant women who underwent and did not undergo amniotomy in terms of the period elapsed until cervical dilation was 6 cm, until 10 cm after cervical dilation was 6 cm and until delivery after it reached 10 cm and total labor duration (p>0.05). The C/S rate (p=0.030) and hospitalization duration (p=0.04) of pregnant women who underwent amniotomy was significantly higher than those who did not undergo amniotomy. There was no difference between two groups in terms of morbidity/mortality during puerperal period and premature newborn outcomes.

Conclusion: Amniotomy does not reduce the labor duration in the management of spontaneous labor; as it increases the rate of C/S and hospitalization duration of mother, it should not be performed as a routine practice in training and research hospitals.

Keywords: Labor duration, amniotomy procedure, cesarean section, first stage of labor, second stage of labor.

Özet: Amniyotominin eylem süresi, sezaryen oranları, maternal ve fetal sonuçlar üzerine etkisi

Amaç: Spontan başlayan doğum eyleminde amniyotominin doğum evrelerinin sürelerine, sezaryen (C/S) oranlarına ve maternal, fetal sonuçlar üzerine etkileri araştırıldı.

Yöntem: Prospektif, basit randomizasyon ile gerçekleştirilen çalışmada Zekai Tahir Burak Kadın Sağlığı Eğitim ve Araştırma Hastanesi Doğum Ünitesine kabulü yapılan ve doğurtulan düşük riskli gebelerde, amniyotominin, doğum eylemi süresine, doğum şekline ve puerperal döneme ait morbidite/mortaliteye ve erken yenidoğan sonuçlarına etkisinin değerlendirilmesi amaçlanmıştır.

Bulgular: Amniyotomi uygulanan ve uygulanmayan gebeler arasında kabulden servikal açıklık 6 cm oluncaya kadar geçen süre, servikal açıklık 6 cm olduktan sonra 10 cm oluncaya kadar, 10 cm olduktan sonra doğuma kadar geçen süre ve toplam doğum süresi açısından istatistiksel anlamlı farklılık saptanmadı (p>0.05). Amniyotomi uygulanan gebelerin C/S ile doğum yapma yüzdesi (p=0.030) ve hastanede kalma süreleri (p=0.04) amniyotomi uygulanmayanlardan anlamlı olarak yüksekti. Puerperal dönemde morbidite/mortalite ve erken yenidoğan sonuçları arasında farklılık belirlenmedi.

Sonuç: Spontan başlayan doğum eyleminin yönetiminde amniyotomi eylem süresini kısaltmamaktadır; C/S oranında artış ve annenin hastanede daha uzun süre yatışına yol açtığından eğitim hastanelerinde rutin uygulanmamalıdır.

Anahtar sözcükler: Doğum eylemi süresi, amniyotomi prosedürü, sezaryen, doğumun ilk evresi, doğumun ikinci evresi.

Introduction

Amniotomy, which is considered to intensify and raise the frequency of uterine contractions by increasing the production and release of prostaglandins and oxytocins and therefore to shorten the labor duration, is the most common procedure in obstetric practice;[1–3] however, the literature contains controversial reports whether amniotomy during a spontaneous labor shortens the labor duration or not, and if it shortens, whether it improves maternal and fetal outcomes or not, or whether it causes maternal and/or procedure-related

Correspondence: Ayşegül Baylas Şahin, MD. Gynecology and Obstetrics Clinic, ZTB Women's Health Training and Research Hospital, Ankara, Turkey. e-mail: aysebaylas@yahoo.com

Received: December 15, 2016; **Accepted:** February 25, 2017

Please cite this article as: Baylas Şahin A, Yapar Eyi EG. The effects of amniotomy on labor duration, cesarean section rates, and maternal and fetal outcomes. Perinatal Journal 2017;25(1):19–25.

Available online at:
www.perinataljournal.com/20170251004
doi:10.2399/prn.17.0251004
QR (Quick Response) Code:

deomed

fetal complications or not.[3–6] The evidences showing that amniotomy shortens the labor duration or improves obstetric outcomes are not based on high quality meta-analyses, systematic reviews of randomized controlled studies, or randomized controlled studies with low bias risk. Therefore, asserting that the procedure provides absolute healthcare benefits and the benefits overweigh the risks is not possible since current data are not Grade A evidence.[7]

In our study, we aimed to investigate the effects of amniotomy on labor duration, labor, delivery, morbidity/mortality rates during puerperal period and premature newborn outcomes in pregnant women with low risk who admitted to Obstetrics Clinic of Zekai Tahir Burak Women's Health Training and Research Hospital and delivered at our hospital.

Methods

This prospective randomized controlled study was performed between August 2016 and November 2016 by obtaining approval of the Ethics Committee no. 7 for Clinical Researches (Decision No. 38/2016) of Zekai Tahir Burak Women's Health Training and Research Hospital.

Pregnant women who were hospitalized at Obstetrics Clinic, had no problem during their routine gestational follow-up visits, whose labors started spontaneously, on 36 6/7 weeks of gestation with singleton pregnancy and on vertex presentation, had intact amniotic membrane, no fetal malformation and maternal disease and who had currently no obstacle for normal vaginal delivery were included in the study. The pregnant women who had planned cesarean indication and were required to undergo emergency cesarean section were excluded from the study.

Biostatistical pre-assessment was carried out before selecting the population, and via PASS 11 (Power and Sample Size, version 11, for Windows), 220 individuals were selected with a population size of 80.12% testing power in total as a result of power analyses performed for t-test in the independent groups.

For the control and study groups, equal numbers of closed opaque envelopes were prepared which were 220 in total. Right after the pregnant women, who were determined according to the criteria, were admitted to the clinic, a simple randomization was conducted by letting pregnant women to choose an opaque envelope from the box. Pregnant women who were separated as amniotomy and non-amniotomy groups were admitted to the labor.

Vaginal examination was performed to the pregnant women included in the study with intervals not exceeding two hours. Contraction sufficiency was evaluated in the follow-ups. At least three regular contractions, being 200 units and more, within 10-minute period in 20 minutes were considered as sufficient contractions.[8,9] Pregnant women found to have insufficient contraction were administered 2 mlU/min oxytocin in accordance with low dose protocol regardless of their groups. The dose was increased regularly until sufficient contraction was obtained. The labor was followed up by the assistants of obstetrician and gynecologist under the management of obstetrician and gynecologist.

In both groups, the pregnant women were administered hyoscine-n-butylbromide in the dose of 20 mg/ml and pethidine in the dose of 100 mg/2 ml during labor. Medicated pregnant women were recorded. The durations (in minutes) from admission up to cervical dilation being 6 cm, from 6 cm up to full cervical dilation and full cervical dilation up to the moment when delivery was performed were recorded. Amniotomy contraindications were evaluated in the group to be performed amniotomy. The amniotomy was performed after confirming that there was no contraindication in the pregnant women who were selected for the amniotomy group as a result of vaginal examination, fetal heartbeat trace and ultrasonographic findings. The dilation for amniotomy procedure was determined as minimum 4 cm. Procedure time was recorded in pregnant women who underwent amniotomy.

Cesarean section indications of pregnant women who were decided to perform cesarean section in their follow-ups were evaluated.

Hemoglobin and hematocrit values before and after delivery were recorded for the assessment of postpartum hemorrhage. The decrease of 10 units in hematocrit value was considered to be postpartum hemorrhage. The patients who had postpartum hemorrhage and underwent transfusion were evaluated. Their intrapartum and postpartum fevers were monitored and postpartum hyperthermia was investigated. White blood cell values were screened in the hemogram results. Postpartum breastfeeding was investigated. In the newborn results, 1-minute and 5-minute Apgar scores, birth weight, pH levels of cord blood, hospitalization at newborn intense care unit, hospitalization indication and the duration (in hour) for hospitalization at newborn intense care unit were recorded. The hospitalization durations of pregnant women were also recorded in hours.

The Analysis and Statistics of the Data

The data of the study was evaluated in computer environment by uploading via SPSS (Statistical Package for Social Sciences) for Windows 22.0 (SPSS Inc, Chicago, IL, USA). The definitive statistics were presented as mean±standard deviation (minimum–maximum), frequency distribution and percentage. Pearson chi-square test and Fisher's exact test were used for the assessment of categorical variables. The concordance of variables to normal distribution was evaluated by using visual (histogram and probability graphics) and analytical methods (Kolmogorov-Smirnov/Shapiro-Wilk tests). It was found that all measurement variables were not concordant with normal distribution. As statistical method, Mann-Whitney U test was used for the statistically significance between two independent groups and Kruskal-Wallis test was used between three independent groups. When significant difference was found between three independent groups, post-hoc Bonferroni correction was performed to identify the reason of difference. $p<0.05$ was defined as statistically significant level.

Results

A total of 220 pregnant women were included in the study. While 110 (50%) of 220 pregnant women underwent amniotomy, it was not performed for the remaining 110 (50%) pregnant women. Mean age of the group was 26.54±5.98 (min: 15 – max: 46) years. The ages, BMI values, weeks of gestation and parity conditions of pregnant women who underwent and did not undergo amniotomy were presented in **Table 1**. No statistically significant difference was found between the groups ($p>0.05$). According to the examination at the time of admission, there was no statistical difference between amniotomy and no-amniotomy groups in terms of the cervical dilation, fetal heartbeat sample at follow-up (Category I, Category II), white blood cells, hemoglobin and hematocrit values, oxytocin administration, cervical dilation upon oxytocin administration, and application of hyoscine-n-butylbromide and pethidine (**Table 2**).

Table 1. The distribution of definitive characteristics in groups which underwent and did not undergo amniotomy.

	Amniotomy (-) (n=120)	Amniotomy (+) (n=118)	p*
	$\bar{x}$±S	$\bar{x}$±S	
Age (year)	26.84±6.56	26.44±5.36	0.581
BMI (kg/m²)	28.57±4.41	27.88±3.92	0.444
Parity			
Nulliparous	35 (31.8)	51 (46.4)	0.073†
Multiparous	75(68.2)	59 (53.7)	
Week of gestation	39.12±1.47	39.14±1.30	0.832

*Mann-Whitney U test; †Pearson chi-square test. $\bar{x}$: Mean; S: Standard deviation

Table 2. Delivery type and maternal parameters during and after delivery in groups which underwent and did not undergo amniotomy.

	Amniotomy (-) (n=110)	Amniotomy (+) (n=110)	p
Delivery type, n (%)			
C/S	2 (1.8)	9 (8.2)	**0.030***
Vaginal delivery	108 (98.2)	101 (91.8)	
C/S indication (n=11), n (%)			
Fetal distress	1 (50.0)	2 (22.2)	
Cord prolapse / presentation	0	2 (22.2)	-----
Other	1 (50.0)	5 (55.6)	
Postpartum hemorrhage			
No	109 (99.1)	105 (95.5)	0.212†
Yes	1 (0.9)	5 (4.5)	
Fetal weight	3.96±0.44	3.84±0.50	0.058‡
Placental weight (g), $\bar{x}$±S	544.1±68.8	542.1±66.0	0.854‡
Elevated white blood cell count, n (%)			
No	109 (99.1)	107 (97.3)	0.622†
Yes	1 (0.9)	3 (2.7)	
Decreased hemoglobin, n (%)			
No	108 (98.2)	103 (93.6)	0.171†
Yes	2 (1.8)	7 (6.4)	
Maternal hospitalization duration (hour), ±S	28.84±16.57	33.39±21.20	**0.037‡**

*Pearson chi-square test; †Fisher's exact test; ‡Mann-Whitney U test. $\bar{x}$: Mean; S: Standard deviation

Table 3. The distribution of clinical characteristics of pregnant women in groups which underwent and did not undergo amniotomy.

	Amniotomy (-) (n=110)	Amniotomy (+) (n=110)	p
Cervical dilation at the time of admission (cm), $\bar{X}$±S	4.61±1.51	4.47±1.47	0.478*
<4 cm, n (%)	32 (29.1)	37 (33.6)	0.712†
4–<6 cm, n (%)	50 (45.5)	49 (44.5)	
≥6 cm, n (%)	28 (25.5)	24 (21.8)	
Contraction at the time of admission, n (%)			
Insufficient	9 (8.2)	25 (22.7)	**0.003**†
Sufficient	101 (91.8)	85 (77.3)	
Cardiotocography, n (%)			
Category I	106 (96.4)	105 (95.5)	1.000‡
Category II	4 (3.6)	5 (4.5)	
White blood cell (/mm³), $\bar{X}$±S	11670.0±2995.9	11537.4±2857.9	0.468*
Hemoglobin (g/dL), $\bar{X}$±S	11.98±1.28	11.79±1.25	0.239*
Hematocrit (%), $\bar{X}$±S	36.65±3.66	36.10±3.44	0.338*
Oxytocin administration, n (%)			
Not administered	71 (64.5)	61 (55.5)	0.169†
Administered	39 (35.5)	49 (44.5)	
Cervical dilation when oxytocin was administered (cm) (n=88), $\bar{X}$±S	4.96±0.99	4.60±0.95	0.082*
Hyoscine-n-butylbromide administration, n (%)			
Not administered	50 (45.5)	43 (39.1)	0.339†
Administered	60 (54.5)	67 (60.9)	
Pethidine administration, n (%)			
Not administered	108 (98.2)	108 (98.2)	1.000†
Administered	2 (1.8)	2 (1.8)	
Epidural anesthesia, n (%)			
Applied	1 (0.9)	0	------
Not applied	109 (99.1)	110 (100)	

*Mann-Whitney U test; †Pearson chi-square test; ‡Fisher's exact test. $\bar{X}$: Mean; S: Standard deviation

The labor durations of both groups are shown in the **Table 3**. Between the two groups, the duration elapsed until cervical dilation is 6 cm (p=0.15), the duration elapsed until cervix reaches full dilation from 6 cm (p=0.80), the duration elapsed from full dilation up to delivery (p=0.55) and total labor duration (p=0.13) did not demonstrate any statistical difference.

When the distribution of delivery-related characteristics (**Table 4**) is evaluated between two groups, the delivery type demonstrated statistical difference (p=0.03). The number of cesarean section procedure (9 C/Ss) in the amniotomy group was significantly higher than those (2 C/Ss) who did not undergo amniotomy. While C/S indications were cord presentation (2), fetal distress (2) and non-progressive labor (5) in the amniotomy group, they were fetal distress (1) and abruptio placentae (1) in those who did not undergo amniotomy. Between two groups, no statistically significant difference was found in terms of birth weights of newborns, Apgar scores, pH levels of cord blood gas and the need for newborn intense care (p>0.05) (**Table 5**). While no difference was found between the groups in terms of placental weight, reduced hemoglobin, postpartum hemorrhage, elevated white blood cell count and breastfeeding status, the maternal hospitalization duration was longer in the amniotomy group (p=0.04).

Table 4. The distribution of labor durations in groups which underwent and did not undergo amniotomy.

	Amniotomy (-)		Amniotomy (+)		p*
	n	Median (min–max)	n	Median (min–max)	
The period elapsed until cervical dilation is 6 cm (minute)	81	112 (12–1033)	82	172.5 (10–1380)	0.157
The period elapsed until cervical dilation reaches 10 cm from 6 cm (minute)	108	90 (5–430)	101	90 (5–480)	0.803
The period elapsed until delivery from cervical dilation being 10 cm (minute)	108	15 (3–55)	101	20 (3–55)	0.055
Total duration (minute)	109	189 (10–1238)	105	220 (10–1785)	0.134

*Mann-Whitney U test.

Discussion

O'Driscoll et al. used amniotomy within the active management of labor in order to ensure controlled and fast labor and to assist both labor induction and labor;[10] however, the literature is controversial on the acceleration of labor by amniotomy. There are publications asserting that amniotomy shortens the first stage of labor while others report that amniotomy does not make a difference.[3,11,12] It also could not be shown that labor acceleration or the detection of meconium in the amnion by amniotomy improves fetal/maternal outcomes based on evidence.[3] In the meta-analysis of 5583 cases without any parity discrepancy which included 15 studies and published in 2013 by Cochrane Collaboration, the labor durations were evaluated in groups which underwent and did not undergo amniotomy, and it was reported in the results for the first stages of 1127 women that 20.43 minutes of reduction in the amniotomy group did not demonstrate statistically significant difference. In our study, we found 60.5 minutes of extension in the first stage of labor in the amniotomy group, but there was no statistically significant difference. In 1993, Garite et al. compared 235 pregnant women who underwent amniotomy at 5.5 cm with 224 pregnant women who were followed up without any amniotomy procedure until 8 cm to investigate the effects of elective amniotomy on fetal heartbeat, and they reported that elective amniotomy shortened active phase and decreased oxytocin need.[13]

The meta-analysis series of Cochrane Collaboration in 2013 on eight studies to evaluate the second stage of labor found 1.33 minutes of difference in a total of 1927 women in the amniotomy group, 5.43 minutes of difference in primiparous cases in the sub-group analysis, and 1.19 minutes of difference in multiparous cases; but it was reported that the results did not demonstrate any statistical significance.[3]

In 1992, Barret et al. assessed pregnant women who underwent amniotomy and had intact amniotic membrane until the second stage of labor and they reported that there was no difference during the second stage.[14] In another meta-analysis of Cochrane Collaboration published in 2001, a total of 2566 pregnant women were evaluated who underwent amniotomy for labor induction as well as oxytocin infusion. Pregnant women who underwent only amniotomy, those who underwent amniotomy together with oxytocin infusion, and those who received only prostaglandin were compared to placebo. When the group which underwent amniotomy only was compared to the group which underwent amniotomy together with oxytocin infusion, it was shown that labor durations were shorter in the amniotomy + oxytocin group than the group which underwent amniotomy only. Postpartum hemorrhage was higher in the amniotomy + oxytocin group than the placebo group.[15] In our study, we evaluated the pregnant women in terms of the sufficiency of contractions, and we tried to establish contraction homogeneity by administering oxytocin due to the difference between the groups. While there were insufficient contractions in 9 pregnant women who did not undergo amniotomy, we provided oxytocin support to a total of 39 pregnant women in their follow-ups and obtained sufficient contractions; in the amniotomy group, a total of 25 pregnant women had insufficient contractions at the time of admission, and we obtained sufficient contractions in 49 pregnant women by oxytocin support in their follow-ups. There was no statistically significant difference between the groups after the procedure.

Table 5. The distribution of newborn characteristics in groups which underwent and did not undergo amniotomy.

	Amniotomy (-) (n=110)	Amniotomy (+) (n=110)	p
Birth weight of baby (g), $\bar{X}$±S	3264.9±383.1	3278.7±342.0	0.687*
Apgar score, n (%)			
8–10	100 (90,9)	100 (90.9)	1.000*
7–9	9 (8.2)	9 (8.2)	
6–8	1 (0.9)	1 (0.9)	
pH, $\bar{X}$±S	7.37±0.06	7.36±0.06	0.652†
Need for newborn intensive care, n (%)			
No	106 (96.4)	109 (99.1)	0.369‡
Yes	4 (3.6)	1 (0.9)	
Hospitalization duration in newborn intensive care unit (hour) (n=5), $\bar{X}$±S	24.00±10.95	3	-----

*Pearson chi-square test; †Mann-Whitney U test; ‡Fisher's exact test. $\bar{X}$: Mean; S: Standard deviation

In the meta-analysis of Cochrane Collaboration performed in 2013, the data of 5021 pregnant women related with their delivery types were evaluated and it was shown that C/S risk increased in the amniotomy group but the results were not significant.[12] In our study, we performed cesarean section to 9 cases in the amniotomy group and 2 cases in the group which did not undergo amniotomy. While C/S rate demonstrated statistically significant increase in the amniotomy group, there was no statistical difference in terms of C/S indications. Goffinet et al. assessed the adverse effects of premature amniotomy on fetal heartbeat in their studies in 1997 and they compared the group which underwent early amniotomy with the group which had intact membranes. They found severe variable decelerations and late decelerations in the amniotomy group more frequently, but there was no significant difference in newborn outcomes. They did not find any difference between C/S rates of both groups; they observed that the number of fetal distress as C/S indication was higher in the amniotomy group.[14] In 1995, Mercer et al. investigated the effects of premature amniotomy which was performed for labor induction, and they performed premature amniotomy to 106 pregnant women and late amniotomy (after 5 cm) to 103 pregnant women. While they found more cord compression findings in the early amniotomy, they did not identify any difference between premature newborn outcomes.[16] In another study where Gabbe et al. investigated the relationship between amniotomy and cord compression in 1975, the authors emphasized that amniotic fluid has a protective significance for normal cord blood flow.[17] In our study, we observed Category II fetal electrocardiotocography more frequently in the amniotomy group, but the difference was not statistically significant.

While 4 out of 5 cases with postpartum hemorrhage diagnosis were in the amniotomy group in our study, lack of significant result related with postpartum hemorrhage between the groups is in agreement with the literature.[18] A total of two patients underwent transfusion due to postpartum hemorrhage. In consideration of other maternal outcomes, there was no significant difference between the groups in terms of postpartum infection, maternal morbidity and mortality. The groups also did not have any difference in terms of postpartum breastfeeding. The results are concordant with the literature.

In terms of fetal outcomes, there was no significant difference in terms of pH levels of newborn cord blood gas, Apgar scores, need for newborn intense care unit, indication for hospitalization at newborn intense care unit and hospitalization durations, and these results are in agreement with the literature.[3,11,12]

In terms of maternal postpartum hospitalization duration, we found that the duration was extended for 9 pregnant women in the amniotomy group due to C/S, and mean hospitalization duration after C/S procedure was 53 hours. While the hospitalization duration for the amniotomy group was 28.84 hours, it was 33.9 hours for the group which did not undergo amniotomy.

In the meta-analysis conducted by Consortium on Safe Labor in 2010, 62,415 women from 19 hospitals were evaluated and it was seen that cervical dilation was accelerated after 6 cm in both multiparous and nulliparous pregnant women.[19] According to Zhang et al., the labor duration between 4 and 6 cm is longer than the previous definitions. The cesarean sections to be performed with the diagnosis of non-progressive labor may decrease by the new labor curve created by Zhang et al.[20] After the dilation reaches 6 cm, the labor rapidly proceeds as defined by Zhang et al. The duration between 6 and 10 cm accelerates independent from amniotomy.[20] Our study also supports the labor duration independent from amniotomy.

Conclusion

In the standard management of labor beginning spontaneously, amniotomy should not be recommended due to the lack of difference in the duration of labor stages between the groups which undergo and do not undergo amniotomy, increasing rates of C/S and extension of hospitalization duration in the amniotomy group according to the comparison. The results should be confirmed with multi-centered, prospective, randomized series including many cases and minimizing bias possibility which classify according to the number of parity and separate pregnant women into groups in which labor is assisted and not assisted pharmacologically, categorize the severity and frequency of uterine contractions according to cervical dilation and effacement, and evaluate newborn complications and especially infections in detail.

Conflicts of Interest: No conflicts declared.

References

1. Busowski JD, Parsons MT. Amniotomy to induce labor. Clin Obstet Gynecol 1995;38:246–58.
2. Mitchell MD, Fint APF, Bibby J, Brunt J, Arnold JM, Anderson ABM, Turnbull AC. Rapid increases in plasma prostaglandin concentrations after vaginal examination and amniotomy. Br Med J 1977;2:1183–5.
3. Smyth RM, Markham C, Dowswell T. Amniotomy for shortening spontaneous labour. Cochrane Database Syst Rev 2013;(6):CD006167.
4. Brown HC, Paranjothy S, Dowswell T, Thomas J. Package of care for active management in labor for reducing caesarean section rates in low low risk women. Cochrane Database Syst Rev 2013;(9):CD004907.
5. Dunn PM. Dr Thomas Denman of London (1733–1815): rupture of the membranes and management of the cord. Arch Dis Child 1992;67(7 Spec No):882–4.
6. Kennedy J, Stewart P, Barlow DH, Hilan E, Calder AA. Induction of labour: a comparison of a single prostaglandin E2 vaginal tablet with amniotomy and intravenous oxytocin. Br J Obstet Gynaecol 1982;89:704–7.
7. Nasser M, Meerpohl J, Post PN, Kunz R, Brozek J, Vist G, et al. Grade guidelines: 14. Going from evidence to recommendations: the significance and presentation of recommendations. J Clin Epidemiol 2013;66:719–25.
8. Eran Hadar E, Biron-Shental T, Gavish O, Raban O Yogev Y. A comparison between electrical uterine monitor, tocodynamometer and intra uterine pressure catheter for uterine activity in labor of labour. J Matern Fetal Neonatal Med 2015; 28:1367–74.
9. Bakker JH, Verhoeven CJ, Janssen PF, van Lith JM, van Oudgaarden ED, Bloemenkamp KW, et al. Outcomes after internal versus external tocodynamometry for monitoring labor. N Engl J Med 2010;362:306–13.
10. O'Driscoll K, Jackson RJ, Gallagher JT. Active management of labor and cephalopelvic disproportion. J Obstet Gynaecol Br Commonw 1970;77:385–9.
11. Li N, Wang Y, Zhou H. Effects of routine early amniotomy on labor and health status of foetus and neonate: a meta-analysis. [Article in Chinese] Zhonghua Fu Chan Ke Za Zhi 2006;41: 16–9.
12. Wei, S., Wo BL, Qi HP, Xu H, Luo ZC, Roy C, Fraser WD. Early amniotomy and early oxytocin for prevention of or therapy for, delay in first stage spontaneous labour compared with routine care. Cochrane Database Syst Rev 2013;(8):CD006794.
13. Garite TJ, Porto M, Carlson NJ, Rumney PJ, Reimbold PA. The influence of elective amniotomy on fetal heart rate patterns and the course of labor in term patients: a randomized study. Am J Obstet Gynecol 1993;168:1827–32.
14. Barrett JF, Savage J, Philips K, Lilford RJ. Randomized trial of amniotomy in labour versus the intention to leave membranes intact until the second stage. Br J Obstet Gynaecol 1992;99: 5–9.
15. Howarth G, Botha DJ, Amniotomy plus intravenous oxytocin for induction of labour. Cochrane Database Syst Rev 2001;(3): CD003250.
16. Goffinet F, Fraser W, Marcoux S, Bréart G, Moutquin JM, Daris M. Early amniotomy increases the frequency of fetal heart rate abnormalities. Amniotomy Study Group. Br J Obstet Gynaecol 1997;104:548–53.
17. Gabbe SG, Ettinger BB, Freeman RK, Martin CB. Umbilical cord compression associated with amniotomy: laboratory observations. Am J Obstet Gynecol 1976;126:353–5.
18. Magann EF, Evans S, Chauhan SP, Lanneau G, Fisk AD, Morrison JC. The length of the third stage of labor and the risk of postpartum hemorrhage. Obstet Gynecol 2005;105:290–3.
19. Eunice Kennedy Shriever National Institute of Child Health and Human Development (NICHD). Consortium on safe labor (CSL) [Internet]. Rockville, MD: NICHD; 2013. Available from: https://www.nichd.nih.gov/about/org/diphr/eb/research/Pages/safe-labor.aspx
20. Zhang J, Troendle J, Mikolajczyk R, Sundaram R, Beaver J, Fraser W. The natural history of the normal first stage of labor. Obstet Gynecol 2010;115:705–10.

PERINATAL JOURNAL

Original Article

Perinatal Journal 2017;25(1):26–31

Assessment of health-promoting lifestyle habits in normal and high-risk pregnancies

Yasemin Erkal Aksoy[1], Esin Çeber Turfan[2], Sema Dereli Yılmaz[1]

[1]*Midwifery Department, Faculty of Health Sciences, Selçuk University, Konya, Turkey*
[2]*Midwifery Department, Faculty of Health Sciences, Ege University, İzmir, Turkey*

Abstract

Objective: We planned this study in descriptive type in order to assess health-promoting lifestyle habits in normal and high-risk pregnancies.

Methods: The population of the study consisted of all pregnant women who were receiving service at the clinic of high-risk and normal pregnancies of Konya Maternity Ward, Turkey. The size of population was calculated by power analysis as 71 individuals per group (total n=142). In order to prevent data losses, a total of 145 pregnant women were contacted. Pregnant women who volunteered to participate in the study, older than 18-year-old, who had no mental disorder and primary school graduate at least were included in the study. The data of the study was collected by sociodemographic questionnaire and Health Promoting Lifestyle Profile (HPLP) scale.

Results: The mean of total HPLP score was 117.27±24.24 in normal pregnant women, and 123.62±25.44 in high-risk pregnant women. There was no significant difference between normal and high-risk pregnancies in terms of total HPLP scores. However, there was a significant difference between two groups in terms of health responsibility (p=0.047), exercise (p=0.031) and stress management (p=0.039) subscales.

Conclusion: In this study, we evaluated the health-promoting lifestyle habits of pregnant women and the factors affecting these habits. According to the results of the study, the development of risk conditions or their pre-existence during pregnancy makes a difference in the levels of health-promoting lifestyle habits and affects them negatively.

Keywords: High-risk pregnancy, normal pregnancy, health-promoting lifestyle habit.

Özet: Normal ve riskli gebeliklerde sağlıklı yaşam biçimi davranışlarının değerlendirilmesi

Amaç: Bu araştırma, normal ve riskli gebeliklerde sağlıklı yaşam biçimi davranışlarının değerlendirilmesi amacıyla tanımlayıcı tipte planlanmıştır.

Yöntem: Araştırmanın evrenini Konya doğumevinde yüksek riskli gebelik ve normal gebelik polikliniğinde hizmet alan tüm gebe kadınlar oluşturmakta idi. Örneklem büyüklüğü power analizi ile her grup için 71 kişi olarak hesaplandı (toplam n=142). Veri kayıplarını önlemek amacıyla toplamda 145 gebe kadına ulaşıldı. Araştırmaya gönüllü olarak katılmayı kabul eden, 18 yaşından büyük, psikolojik bir rahatsızlığı olmayan, en az ilkokul mezunu olan gebeler alındı. Araştırmada sosyodemografik soru formu ve Sağlıklı Yaşam Biçimi Davranışları (*Health Promoting Lifestyle Profile*, HPLP) ölçeği ile veriler toplandı.

Bulgular: Gebelerin HPLP toplam puan ortalaması normal gebelerde 117.27±24.24, riskli gebelerde ise 123.62±25.44 olarak hesaplandı. Normal ve riskli gebeliklerin HPLP toplam puanları arasında anlamlı fark bulunmadı. Ancak ölçeğin alt boyutlarından sağlık sorumluluğu (p=0.047), egzersiz (p=0.031) ve stres yönetiminde (p=0.039) normal ve riskli gebeler arasında anlamlı fark bulundu.

Sonuç: Bu çalışmada gebelerin sağlıklı yaşam biçimi davranışları ve etkileyen faktörler incelenmiştir. Çalışmanın sonucuna göre gebelikte riskli durumların ortaya çıkması ya da önceden var olması gebelerin sağlıklı yaşam biçimi davranış düzeylerinde farklılık ortaya çıkarmakta ve olumsuz etkilemektedir.

Anahtar sözcükler: Riskli gebelik, normal gebelik, sağlıklı yaşam biçimi davranışı.

Introduction

Pregnancy and labor are physiological processes. However, they also can be the processes full of anxiety and concerns. Physiological changes during pregnancy may narrow down the line between health and illness. Therefore, each pregnancy poses a potential risk.[1] Human body undergoes significant physiological, anatomic and biochemical changes starting with the fer-

Correspondence: Yasemin Erkal Aksoy, MD. Midwifery Department, Faculty of Health Sciences, Selçuk University, Konya, Turkey. e-mail: ebeyaseminerkal@hotmail.com

Received: February 20, 2017; **Accepted:** March 18, 2017

Please cite this article as: Erkal Aksoy Y, Çeber Turfan E, Dereli Yılmaz S. Assessment of health-promoting lifestyle habits in normal and high-risk pregnancies. Perinatal Journal 2017;25(1):26–31.

Available online at:
www.perinataljournal.com/20170251006
doi:10.2399/prn.17.0251006
QR (Quick Response) Code:

deomed

tilization in order to adapt to the pregnancy.[2] A woman with the high-risk pregnancy has physical, emotional and social problems. The physiological problems which pose a risk for pregnancy can be pre-existing issues before the pregnancy (such as heart disease, diabetes, hypertension) as well as problems directly developing during pregnancy (such as preeclampsia, eclampsia, hemorrhage, hypertension).[3] All pregnancies should be evaluated in terms of current and potential risk factors. Some women have particular risk factors even in the beginning of pregnancy such as diabetes or preterm labor history, which include them into the high-risk category. In other women who do not have any current risk factors, pregnancy starts normally and then risk factors such as rupture of membrane or pregnancy-induced hypertension may develop later.[4]

Health promotion is defined as the process of enabling individuals to increase control over, and to improve their health. It is fundamental to resort health-promoting habits to protect oneself from diseases, establish early diagnosis and maintain health.[5,6] According to Pender, health-promoting lifestyle habits are spiritual growth, health responsibility, exercise, nutrition, interpersonal relations and stress management.[7] The development of health-promoting lifestyle habits of pregnant women may vary according to the risk condition. We planned this study in descriptive type in order to assess health-promoting lifestyle habits in normal and high-risk pregnancies.

Methods

The population of the study consisted of all normal and high-risk pregnant women who were receiving service at the High-Risk Pregnancy Service and Pregnancy Polyclinic at Konya Maternity Ward, Turkey between January 1, 2016 and May 31, 2016. The size of the population was calculated as 71 individuals per group (total n=142) via G*Power 3.0.10 as determining the known score (121.31±21.02) with 80% power within 10-point deviation.[8] In order to prevent data losses, a total of 145 pregnant women were contacted. The data was collected by researchers via face-to-face interview method. Pregnant women who volunteered to participate in the study, older than 18-year-old, who had no mental disorder and primary school graduate at least were included in the study. The data was collected through sociodemographic questionnaire and the scale of Health-Promoting Lifestyle Profile.

The "Sociodemographic Questionnaire" consisting of 23 questions was created by the researchers through literature review to evaluate the sociodemographic characteristics of individuals.

The scale of Health Promoting Lifestyle Profile (HPLP) was developed by Walker, Sechreist and Pender in 1987 to evaluate the health-promoting habits of individuals associated with a healthy lifestyle.[9] The rating of the scale is 4-point Likert. The responses of the scales are "never" (1), "sometimes" (2), "often" (3) and "routinely" (4). The lowest score is 48 and the highest score is 192 for the entire scale. The overall score of the scale provides the score of HPLP. The alpha value of the scale, which was used by Esin (1997) in Turkey with its first version including the 48 items and evaluated for validity and reliability, was 0.91. The scale has self-actualization dimension in "Items 3, 8, 9, 12, 16, 17, 21, 23, 29, 34, 37, 44, 48", health responsibility dimension in "Items 2, 7, 15, 20, 28, 32, 33, 42, 43, 46", exercise dimension in "Items 4, 13, 22, 30, 38", nutrition dimension in "Items 1, 5, 14, 19, 26, 35", interpersonal support dimension in "Items 10, 18, 24, 25, 31, 39, 47", and stress management dimension in "Items 6, 11, 27, 36, 40, 41, 45".[10] In our study, we used the first version of HPLP scale consisting of 48 items which were validated for reliability by Esin.

Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA) was used for the statistical analysis. The data obtained in the study was presented as figure, percentage, arithmetic mean and standard deviation. After normality analyses performed on the data, t-test and one-way analysis of variance (ANOVA) tests were applied in the independent groups, and $p<0.05$ was considered significant.

Results

When the descriptive characteristics of the pregnant women (n=145) included in the study were analyzed, the current age of pregnant women was found 26.11±5.47 years. Of the pregnant women, the age of first marriage was 20.85±2.92 years and the age of first delivery was 22.63±3.33 years. While 49.7% of pregnant women were secondary school graduate, 84.8% of them had no job ever, 69.7% of them were living in city and 84.8% of them had health insurance. The week of gestation was 33.73±6.38. Monthly income in the family of 77.9% of the pregnant women was at medium level (incomes and expenses were equal). While 15.9% of pregnant women

Table 1. The descriptive characteristics of the pregnant women and the distribution of their mean HPLP scores.

Characteristics	n	%	Mean±SD	Statistical analysis
Educational status				
Primary school	13	9.0	113.92±31.89	F=2.897
Secondary school	72	49.7	116.78±25.07	p=0.058
Higher education	60	41.4	126.22±22.31	
Financial status				
Income lower than expenses (low)	22	15.2	105.09±25.24	**F=11.531**
Income equal to expenses (medium)	113	77.9	121.02±23.52	**p=0.000**
Income higher than expenses (high)	10	6.9	147.50±14.30	
Consanguineous marriage				
Yes	23	15.9	112.48±25.77	t=-1.675
No	122	84.1	121.93±24.63	p=0.096
Social security				
N/A	22	15.2	108.32±23.59	**F=4.905**
SSI (SGK)	115	79.3	121.53±24.34	**p=0.009**
Private insurance	8	5.5	137.88±25.96	

had consanguineous marriage, the husbands of 56.6% of pregnant women helped them for chores during pregnancy. When there was a problem associated with pregnancy, 58.6% of the pregnant women consulted healthcare professionals. The descriptive characteristics of the pregnant women and the distribution of their mean HPLP scores are presented in **Table 1**. There was a significant difference between mean HPLP scores of the pregnant women and their financial and social security conditions ($p<0.05$). There was no significant difference between other descriptive characteristics and HPLP scores ($p>0.05$).

The gestational characteristics of the pregnant women and their distribution according to mean HPLP scores are presented in **Table 2**. Of the pregnant women, 15.2% had a chronic disease. While 51% of them were on their first pregnancy (primiparous), 89% of them planned their pregnancy, and 20% of them had the history of miscarriage/abortion. Of the multiparous preg-

Table 2. The gestational characteristics of the pregnant women and the distribution of their mean HPLP scores.

Gestational characteristics	n	%	Mean±SD	Statistical analysis
Gravida				
First pregnancy	74	51.0	127.64±23.04	**t=3.702**
Two and more	71	49.0	112.92±24.82	**p=0.000**
Planned pregnancy				
Yes	129	89.0	122.07±24.54	**t=2.281**
No	16	11.0	107.19±25.17	**p=0.024**
Week of gestation				
28 and below	25	17.2	118.92±30.19	t=-0.284
29 and above	120	82.8	120.74±23.87	p=0.779
Presence of the history of miscarriage/abortion				
Yes	29	20.0	109.31±20.43	**t=-2.741**
No	116	80.0	123.21±25.29	**p=0.007**
Presence of chronic disease				
Yes	22	15.2	123.09±21.93	t=0.542
No	123	84.8	119.95±25.52	p=0.589

Table 3. The distribution of mean HPLP and subscale scores of the pregnant women.

	Mean±SD	Min–Max	Mean scores to be taken from the scale	
			The lowest	The highest
Total HPLP score	120.42±24.96	60–180	48	192
Self actualization	33.56±7.05	17–50	13	52
Health responsibility	24.08±6.70	11–38	10	40
Exercise	10.25±3.68	5–19	5	20
Nutrition	16.08±3.34	7–24	6	24
Interpersonal support	19.04±3.74	9–28	7	28
Stress management	17.39±4.40	7–28	7	28

nant women (49.0%), 37.9% had normal delivery and 13.1% underwent cesarean section. A significant difference was found between gravida, planned pregnancy, history of miscarriage/abortion and HPLP scores ($p<0.05$).

HPLP scores and mean subscale scores of the pregnant women are presented in **Table 3**. Mean total HPLP score was calculated 120.42±24.96 (min=60, max=180). Considering the mean scores of HPLP subscales, it was found that "Self Actualization" subscale had the highest mean score (33.56±7.05) while "Exercise" subscale had the lowest mean score (10.25±3.68). While 50.3% (n=73) of the cases had normal pregnancy women, 49.7% (n=72) of them hospitalized in the clinic with the diagnosis of high-risk pregnancy.

Table 4 presents the diagnoses of pregnant women who were hospitalized at high-risk pregnancy clinic. In terms of the hospitalization at high-risk pregnancy clinic, 33.3% of the pregnant women were diagnosed with threat of premature birth, 12.5% of them with hemorrhage, 11.1% of them with premature rupture of membrane, 6.9% of them with oligohydramnios, 5.6% of them with preeclampsia, and 30.6% of them with other reasons (ablatio placentae, placenta previa, polyhydramnios, multiple pregnancy, imminent abortion, infection, fetal distress, hyperemesis gravidarum, hypertension, upper respiratory tract infection etc.).

Mean scores of HPLP and subscales of normal and high-risk pregnant women are compared in **Table 5**.

Table 4. Distribution of high-risk pregnant women according to their risk conditions.

High-risk pregnancy diagnosis	n	%
Hemorrhage	9	12.5
Threat of premature birth	24	33.3
Premature rupture of membrane	8	11.1
Preeclampsia	4	5.6
Oligohydramnios	5	6.9
Other reasons*	22	30.6
Total	72	100

*Ablatio placentae, placenta previa, polyhydramnios, multiple pregnancy, imminent abortion, infection, fetal distress, hyperemesis gravidarum, hypertension, upper respiratory tract infection etc.

Table 5. Comparison of HPLP and subscales of normal and high-risk pregnant women.

	Normal pregnancy	High-risk pregnancy		
	Mean±SD	Mean±SD	t	p
Total HPLP score	117.27±24.24	123.62±25.44	-1.539	0.126
Self actualization	33.28±6.74	33.84±7.39	-0.476	0.635
Health responsibility	22.98±6.83	25.19±6.43	-2.003	**0.047**
Exercise	9.60±3.53	10.91±3.73	-2.174	**0.031**
Nutrition	15.80±3.20	16.36±3.46	-0.996	0.321
Interpersonal support	18.94±3.80	19.15±3.70	-0.333	0.740
Stress management	16.64±4.22	18.15±4.49	-2.085	**0.039**

Although there was no significant difference between normal and high-risk pregnancies in terms of total HPLP scores, a significant difference was found between the groups in terms of health responsibility, exercise and stress management subscales ($p<0.05$).

Discussion

In our study, we found that the mean age of pregnant women was 26.11±5.47 years, 49.7% of them were secondary school graduate, 84.8% of them had no job ever, and 69.7% of them were living in city. Monthly income in the family of 77.9% of the pregnant women was at medium level (incomes and expenses were equal). Saydam et al. found in their study that mean age of pregnant women was 29.54±6.26 years, 49.6% of them were primary school graduate/secondary school dropout, 84.9% of them had no job ever, 64.8% of them were living in metropolis/city, and income-expense levels of 72.3% of them were "equal".[8] The week of gestation was 33.73±6.38. Of the pregnant women, 15.9% had consanguineous marriage. Our results show similarity with the studies in the literature.[8,11] In our study, there is a significant difference between mean HPLP scores of the pregnant women and their financial and social security conditions. There is no significant difference between other descriptive characteristics and HPLP scores. Onat and Aba found difference in their study between HPLP scores and financial conditions of pregnant women. We found a significant difference in our study between gravida, planned pregnancy, history of miscarriage/abortion and HPLP scores. Unlike our study, Onat and Aba did not find a difference in their study between HPLP score and pregnancy being planned.[11] The mean total HPLP score of the pregnant women was 120.42±24.96 (min=60, max=180). Considering the mean scores of HPLP subscales, we found that "self actualization" subscale had the highest mean score (33.56±7.05) while "exercise" subscale had the lowest mean score (10.25±3.68). The mean scores of HPLP and subscales in this study show similarity with the literature.[8,10–14]

We found significant difference in our study between normal and high-risk pregnant women in terms of health responsibility, exercise and stress management, which are the subscales of HPLP. In case of any risk condition, it is possible that the pregnant women receive care service from healthcare professionals, that there may be physical restrictions and that they may have difficulties to deal with their condition etc. We found statistically significant difference in HPLP subscales of normal and high-risk pregnant women; however, there are no great differences among the mean scores. Therefore, we believe that it is necessary to evaluate health-promoting lifestyle habits of all pregnant women identified.

Conclusion

In this study, we evaluated the health-promoting lifestyle habits of pregnant women and the factors affecting these habits. There was no significant difference between normal and high-risk pregnancies in terms of total HPLP scores in our study. However, we found significant difference between the groups in terms of health responsibility, exercise and stress management subscales. Healthcare professionals have prominent roles to encourage pregnant women for health-promoting habits. Pregnant women should be evaluated comprehensively during antenatal care, and wrong habits should be identified. Through training programs or consultancy, pregnant women and their spouses should be encouraged for health-promoting habits. There are many studies on this topic among the general population; however, there are a limited number of studies focusing on pregnancy. The number of studies carried out on pregnant women should be increased. The results of this study can be used as a reference for antenatal care, healthcare professionals and maternal/neonatal health policies.

Conflicts of Interest: No conflicts declared.

References

1. World Health Organization. Managing complications in pregnancy and childbirth: a guide for midwives and doctors. Geneva: WHO Department of Reproductive Health and Research; 2003.
2. Erdem M. Normal gebelikteki fizyolojik değişiklikler. In: Yamaç K, Gürsoy R, Çakır N, editors. Gebelik ve sistemik hastalıklar. Ankara: Medikal & Nobel Kitabevi; 2002. p. 1–11.
3. Taşkın L. Doğum ve kadın sağlığı hemşireliği. 10th ed. Ankara: Akademisyen Kitabevi; 2011. p. 227–73.
4. Qeenan JT, Hobbins JC, Spong CY. Yüksek riskli gebeliklerde tanı ve tedavi protokolleri. In: Güner H, editor. 4th ed. Ankara: Atlas Kitapçılık; 2007. p. 3–8.
5. Grace SL, Williams A, Stewart DE, Franche RL. Health-promoting behaviors through pregnancy, maternity leave, and

return to work: Effects of role spillover and other correlates. Women Health 2006;43:51–72.

6. Ay FA. Mesleki temel kavramlar. In: Ay FA, editor. Sağlık uygulamalarında temel kavramlar ve beceriler. İstanbul: Nobel Tıp Kitabevleri; 2013. p. 15.
7. Pender NJ, Barkauskas VH, Hayman L, Rice VH, Anderson ET. Health promotion and disease prevention: toward excellence in nursing practice and education. Nurs Outlook 1992;40:106–12.
8. Saydam BK, Bozkurt BÖ, Hadımlı AP, Can HÖ, Soğukpınar N. Evaluation of the effects of self care agency on health promoting lifestyle profile in pregnants at high risk. Perinatal Journal 2007;15:131–9.
9. Walker SN, Sechirst KR, Pender NJ. The Health-Promoting Lifestyle Profile: development and psychometric characteristics. Nurs Res 1987;36:76–81.
10. Esin N. Sağlıklı yaşam biçimi davranışları ölçeğinin Türkçeye uyarlanması. Hemşirelik Bülteni 1999;12(45):87–95.
11. Onat G, Aba YA. Health-promoting lifestyles and related factors among pregnant women. Turkish Journal of Public Health 2014;12:69–79.
12. Altıparmak S, Kutlu A. The healthy lifestyle behaviors of 15–49 age group women and affecting factors. TAF Preventive Medicine Bulletin 2009;8:421–6.
13. Yadollahi P, Davazdahemami S, Bromandfar K, Fathizadeh N. The relationship between life style and individual reproductive characteristics of pregnant woman. Iran J Nurs Midwifery Res 2007;12:75–9.
14. Kavlak O, Atan SU, Şirin A, Şen E, Güneri SE, Dağ HY. Pregnant Turkish women with low income: their anxiety, health-promoting lifestyles, and related factors. Int J Nurs Pract 2013;19:507–15.

PERINATAL JOURNAL

Original Article

Perinatal Journal 2017;25(1):32–37

A new marker for the prediction of mean platelet volume, placenta previa and placental invasion anomalies

Oya Soylu Karapınar, İlay Gözükara, Ali Ulvi Hakverdi, Arif Güngören

Department of Obstetrics and Gynecology, Tayfur Ata Sökmen Faculty of Medicine, Mustafa Kemal University, Hatay, Turkey

Abstract

Objective: The aim of this study is to evaluate the relationship between some parameters of complete blood count and placenta previa and placental invasion anomalies.

Methods: In this study, 70 cases with placenta previa and 70 control cases who admitted to the Department of Obstetrics and Gynecology of Mustafa Kemal University between September 2015 and December 2016 were reviewed retrospectively. The sociodemographic data and the numbers of previous cesarean section of the patients were recorded. Before the cesarean section, the counts of preoperative lymphocyte, neutrophil and platelet, mean platelet volume (MPV), neutrophil/lymphocyte rate, platelet/lymphocyte rate, and hemoglobin and hematocrit values were recorded. It was analyzed whether these parameters were able to predict placenta previa and placental invasion anomalies or not.

Results: There was no difference between two groups in terms of sociodemographic (age, gravida, parity, living fetus and the number of previous cesarean section) data. The week of gestation during delivery and birth weight were significantly low in placenta previa group. Postoperative hemoglobin and hematocrit values were also significantly low in previa group. Considering the complete blood parameters, MPV was significantly low in previa group (p=0.042). Placental invasion anomaly was confirmed histopathologically in 24 of 27 cases in previa group who underwent cesarean hysterectomy. When the group with invasion anomaly was compared to the control group, MPV was also significantly low (p=0.047).

Conclusion: In addition to the ultrasound images, simple blood count parameters can be used to confirm placenta previa and placental invasion anomalies in particular. Among these parameters, MPV seems to be the most potent predictor.

Keywords: Placental invasion anomalies, placenta previa, mean platelet volume.

Özet: Ortalama trombosit hacmi, plasenta previa ve plasenta invazyon anomalilerini öngörmede yeni bir belirteç

Amaç: Bu çalışmanın amacı bazı tam kan sayımı parametreleri ile plasenta previa ve plasenta yapışma anomalileri arasındaki ilişkiyi değerlendirmektir.

Yöntem: Bu çalışmada Eylül 2015 – Aralık 2016 tarihleri arasında Mustafa Kemal Üniversitesi Kadın Hastalıkları ve Doğum Kliniği'ne başvuran 70 plasenta previa ve 70 kontrol olgusu retrospektif olarak tarandı. Hastaların sosyodemografik özellikleri, önceki sezaryen sayıları kaydedildi. Sezaryen öncesi tüm olguların preoperatif lenfosit sayısı, nötrofil sayısı, trombosit sayısı, ortalama trombosit hacmi (MPV), nötrofil/lenfosit oranı, trombosit/lenfosit oranı, hemoglobin ve hematokrit değerleri kaydedildi. Bu parametrelerin plasenta previa ve plasenta yapışma anomalilerini öngörüp öngöremeyeceği analiz edildi.

Bulgular: Her iki grupta olguların sosyodemografik (yaş, gravida, parite, yaşayan, geçirilmiş sezaryen sayısı) verileri açısından fark yoktu. Doğumdaki gestasyonel yaş ve doğum ağırlığı plasenta previa grubunda anlamlı düşük bulundu. Postoperatif hemoglobin ve hematokrit değerleri previa grubunda anlamlı düşük idi. Tam kan parametrelerine bakıldığında previa grubunda MPV anlamlı düşük bulundu (p=0.042). Previa grubundaki sezaryen histerektomi uygulanan 27 olgunun 24 tanesinde histopatolojik olarak plasenta invazyon anomalisi konfirme edildi. İnvazyon anomalisi olan grup ile kontrol grubu karşılaştırıldığında MPV yine anlamlı düşük bulundu (p=0.047).

Sonuç: Sonografik görüntülere ek olarak basit kan sayımı parametreleri plasenta previa ve özellikle de plasenta invazyon anomalilerini konfirme etmek için kullanılabilir. Bu parametreler içinde MPV en güçlü prediktör gibi görünmektedir.

Anahtar sözcükler: Riskli gebelik, normal gebelik, sağlıklı yaşam biçimi davranışı.

Correspondence: Oya Soylu Karapınar, MD. Department of Obstetrics and Gynecology, TAS Faculty of Medicine, Mustafa Kemal University, Hatay, Turkey. e-mail: oyakarapinar@hotmail.com

Received: January 26, 2017; **Accepted:** March 18, 2017

Please cite this article as: Soylu Karapınar O, Gözükara İ, Hakverdi AU, Güngören A. A new marker for the prediction of mean platelet volume, placenta previa and placental invasion anomalies. Perinatal Journal 2017;25(1):32–37.

Available online at:
www.perinataljournal.com/20170251007
doi:10.2399/prn.17.0251007
QR (Quick Response) Code:

deomed

Introduction

Placenta previa is defined as the condition that placenta tissue is placed above or very close to internal cervical os. Its estimated incidence at term is 1/200 and the worldwide incidence varies.[1] Placenta accreta is the attachment of trophoblasts to uterine wall and it may invade at various levels including myometrium and serosa. The term 'placenta accreta' comprises entire spectrum including accreta, increta and percreta, and it is also called as morbid invasive placenta.[2] Placenta accreta is seen in 1 out of 300 pregnancies and its incidence has increased about 10 times in the last 5 decades.[3,4] It is a life-threatening clinical condition due to unexpected catastrophic complications during delivery such as severe hemorrhage, cesarean hysterectomy or bladder injury, and intestinal and vascular trauma.[5]

The connections between maternal inflammatory cells in basal layer, maternal desidual tissue and fetal extravillous trophoblast cells may lead to morbid invasive placenta. However, the underlying pathogenic mechanism of morbid invasive placenta is still unclear.[6] Although defective decidualization in implantation area is one of the significant underlying etiological factors of placenta previa and morbid invasive placenta, some studies histopathologically showed uteroplacental vascular anomalies in basal layer,[7] decidual hemosiderosis and infarction,[8] and acute and chronic inflammation.[9] Various studies reported that the invasion of cancerous cells had common characteristics with trophoblast invasion.[10] Neutrophil/lymphocyte rate (NLR), platelet/lymphocyte rate (PLR) and mean platelet volume (MPV) values are the most recent markers to evaluate the inflammatory response, and they are successfully used in various gynecological cancer and inflammatory diseases as predictive marker and prognostic factor.[11–13] In this study, we aimed to evaluate the relationship between complete blood count and their parameters and placenta previa and placental invasion anomalies, which are inflammatory and invasive.

Methods

This study was conducted through the retrospective review of the cases who admitted to the Department of Obstetrics and Gynecology of Mustafa Kemal University between September 2015 and December 2016. For this study, we obtained the approval of head physician of Health Application and Research Hospital of Mustafa Kemal University.

The study group included 70 cases who were suspected to have complete placenta previa and placental invasion anomaly according to the ultrasonography examination. The control group had 70 cases who had normally located placenta with previous or repeating cesarean section. Cases with multiple pregnancies, those with infectious and hemorrhagic problems in current pregnancy, cases with systemic diseases such as cardiovascular, endocrinologic, metabolic, inflammatory and autoimmune diseases, cases with smoking habit, and those with maternal obesity were excluded from the study. By reviewing the files of cases, their demographic data (age, gravida, parity, living fetus, week of gestation, birth weight, and previous deliveries) and preoperative hematologic parameters before cesarean section were recorded. Since the cases had placenta previa and with previous cesarean section, all patients delivered by cesarean section. In previa group, cesarean hysterectomy was performed in 27 cases who had placental invasion anomaly and developed postpartum hemorrhage.

Among the hematologic parameters, preoperative hemoglobin, hematocrit, and postoperative hemoglobin and hematocrit values were recorded. Preoperative neutrophil count, lymphocyte count, platelet count and MPV values were recorded. NLR and PLR were calculated by proportioning neutrophil to lymphocyte and platelet to neutrophil, respectively. The demographic data and hematologic parameters of the patients were compared. SPSS 21 was used for statistical analysis. The groups were compared by independent t-test. $p<0.05$ was considered significant.

Results

Both groups were similar in terms of age distribution (31.4±5.3 years in previa group, and 29.8±4.7 years in control group) and obstetric history (except gravida) (**Table 1**). Statistically significant low results were found in previa group compared to the control group in terms of week of gestation during delivery (36.0±2.4 weeks in previa group and 37.6±1.0 weeks in the control group) and birth weight (2802.28±590.31 g in previa group and 3090.00±477.00 g in the control group) (**Table 1**).

While preoperative hemoglobin levels (10.7±1.6 in previa group and 11.2±1.4 in the control group) were similar in previa and control groups, hematocrit level was

Table 1. Demographic data of previa and control groups.

	Placenta previa (n=70) (mean±SD)	Control group (n=70) (mean±SD)	p value
Age (year)	31.4±5.3	29.8±4.7	0.058
Gravida	3.8±1.3	3.1±1.1	**0.002**
Parity	2.1±1.0	1.9±0.9	0.236
Living fetus	2.0±1.0	1.8+0.9	0.121
Number of previous cesarean section	1.87±0.97	1.72±0.81	0.349
Week of gestation during delivery	36.0±2.4	37.6±1.0	**0.000**
Birth weight (g)	2802.28±590.31	3090.00±477.99	**0.002**

lower in previa group (32.5±4.8 in previa group and 34.5±3.8 in the control group; p=0.008) which was statistically significant. Postoperative hemoglobin (9.4±1.4 in previa group and 10.0±1.1 in the control group; p=0.016) and hematocrit values (28.8+4.4 in previa group and 31.1+3.5 in the control group; p=0.001) were significantly lower than control group. Procedure duration was significantly higher in previa group compared to the control group (88.2±32.9 hours in previa group and 44.0±4.1 hours in the control group; p=0.000).

Lymphocyte count, neutrophil count, and NLR and PLR were similar in both groups. Thrombocyte count was higher in previa group, which was statistically significant (226.3±56.5 in previa group and 201.8±62.9 in the control group; p=0.017) (**Table 2**). MPV was found significantly lower in previa group than the control group (8.9±1.2 in previa group and 9.4±1.6 in the control group; p=0.042) (**Table 2**).

All patients in our study underwent cesarean section. Cesarean hysterectomy was performed in 27 cases in previa group due to placental invasion anomaly and postpartum hemorrhage. It was found that 8 cases had perioperative bladder injury. There was no postoperative complication. It was recorded that there was no neonatal death. When we considered that the cases who underwent hysterectomy in previa group were positive for invasion, MPV, NLR and PLR values of cases who were positive for invasion (n=27) and negative for invasion (n=43) were similar. When the cases who underwent only cesarean hysterectomy were confirmed with pathology results, placental invasion was positive in a total of 24 cases, of which 10 had increta and 9 had percreta. Since all cases in previa group underwent protective uterine surgery gradually (hypogastric artery ligation in 20 cases, uterine artery ligation in 5 cases, and uterine square sutures in 14 cases), the cases who were positive for invasion and confirmed pathologically were compared with the cases in the control group in terms of lymphocyte count, neutrophil count, platelet count and MPV, NLR and PLR values. Only the MPV value (8.7±1.2 in the invasion-positive group and 9.4±1.6 in the control group; p=0.047) was lower in the invasion-positive group, which was statistically significant (**Table 3**).

Table 2. The analysis of hematological parameters in previa and control groups.

	Placenta previa (n=70) (mean±SD)	Control group (n=70) (mean±SD)	p value
Lymphocyte count $\times 10^3/mm^3$	1.8±0.6	1.7±0.8	0.158
Neutrophil count $\times 10^3/mm^3$	9.1±3.3	8.7±2.8	0.485
Platelet count $\times 10^3/mm^3$	226.3±56.5	201.8±62.9	**0.017**
MPV (femtoliter)	8.9±1.2	9.4±1.6	**0.042**
NLR	5.9±4.4	6.0±3.0	0.875
PLR	135.4±62.9	140.7±74.5	0.648

MPV: mean platelet volume, **NLR:** neutrophil/lymphocyte rate, **PLR:** platelet/lymphocyte rate

Table 3. The analysis of hematological parameters in previa group (positive for invasion) and control group.

	Cases with placental invasion anomaly (n=24) (mean±SD)	Control group (n=70) (mean±SD)	p value
Lymphocyte count $\times 10^3/mm^3$	1.8±0.6	1.7±0.8	0.599
Neutrophil count $\times 10^3/mm^3$	9.2±4.0	8.7±2.8	0.541
Platelet count $\times 10^3/mm^3$	225.0±59.3	201.8±62.9	0.118
MPV (femtoliter)	8.7±1.2	9.4±1.6	**0.047**
NLR	6.5±5.6	6.0±3.0	0.578
PLR	140.6±62.0	140.7±74.5	0.993

MPV: mean platelet volume, **NLR:** neutrophil/lymphocyte rate, **PLR:** platelet/lymphocyte rate

Discussion

Placenta previa and morbid invasive placenta are the most common reasons for cesarean hysterectomy. Although the underlying pathogenic mechanism of morbid invasive placenta is unclear, the greatest and most systematic histopathological study performed on this matter considerably associated morbid invasive placenta with chronic inflammation, low maternal vascular blood supply and hemorrhage. Presence of chronic inflammation may lead to abnormal immune response on maternal fetal surface, and this chronic inflammation may have a role in the progress of trophoblastic tissue or in controlling the invasion of placenta.[14] Also, the studies performed on trophoblasts showed that there are similarities between placental cells and cancerous cells in terms of proliferation, migration and invasion.[15]

It was confirmed that some inflammation markers such as neutrophil/lymphocyte and platelet/lymphocyte rates predict malignancy and even they have both diagnostic and prognostic values according to the meta-analyses of some other studies. NLR and PLR values are cheap screening markers calculated from complete blood parameters which show simple systemic inflammatory response in peripheral blood. NLR has diagnostic value in some pathologies characterized by systemic and local inflammatory responses such as diabetes, coronary artery disease, ulcerative colitis and inflammatory arthritis. The rate of these two cell types provides the estimation to identify inflammation.[16–18] PLR, on the other hand, is used to show elevating endogenous residual anticancer preinflammatory and precoagulative responses in malignancies. PLR is currently a prognostic and sensitive marker for breast, ovarian and colorectal cancers.[19] MPV, which is a routine component of complete blood count, is the marker of platelet function and activity. It was reported that decreased MPV values showed disease activity and inflammation in various inflammatory diseases. It was shown that MPV values decreased in high-grade inflammation such as active rheumatoid arthritis, acute attack of familial Mediterranean fever and active chronic obstructive pulmonary disease.[20] İncebıyık et al. reported low MPV values in pelvic inflammatory disease.[21] Due to the similarities between tumor metastases and placental invasion and the presence of chronic inflammation in cases with placenta previa and percreta, they developed the hypothesis that these markers might be significant to identify abnormal placentation. In our study, we found no difference between control and previa groups in terms of age, parity, living fetus and number of previous cesarean section. Similarity of such demographic data between the groups increased the validity of this comparison. Birth weight and week of gestation during delivery were significantly lower in previa group compared to the control group, and these results are associated with preterm labor due to the fact that these pregnancies are among the high-risk pregnancy group and particularly due to hemorrhagic complications. Postoperative hemoglobin and hematocrit levels were significantly low in placenta previa group compared to the control group, and this is the result of severe hemorrhage of these perioperative patients, and procedure durations were significantly higher in previa group than the control group.

In our study, there was statistical difference between previa and control groups in terms of MPV values and

platelet counts. MPV values were significantly lower in the cases with placenta previa and placenta percreta, which were characterized by inflammation, compared to the control group. This shows us that acute and chronic inflammation, which was also shown histopathologically in these cases, is confirmed by MPV values. Also, when invasion-positive hysterectomized cases were compared with the control group, significantly low MPV values were observed in the invasion-positive group. All cases gradually underwent protective uterine surgery. Some procedures such as uterine square and U sutures, uterine artery ligation, ovarian artery ligation and hypogastric artery ligation are able to control hemorrhage in some accreta and increta cases. When we want to confirm the results also with invasion-positive cases, we concluded that cases which were observed adhesion anomaly histopathologically were certainly positive for invasion and we compared them with the control group; as a result, we found MPV significantly low again. High-grade inflammation and the presence of invasion were also confirmed with MPV values. In the literature review, we found only two studies performed in 2016 on this subject. Yayla et al. compared the groups with and without invasion anomaly among the cases with placenta previa, and unlike our study, they found significantly higher MPV values in the group with invasion anomaly.[22] There was no control group in this study; they compared the cases in previa group as those with and without invasion, and they found higher MPV values in the cases with invasion anomaly, and this indicates the presence of low-grade inflammation. Since there was no control group, we cannot determine why there is no similarity with our results. In another study, Ersoy et al. compared the cases with placenta previa to the control group and found significantly low MPV values; similar to our study, they found in their retrospective study that MPV value was significantly low when they performed comparison between the groups with and without invasion anomaly, and between previa group and control group.[23]

In adhesive placental disorders, which are the most common type of complications, placenta percreta is also observed particularly. When confirmed with the previous studies, there is no ideal method to predict severe hemorrhage risk during antepartum period in cases with placenta previa, because hemorrhage volume is multifactorial including the complications associated with placenta previa. Ultrasound and magnetic resonance are useful to predict and decrease the complications of placenta previa.[23] Some studies found an association between placenta previa and hormones such as PAPP-A and MS-AFP which are secreted from fetoplacental unit.[24] Molecules, such as cell free bHCG mRNA which are more complex in maternal plasma, were used to identify placental invasion anomalies, and it was concluded that they were applicable for the prenatal diagnosis (particularly for the accreta cases who need hysterectomy).[25] However, all these markers are not always available, and therefore simpler preoperative tests, which are easy-to-use, are needed. According to our study, inflammatory process and simple blood count parameters for placental invasion anomalies with histopathologies similar to some malignancies may contribute to the confirmation of the condition during ultrasound in cases suspected to have invasion anomaly.

Conclusion

In addition to the ultrasound images, simple blood count parameters can be used to confirm placenta previa and placental invasion anomalies in particular. Among these parameters, MPV seems to be the most potent predictor.

Conflicts of Interest: No conflicts declared.

References

1. Cresswell JA, Ronsmans C, Calvert C, Filippi V. Prevalence of placenta previa by world region: a systematic review and meta-analysis. Trop Med Int Health 2013;18:712–24.
2. Silver RM. Abnormal placentation. Obstet Gynecol 2015;126: 654–68.
3. Morlando M, Samo L, Napolitano R, Capone A,Tessitone G, Maruotti GM, et al. Placenta accreta: incidence and risk factors in an area with a particularly high rate of cesarean section. Acta Obstet Gynecol Scand 2013;92:457–60.
4. Lorenz RP. What is new in placenta accreta? Best articles from the past year. Obstet Gynecol 2013;121:375–6.
5. Asicioglu O, Sahbaz A, Gungorduk K, Yıldırım G, Asıcıoglu BB, Ülker V. Maternal and perinatal out-comes in women with placenta praevia and accreta in teaching hospitals in Western Turkey. J Obstet Gynaecol 2014;34:462–6.
6. Abuhamad A. Morbidly adherent placenta. Semin Perinatol 2013;37:359–64.
7. Sherer DM, Salafia CM, Minior VK, Sanders M, Ernst L, Vintzileos AM. Placental basal plate myometrial fibers: clinical correlations of abnormally deep trophoblast invasion. Obstet Gynecol 1996;87:444–9.

8. Stanek J, Drummond Z. Occult placenta accreta: the missing link in the diagnosis of abnormal placentation. Pediatr Dev Pathol 2007;10:266–73.
9. Fox H, Sebire NJ. Pathology of the placenta. Oxford: Elsevier Health Sciences; 2007.
10. Knöfler M, Pollheimer J. Human placental trophoblast invasion and differentiation: a particular focus on Wnt signaling. Front Genet 2013;4:190.
11. Feng Z, Wen H, Bi R, Ju X, Chen X, Yang W, et al. Preoperative neutrophil-to-lymphocyte ratio as a predictive and prognostic factor for high-grade serous ovarian cancer. PLoS One 2016;11:e0156101.
12. Akın MN, Kasap BH, Yuvacı HU. Neutrophil-to-lymphocyte ratio and platelet distribution in patients with endometrial cancer. J Obstet Gynaecol Res 2015;41:1499.
13. Kim HS, Han KH, Chung HH, Kim JW, Park NH, Song YS, et al. Neutrophil to lymphocyte ratio for preoperative diagnosis of uterine sarcomas: a case-matched comparison. Eur J Surg Oncol 2010;36:691–8.
14. Ernst LM, Linn RL, Minturn L, Miller ES. Placental pathologic associations with morbidly adherent placenta: potential insights into pathogenesis. Pediatr Dev Pathol 2017; March 20 (Epub ahead of print). doi:10.1177/1093526617698600
15. Ferretti C, Bruni L, Dangles-Marie V, Pecking AP, Bellet D. Molecular circuits shared by placental and cancer cells, and their implications in the proliferative, invasive and migratory capacities of trophoblasts. Hum Reprod Update 2007;13: 121–41.
16. Celikbilek M, Dogan S, Ozbakır O, Zararsız G, Kücük H, Gürsoy S, et al. Neutrophil-lymphocyte ratio as a predictor of disease severity in ulcerative colitis. J Clin Lab Anal 2013;27: 72–6.
17. Imtiaz F, Shafique K, Mirza SS, Ayoob Z, Vart P, Rao S. Neutrophil lymphocyte ratio as a measure of systemic inflammation in prevalent chronic diseases in Asian population. Int Arch Med 2012;5:2.
18. Tousoulis D, Antoniades C, Koumallos N, Stefanadis C. Proinflammatory cytokines in acute coronary syndromes: from bench to bedside. Cytokine Growth Factor Rev 2006;17: 225–33.
19. Proctor MJ, Morrison DS, Talwar D, Balmer SM, Fletcher CD, O'Reilly DS, et al. A comparison of inflammation-based prognostic scores in patients with cancer. A Glasgow Inflammation Outcome Study. Eur J Cancer 2011;47:2633–41.
20. Kabil Kucur S, Seven A, Yuksel KD, Sencan H, Gozukara I, Keskin N. Mean platelet volume, a novel biomarker in adolescents with severe primary dysmenorrhea. J Pediatr Adolesc Gynecol 2016;29:390–2.
21. Incebıyık A, Seker A, Vural M, Gul Hilali N, Camuzcuoglu A, Camuzcuoglu A. May mean platelet volume levels be a predictor in the diagnosis of pelvic inflammatory disease? Wien KlinWochenschr 2014;126:422–6.
22. Abide Yayla C, Ozkaya E, Tayyar A, Senol T, Senturk MB, Karateke A. Predictive value of complete blood count parameters for placental invasion anomalies. J Matern Fetal Neonatal Med 2016; Nov 2:1–5. doi:10.1080/14767058.2016.1247266
23. Ersoy AO, Ozler S, Oztas E, Ersoy E, Kırbas A, Danısman N. The association between placenta previa and leukocyte and platelet indices–a case control study. Ginekologia Polska 2016; 87:367–71.
24. Lyell DJ, Faucett AM, Baer RJ, Blumenfeld YJ, Druzin ML, El-Sayed YY. Maternal serum markers, characteristics and morbidly adherent placenta in women with previa. J Perinatol 2015;35:570–4.
25. Zhou J, Li J, Yan P, Ye YH, Peng W, Wang S, et al. Maternal plasma levels of cell-free beta-HCG mRNA as a prenatal diagnostic indicator of placenta accrete. Placenta 2014;35:691–5.

PERINATAL JOURNAL

Original Article

Perinatal Journal 2017;25(1):38–42

Extraperitoneal versus transperitoneal cesarean section: a retrospective analysis

Cengiz Yeşilbaş[1], Hakan Erenel[2]

[1]*Department of Obstetrics and Gynecology, Batman Medical Park Hospital, Batman, Turkey*
[2]*Department of Perinatal Medicine, Cerrahpaşa Medical Faculty, Istanbul University, Istanbul, Turkey*

Abstract

Objective: We aimed to compare the extraperitoneal versus transperitoneal cesarean section techniques.

Methods: We analyzed 34 patients who underwent extraperitoneal cesarean section and 34 patients who underwent transperitoneal cesarean section performed by only one operator in a single institution and compared both methods regarding operation duration, delivery time, nausea or vomiting during operation, postoperative shoulder pain, need for nonsteroidal anti-inflammatory drugs and opioid analgesics during the operation day and the first postoperative day, first flatus time, and mean reduction in hemoglobin values.

Results: Half of the patients in the transperitoneal cesarean section group had nausea and vomiting during the operation and 58% of the patients had shoulder pain postoperatively. None of the patients in the extraperitoneal cesarean section group had nausea or vomiting during the operation and shoulder pain postoperatively. First flatus occurred significantly earlier in the extraperitoneal cesarean section group. Reduction in hemoglobin levels and need of analgesic drugs were higher in the transperitoneal cesarean group.

Conclusion: Extraperitoneal cesarean section is a safe technique which can be carried out by experienced operators. Decreased postoperative pain, need for analgesic drugs and early intestinal activity are seems to be the potential benefits of the technique.

Keywords: Extraperitoneal cesarean section, postoperative pain, analgesic.

Özet: Ekstraperitoneal ve transperitoneal sezaryen doğum: Retrospektif analiz

Amaç: Bu çalışmada ekstraperitoneal ve transperitoneal sezaryen operasyonu geçiren olguların karşılaştırılması amaçlanmıştır.

Yöntem: Aynı kurumda tek operatör tarafından gerçekleştirilmiş olan 34 ekstraperitoneal sezaryen operasyonu olgusu ve 34 transperitoneal sezaryen operasyonu olgusu retrospektif olarak incelendi. Her iki grup operasyon süresi, doğum zamanı, operasyon sırasında bulantı ve kusma, postoperatif omuz ağrısı, operasyon günü ve postoperatif 1. gün nonsteroid antienflamatuar ilaç ve analjezik ihtiyacı, ilk gaz çıkarma zamanı ve hemoglobin değerlerindeki düşme ortalamasına göre karşılaştırıldı.

Bulgular: Transperitoneal sezaryen grubu olan hastaların yarısında operasyon sırasında bulantı ve kusma mevcuttu. Postoperatif olarak bu hastaların %58'inde omuz ağrısı vardı. Ekstraperitoneal sezaryen operasyonu sırasında bulantı ve kusmaya rastlanmaz iken postoperatif hiçbir hastada omuz ağrısı gözlenmedi. Ekstraperitoneal sezaryen operasyonu grubunda ilk gaz çıkış süresi belirgin olarak daha erkendi. Hemoglobin seviyelerindeki düşme ve postoperatif analjezik ihtiyacı transperitoneal sezaryen operasyonu grubunda daha fazla idi.

Sonuç: Ekstraperitoneal sezaryen tekniği deneyimli operatörler tarafından güvenle uygulanabilen bir tekniktir. Azalmış postoperatif ağrı ve analjezik ihtiyacı, erken intestinal aktivite bu tekniğin olası faydalarıdır.

Anahtar sözcükler: Analjezik, postoperatif ağrı, ekstraperitoneal sezaryen.

Introduction

Cesarean section, once only performed when the mother was dead or dying, as an attempt to save the child for a state wishing to increase its population, is now the most frequently performed major surgery in women. Even though there are distinct maternal and fetal indications for cesarean delivery, rates seriously vary between geographical regions. According to World Health Organization's

Correspondence: Cengiz Yeşilbaş, MD. Batman Medical Park Hastanesi, Kadın Hastalıkları ve Doğum Kliniği, Batman, Turkey. e-mail: dr.cyesilbas@gmail.com
Received: February 20, 2017; **Accepted:** March 25, 2017
Please cite this article as: Yeşilbaş C, Erenel H. Extraperitoneal versus transperitoneal cesarean section: a retrospective analysis. Perinatal Journal 2017;25(1):38–42.

Available online at:
www.perinataljournal.com/20170251008
doi:10.2399/prn.17.0251008
QR (Quick Response) Code:

data, cesarean section rate in United States was 32.8% in 2011.[1] Not only the rates, but also technique differ between countries, cities, institutions; even between surgeons work at same institution. The operative technique performed is decided on the basis of the individual experience and preference of surgeons, the characteristics of cases, timing and urgency of intervention.[2]

There have been diversities among the techniques of cesarean section since fifteenth century, when the procedure was presented to ancient medicine. During the sixteenth and seventeenth centuries with the Renaissance, numerous works exposed human anatomy in great detail. By the later 1800s, greater access to cadavers and developing medical education permitted professionals to learn anatomy through dissection. This experience passing through generation to generation had enlightened modern surgery.

There are different aspects of cesarean section. The skin incision may be vertical (midline or paramedian) or transverse lower abdominal (Pfannenstiel, Joel-Cohen, Pelosi, Maylard, Mouchel, Cherney). Transperitoneal or extraperitoneal approach may be adopted. The uterine incision may be transverse lower segment (Munro-Kerr), midline lower segment or midline upper segment (classical). The uterus may be opened with a scalpel, scissors or by blunt dissection. The placenta may be removed manually or with cord traction. The uterus may be delivered from the abdominal cavity or left inside during closure. The uterus may be closed with interrupted or continuous sutures in one, two or three layers. The visceral or the parietal peritoneum, may be sutured or left unsutured. The subcutaneous tissues may be sutured or not. Skin incision may be repaired in various ways. All these manners can be performed separately with endless combinations. Surgeons feel obligated to perform the top-level procedure in order to reduce postoperative morbidity. Therefore, complete techniques combining different approaches about every part of cesarean section have been described. These are Pfannenstiel cesarean technique, Pelosi-type technique, Joel-Cohen technique, Misgav-Ladach technique and extraperitoneal cesarean technique.[3]

Extraperitoneal approach was once widely used before the introduction of metronidazole to the medical world in 1960.[4] It was believed to reduce postoperative intraabdominal infections and also nausea and vomiting, postoperative pain by avoiding exposure of the peritoneal cavity to blood, amniotic fluid, vernix, and mechanical irritation. However, the technique requires experienced surgeons with comprehensive knowledge of the relationship between the paravesical space and the bladder and lower uterine segment. Since the approach was generally abandoned in the post-antibiotic era, there are fewer and fewer obstetricians who are familiar to the surgical technique. Therefore it is hardly ever used today.

To our knowledge, extraperitoneal cesarean section is not routinely performed in our country. This is the first study to compare transperitoneal and extraperitoneal approaches in cesarean section in Turkey.

Methods

This retrospective, case-control study was conducted at private hospital (Department of Obstetrics and Gynecology, Medical Park Hospital, Batman, Turkey). We performed retrospective analysis of 34 patients who underwent extraperitoneal cesarean section (EPC) and compared them with transperitoneal cesarean section (TPC) group. We included singleton term pregnancies undergoing cesarean section (cephalopelvic disproportion, breech presentation, prior cesarean section). The exclusion criteria were as follows: (1) previous abdominal surgery (except cesarean section), (2) Body mass index higher than 35, (3) multiple pregnancy, (4) delivery before 34 weeks of gestation, (5) placenta previa, (6) emergency cesarean section, (7) shoulder presentation (transverse lie) and (8) macrosomic fetus. After approval of the study the local ethics committee, demographic and clinical data of patients were obtained from hospital database. Patients were grouped by operation technique (extraperitoneal cesarean section versus intraperitoneal cesarean section).

Surgeries were performed under spinal anesthesia by one surgeon (C.Y.). The procedure for EPC was as follows: Pfannenstiel incision was made and subcutaneous tissues were opened with blunt and sharp dissection. Rectus fascia was then incised in a curvilinear fashion. Preperitoneal area was dissected and bladder was eliminated. Thereafter, deperitonealised area between uterus and bladder was opened with blunt dissection and lower segment of uterus was incised (**Fig. 1**). After delivery of fetus and placenta, uterine incision was repaired with no 1 vicryl in a running, locked one layer fashion. Intraperitoneal cesarean section was performed with conventional method. Uterus was exteriorized, visceral

peritoneum was closed and visible blood clots were removed in all patients. Parietal peritoneum was closed in intraperitoneal technique.

Primary outcomes measure included operation time, delivery time, nausea and vomiting during operation, postoperative shoulder pain, need for nonsteroidal anti-inflammatory drug (NSAID) and opioid analgesics on day operation and day 1, first flatus time and drop in hemoglobin levels. Blood count was estimated preoperatively and on postoperative day 1. Delivery time was determined as time interval between skin incision and delivery. Duration of the surgery was determined as time interval between skin incision and skin closure.

All calculations were performed using SPSS version 23 for Windows (SPSS Inc., Chicago, IL, USA). Data were expressed by means, standard deviations, percentages, minimum and maximum values. Categorical data were assessed using the chi-square test or Fisher's exact test. Independent samples t-test or Mann-Whitney U test were used for comparison of numerical variables. A p value less than 0.005 was considered statistically significant.

Results

A total of 68 patients were included in the study from January 2015 until May 2016. Demographic and clinical data of patients were shown on **Table 1**. Data was collected from hospital database. Obstetric profile and history of patients were similar. There were patients with previous cesarean section in both groups.

Primary outcome measurements were shown on **Table 2**. Duration of surgery was significantly shorter in the extraperitoneal cesarean section group. Delivery time was shorter in extraperitoneal cesarean group but the difference was not statistically significant. Half of the patients in the intraperitoneal cesarean section group had nausea or vomiting during the operation and 58% of the patients had shoulder pain postoperatively. None of the patients in the extraperitoneal cesarean section group had nausea or vomiting during the operation and shoulder pain postoperatively. First flatus occurred significantly earlier in the extraperitoneal cesarean section group (p<0.001). Drop in hemoglobin levels and need of analgesic drugs were higher in the intraperitoneal cesarean group. There were no intra-operative complications in either group. On the day of operation, NSAIDs provided satisfactory analgesia for all patients after EPC however NSAIDs were not satisfactory in 23 patients after

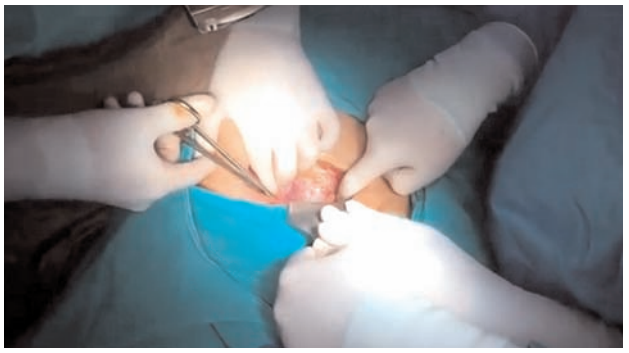

Fig. 1. Extraperitoneal technique. [This video is available at http://www.perinataljournal.com/Files/Archive/en-US/Attachments/6856/PF-2017-03-21-095125.mp4]

Table 1. Demographic and clinical maternal characteristics.

	EP cesarean group (n=34)	TP cesarean section (n=34)	p value
Age (year)	27.4±5.6	27.2±5.9	0.885
Previous cesarean delivery	5 (14.7%)	7 (20.6%)	0.525
Parity			
0	18 (52.9%)	21 (61.8%)	0.462
1	8 (23.5%)	8 (23.5%)	>0.999
≥2	8 (23.5%)	5 (14.7%)	0.355
Gestational age (week)	39.5±0.8	39.0±1.6	0.173

EP: extraperitoneal, **TP:** transperitoneal

Table 2. Primary outcome measurements.

	EP cesarean section (n=34)	TP cesarean section (n=34)	p value
Duration of surgery (minute)	23.1±2.4	35.3±3.6	**<0.001**
Delivery time (second)	119±7	126±22	0.145
Nausea or vomiting during operation	0	(50%)	**<0.001**
Postoperative shoulder pain	0	20 (58.8%)	**<0.001**
First flatus (hour)	11.2±1.5	27.1±3.2	**<0.001**
Drop in Hemoglobin levels, g/dL (preoperative-postoperative)	0.67±0.13	1.09±0.24	**<0.001**
Need for analgesic drugs			
NSAID on Day 0	34 (100%)	11 (32.4%)	**<0.001**
NSAID + opioid analgesics Day 0	0	23 (67%)	**<0.001**
NSAID on Day 1	3 (8.8%)	18 (52.9%)	**<0.001**
Complications	None	None	

EP: extraperitoneal, **NSAID:** nonsteroidal anti inflammatory drugs, **TP:** transperitoneal

TPC (<0.001). On postoperative day 1, 3 patients (8.8%) required NSAIDs after EPC, while 18 patients (52.9%) required NSAIDs after TPC (p<0.001).

Discussion

Cesarean delivery is a life saving procedure for mother and fetus in certain situations and it is the most common major abdominal operation among women worldwide.[5] Although several techniques such as Pfannenstiel, Joel-Cohen technique, Misgav-Ladach technique (modified Joel-Cohen technique) and extraperitoneal technique have been described in the literature, none of these techniques were superior to others.[6] All of these techniques except the extraperitoneal one comprise peritoneal access. Our study showed that there is a significant benefit of avoidance of peritoneal access.

First reports about extraperitoneal cesarean section techniques were described in the early 1900s by Frank.[7] Since penicillin was not introduced to the market until the 1940s, the main aim of this technique was decrease in infectious complications.[8] There are several reports about this technique in the English literature but the data is limited. Mokgokong et al. compared extraperitoneal and intraperitoneal cesarean techniques in 1974 and reported lower postoperative fever rate in extraperitoneal cesarean group.[9] They also reported that one of 173 patients (0.5%) had a serious complication during or after surgery in extraperitoneal group however this rate was 5% for intraperitoneal cesarean group.[9] Cervical abscess with vaginal fistula as a complication after extraperitoneal cesarean was also reported in the literature.[10] In our series, there was no complication during or after surgery.

In a recent prospective randomized study, comparison of extraperitoneal versus transperitoneal cesarean section showed decrease in the frequency of postoperative pain, usage of analgesics, and intraoperative nausea with no increase in complications.[11] In addition, the operating time was shorter with extraperitoneal technique.[11] Our study showed excellent concordance with these results. In our study, skin incision-to-delivery time was not different between the two groups. Shorter duration of surgery in extraperitoneal group can be explained with fewer incisions through the layers of the abdominal wall, absence of peritoneal cleaning and bleeding control. Dissections could be challenging in training period of extraperitoneal technique and neighbor organ injury is probable complication during dissection; however, shorter duration of surgery can be achieved after adequate surgical experience. The surgeon learned this technique during obstetrics residency in the responsibility of attending OB/GYN specialist in the Cerrahpaşa Medical Faculty, Istanbul.

Patients who underwent extraperitoneal cesarean delivery had significantly shorter time to first flatus (11.2 vs 27.1 hours) which can be a consequence of absence of peritoneal access and bowel irritation. In the study of Tappauf et al., drop in hemoglobin levels was not different between the groups; however, we observed higher drop in hemoglobin levels in the intraperitoneal cesarean group.[11] Probably longer duration of intraperitoneal surgery could explain this difference. Prevention of meconium, amniotic fluid, blood and vernix induced intraperitoneal irritation seems to be major advantage of the extraperitoneal procedure. However, the extraperitoneal technique requires skilled surgeon who is familiar with preperitoneal area and paravesical space and probably learning curve is harder. Another concern is that this technique hinders surgical uterine devascularization or the use of uterine compression sutures in case of uterine atony or laceration.

Some limitations of our study include its retrospective design, absence of pain scoring system and relatively small sample size. On the other hand, there is only one study focusing on postoperative comfort and need for analgesic drugs rather than postoperative infection in recent years.

Conclusion

In conclusion, extraperitoneal technique is a safe procedure in experienced hands; however, this technique is not a part of routine obstetrics trainee program. Decreased postoperative pain, need for analgesic drugs and early intestinal activity are seems to be most likely benefits of the technique. Furthermore, absence of peritoneal access may prevent potential intraperitoneal bowel and bladder adhesions and decrease difficulty of subsequent intraperitoneal cesarean delivery. Further multicenter, large randomized controlled studies are needed to validate or confute advantages of extraperitoneal cesarean technique.

Conflicts of Interest: No conflicts declared.

References

1. Vogel JP, Betrán AP, Vindevoghel N, Souza JP, Torloni MR, Zhang J, et al.; WHO Multi-Country Survey on Maternal and Newborn Health Research Network. Use of the Robson classification to assess caesarean section trends in 21 countries: a secondary analysis of two WHO multicountry surveys. Lancet Global Health 2015;3:e260–70.
2. Dahlke JD, Mendez-Figueroa H, Rouse DJ, Berghella V, Baxter JK, Chauhan SP. Evidence-based surgery for cesarean delivery: an updated systematic review. Am J Obstet Gynecol 2013;209:294–306.
3. Hofmeyr GJ, Mathai M, Shah A, Novikova N. Techniques for caesarean section. Cochrane Database Syst Rev 2008;(1): CD004662.
4. Li JJ, Corey EJ (editors). Drug discovery. Practices, processes and perspectives. Hoboken, NY: John Wiley & Sons; 2013. p. 27.
5. Martin JA, Hamilton BE, Ventura SJ, Osterman MJ, Kirmeyer S, Mathews TJ, et al. Births: final data for 2009. Natl Vital Stat Rep 2011;60:1–70.
6. Hofmeyr JG, Novikova N, Mathai M, Shah A. Techniques for cesarean section. Am J Obstet Gynecol 2009;201:431–44.
7. Federation of Obstetrics and Gynecological Societies of India (FOGSI). Do's and dont's in obstetrics and gynecology practice. New Delhi: Jaypee Brothers; 2012.
8. Aminov RI. A brief history of the antibiotic era: lessons learned and challenges for the future. Front Microbiol 2010; 1:134.
9. Mokgokong ET, Crichton D. Extraperitoneal lower segment cesarean section for infected cases: a reappraisal. S Afr Med J 1974;48:788–90.
10. Chou CY, Liang PC, Chen CA, Lee CN. Cervical abscess with vaginal fistula after extraperitoneal cesarean section. J Formos Med Assoc 2007;106:1048–51.
11. Tappauf C, Schest E, Reif P, Lang U, Tamussino K, Schoell W. Extraperitoneal versus transperitoneal cesarean section: a prospective randomized comparison of surgical morbidity. Am J Obstet Gynecol 2013;209:338.e1–8.

PERINATAL JOURNAL

Case Report

Perinatal Journal 2017;25(1):43–47

Acute pulmonary edema developing after cesarean section: a case report

Ersin Çintesun[1], Faruk Çiçekçi[2], Ayşe Gül Kebapçılar[1], Hüseyin Özbiner[3], Çetin Çelik[1]

[1]*Department of Obstetrics and Gynecology, Faculty of Medicine, Selçuk University, Konya, Turkey*
[2]*Department of Anesthesiology and Reanimation, Faculty of Medicine, Selçuk University, Konya, Turkey*
[3]*Department of Radiology, Faculty of Medicine, Selçuk University, Konya, Turkey*

Abstract

Objective: The aim is to present the case of sudden pulmonary edema developing after cesarean section of a pregnant woman who had undiagnosed valvular heart disease, and to raise awareness about the importance of heart diseases in pregnant women.

Case: A primigravida pregnant woman who was on 33 weeks of gestation admitted to the hospital with the complaints of bleeding and contraction. Intrauterine singleton pregnancy was identified. Tocolysis was initiated and betamethazone was administered. Approximately 48 hours later, the patient was taken to cesarean section with spinal anesthesia upon finding non-reactive and variable decelerations in NST. When monitoring the patient at postoperative service, she was diagnosed with pulmonary edema due to sudden onset of maternal hypotension, tachycardia, dyspnea and tachypnea, and put into intensive care. She was discharged in full recovery one week later following the treatment at intensive care.

Conclusion: Since the changes during pregnancy may sometimes show similarities with the symptoms of some cardiac pathologies, preconceptional cardiac evaluation would be an appropriate step if women planning pregnancy have cardiac risk factors.

Keywords: Cesarean section, pulmonary edema, cardiac disease, mitral valve insufficiency.

Özet: Sezaryen doğum sonrası gelişen akut akciğer ödemi: Olgu sunumu

Amaç: Önceden tanı konulmamış kalp kapak hastalığı olan gebede sezaryen sonrası ani gelişen akciğer ödemi olgusunun sunulması ve kalp hastalıklarının gebe hastalardaki önemi hakkında farkındalık oluşturulması amaçlanmıştır.

Olgu: Gebelik yaşı 33 hafta primigravid gebe hasta, kanama ve kontraksiyon ile hastaneye başvurdu. İntrauterin tekil gebelik tespit edildi. Tokoliz ve betametazon başlandı. Yaklaşık 48 saat sonra NST'de non-reaktif ve variable deselerasyonlar saptanması üzerine spinal anestezi ile sezaryene alındı. Hasta postoperatif serviste takip edilirken iki saat sonra ani başlayan maternal hipotansiyon, taşikardi, dispne, takipne meydana geldi ve akciğer ödemi teşhisi konuldu ve yoğun bakıma alındı. Yoğun bakımda tedavi sonrası 1 hafta sonra şifa ile taburcu edildi.

Sonuç: Gebelikte meydana gelen değişiklikler bazı kardiyak patolojilerin semptomlarıyla benzerlik gösterdiğinden gebelik planlayan kadınlarda kardiyak açıdan risk faktörleri mevcut ise prekonsepsiyonel kardiyak değerlendirme yapılması uygun olacaktır.

Anahtar sözcükler: Sezaryen, akciğer ödemi, kalp hastalığı, mitral kapak yetmezliği.

Introduction

Acute pulmonary edema is an emergency clinical condition with mortality and morbidity risk which is seen in about 0.08% of pregnant women.[1] It has generally 2 reasons: Cardiogenic pulmonary edema is caused by high pulmonary capillary hydrostatic pressure, and non-cardiogenic pulmonary edema is associated with the permeability due to capillary endothelial and alveolar epithelium injury.[2] The major reason in non-cardiogenic pulmonary edema is acute respiratory distress syn-

Correspondence: Ersin Çintesun, MD. Department of Obstetrics and Gynecology, Faculty of Medicine, Selçuk University, Konya, Turkey. e-mail:ersincintesun@gmail.com

Received: December 17, 2016; **Accepted:** February 26, 2017

Please cite this article as: Çintesun E, Çiçekçi F, Kebapçılar AG, Özbiner H, Çelik Ç. Acute pulmonary edema developing after cesarean section: a case report. Perinatal Journal 2017;25(1):43–47.

Available online at:
www.perinataljournal.com/20170251005
doi:10.2399/prn.17.0251005
QR (Quick Response) Code:

deomed

drome (ARDS), and high altitude and neurogenic pulmonary edema, high dose opioid use, pulmonary emboly, eclampsia-associated pulmonary edema acute pulmonary damage in transfusion are rarer reasons.[3–5] Cardiogenic and non-cardiogenic pulmonary edemas have a similar radiological appearance. Both clinical conditions cannot be always distinguished clearly, and even both may appear simultaneously. The presence of protein in lung fluid and pulmonary artery wedge pressure (PAWP) can be used in the differential diagnosis. PAWP being ≤18 indicates non-cardiogenic pulmonary edema.

The primary reason for cardiogenic pulmonary edema is acute decompensated cardiac insufficiency leading to rapid and acute increase in the left ventricular filling pressure and the pressure of left atrium.[2] Except coronary artery and valvular diseases, primary hydration (such as blood transfusion), severe hypertension, renal artery stenosis and renal diseases may also cause pulmonary edema. Pregnancy-induced physiological changes may complicate the diagnosis of cardiac diseases. Changes such as systolic murmurs, effort dyspnea, exhaustion and lower limb edema seen during normal pregnancy may be perceived as cardiac diseases. However, cardiac diseases should be considered in some symptoms such as progressive dyspnea or orthopnea, night cough, hemoptysis, syncope and chest pain, and in some clinical findings such as clubbed fingers, cyanosis, persistent dilatation in neck veins, systolic murmur being 3/6 and above, diastolic murmur, cardiomegaly, and persistent arrhythmia. In most of the pregnant women, the diagnosis of diseases can be established by non-invasive methods such as electrocardiography (ECG), echocardiography (ECO) and chest radiography, but invasive techniques can be used in some cases.

In this study, we aimed to present the case of sudden pulmonary edema developing after cesarean section of a pregnant woman who had undiagnosed valvular heart disease.

Case Report

Twenty-one-year-old primigravida pregnant woman who was on 33 weeks of gestation according to the first trimester ultrasonography examination admitted to our hospital with the complaints of vaginal bleeding and contraction. In the fetal ultrasonographic examination, intrauterine singleton pregnancy with living fetus was identified where placenta with 1670 g of fetal weight was on fundal location, and consistent with 50th percentile. Amniotic fluid was within normal limits and the placenta was on fundal location. According to umbilical artery Doppler blood count, S/D was 4.30, PI was 1.31 and RI was 0.22. According to her medical history, she had no known disease, drug intake, smoking habit or alcohol consumption. Her vital signs in the physical examination were stable; her body temperature was 36.1°C and heart rate was 87 beat/min, arterial blood pressure was 122/76 mmHg, respiratory rate was 12; her laboratory findings showed that Hb value was 9 g/dL, Plt value was 256 K/uL, PT value was 10.1/sec, INR value was 0.93 and aPPT value was 27.7/sec; the protein in her urine was negative. Non-stress test (NST) was reactive. No cervical dilation and bleeding were observed in the pelvic examination. Upon the contractions felt by the patients, betamethazone 3 g 2×2 (with 24 hours of interval) was initiated for the liver development of baby and nifedipine 10 mg capsule 3×1 was initiated for tocolysis. The vital follow-ups of the patient were within normal limits. When the patient could not feel the movements of baby approximately 48 hours later after the hospitalization and NST progress was non-reactive for longer than 90 minutes as wells as the presence of variable decelerations, the patient was taken to the cesarean section with spinal anesthesia without sedation premedication. A live female baby, whose birth weight 1765 g and 1-minute Apgar score was 7, was delivered. The baby was hospitalized at newborn intensive care unit. No complication was observed in the patient during spinal anesthesia. The cesarean section took 30 minutes without any problem, there was about 600 cc bleeding and she was monitored at obstetrics clinic. While the patient's service follow-ups after cesarean section were stable, dyspnea, agitation, deterioration of general condition, clouding of consciousness, hypotension, tachypnea and tachycardia developed suddenly at postoperative second hour. It was calculated that the patient was administered 2000 cc intravenous isotonic solution and the patient urinated 1000 cc. Arterial blood pressure was 70/60 mmHg, heart rate was 130 beat/min, respiratory rate was 33 per minute, arterial blood gas Ph was 7.32, PCO_2 was 31.3 mmHg, PO_2 was 88 mmHg, oxygen saturation was 80%, and Hb was 9.1 g/dL. The patient was provided 3 lt/min 100% oxygen support treatment. Generalized infiltrations were observed in the chest radiography (**Fig. 1**). Common thin rales were identified in both lungs. Heart sounds could not be evaluated properly due to the rales. There was no asymmetric rash, swelling or temperature increase in the legs of the patients. With the pre-diagnosis of pulmonary

emboly and aspiration pneumonia, it was decided to do pulmonary CT scan. The patient was intubated and taken to anesthesia intensive care unit since she could not tolerate supine position after CT scan, her oxygen saturation decreased 60%, she had agitation, her general condition deteriorated. Common interstitial thickenings and ground-glass appearance were observed in both lungs In the CT scan (**Fig. 2**). Secondary tricuspid regurgitation, secondary mitral regurgitation, ejection fraction 55%, 45 mmHg pulmonary artery pressure (PAP), and impaired left ventricular wall motion were observed in the ECO scan performed under suboptimal conditions during intensive care follow-ups. It was considered that the patient had pulmonary edema developed due to valvular heart disease and cardiac failure. There was no reproduction in blood, urine and sputum cultures during intensive care follow-ups. Tuberculosis was ruled out in acid-fast bacilli (ARB) staining. C-reactive protein (CRP) value was 2 mg/dl when she hospitalized at the intensive care unit, and it elevated to 16 mg/dl one day later. Then, upon the recommendation of infectious diseases clinic, 1 g 3×1 meropenem was administered. The patient responded to meropenem treatment and controlled diuresis therapy, and extubated on sixth day. Liver and kidney functions were normal according to laboratory results. The chest radiography scans (**Fig. 3**) after treatment were normal, and the patient was discharged with full recovery after 1-week follow-up in the clinic. The patient underwent ECO again under optimal conditions in the cardiology clinic 10 days later. In the ECO scan, it was seen that the left atrium was dilated, mitral regurgitation grade III–IV, ejection fraction was 48%, and it was decided to perform mitral valve replacement (**Fig. 3**).

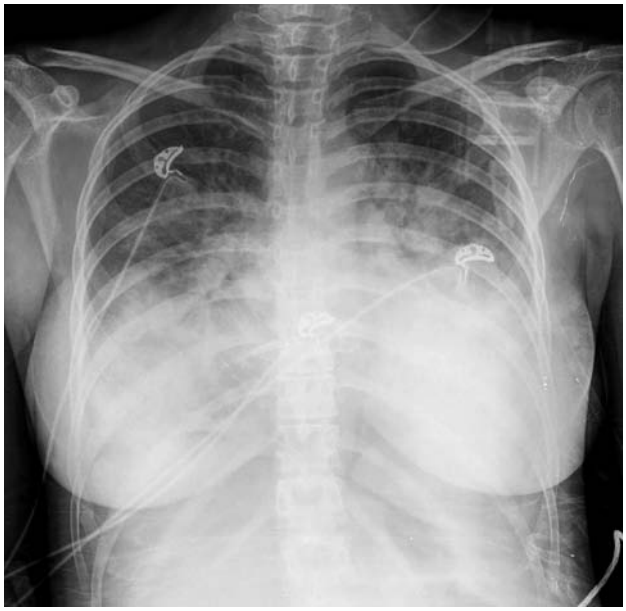

Fig. 1. Chest radiography scan before the treatment.

Discussion

Cardiac diseases are seen in more than 1% of all pregnancies and it is the reason about 20% of maternal deaths; the reasons of more than half of the cardiac diseases during pregnancy are congenital cardiac diseases.[6] Cardiac diseases are still the common reasons of maternal mortality, and mortality rates associated with cardiac diseases increase while maternal mortality rates related with bleeding and hypertension decrease.[7,8] Cardiac diseases are also the frequent reasons of intensive care hospitalization due to obstetric reasons.[8] Cardiovascular

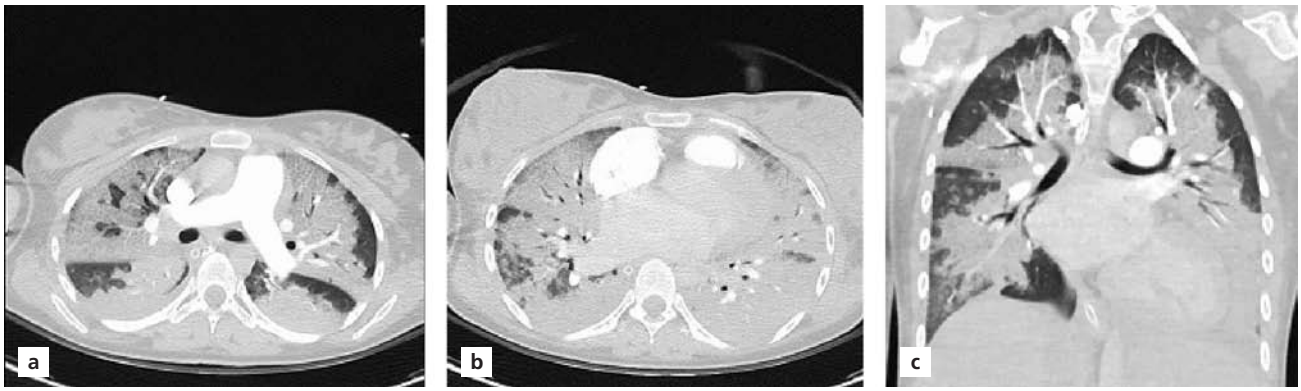

Fig. 2. (**a**–**c**) Pulmonary CT scan before the treatment.

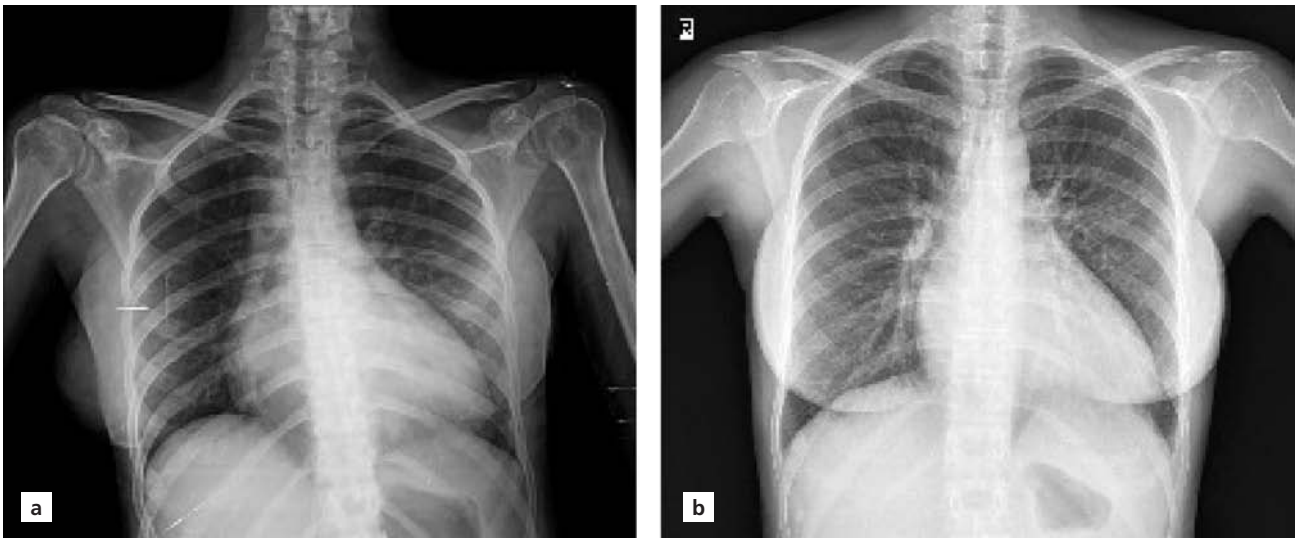

Fig. 3. (**a**, **b**) Chest radiography scan after the treatment.

changes during pregnancy start at 5–8 weeks of gestation, continue up to the end of second trimester, and have a stable progress from last trimester up to the end of pregnancy.[9,10] Relapse of cardiac functions after delivery may be delayed up to postpartum 24th week .[11] Valvular heart diseases are the congenital or acquired damage of cardiac valves. The most common reason of acquired valvular heart diseases is the rheumatic valvular disease. While rheumatic valvular diseases are seen less in developed countries due to the scarcity of crowded living conditions and widespread use of penicillin, they are still common in developing countries.[12] The most common rheumatic valvular diseases are mitral stenosis, mitral insufficiency, aortic stenosis and aortic insufficiency, respectively.[13] Hemodynamic changes during pregnancy in women with valvular heart diseases (VHD) may result in cardiac decompensation. Stenotic valvular lesions are tolerated less during pregnancy compared to regurgitant lesions. The complication risk varies according to the type and severity of underlying VHD. According to the recommendations of American Heart Association / American College of Cardiology (AHA/ACC) published in 2014 and of European Society of Cardiology (ESC) published in 2011/2012, it is difficult to tolerate pregnancy by patients with severe aortic stenosis (aortic valve area ≤1.0 cm^2) or severe mitral stenosis (aortic valve area ≤1.5 cm^2).[14–16] In valvular lesions diagnosed by insufficiency, the risk depends on the severity of insufficiency, symptoms and ventricular functions.

In our case, we observed advanced mitral insufficiency diagnosed with pulmonary edema after cesarean section in a patients who had no history of any cardiac complaint. Mitral insufficiency is a condition which is the most common in pregnant women and mostly concurrent with mitral stenosis.[17] The severity of mitral insufficiency decreases due to the reduced vascular resistance in pregnant women. While patients with mild and moderate mitral insufficiency usually have a comfortable pregnancy, mitral valve surgery, and preferably mitral valve repair, is recommended before pregnancy for women with severe mitral insufficiency. However, if patient develops left ventricular dysfunction induced by mitral insufficiency, the toleration will be difficult during and after pregnancy.[18] Our case had advanced mitral insufficiency and left ventricular dysfunction not accompanied with mitral stenosis. It is likely that the hydration which will not cause any hemodynamic problem in a normal patient caused pulmonary edema in this patient.

Tricuspid regurgitation usually develops due to rheumatic valvular disease and it is frequently concomitant with other valvular diseases. Present complaints of patients depend on the decrease of cardiac output, and the treatment approach in such patients is similar to those of mitral stenosis. Tricuspid regurgitation usually develops secondary to the pulmonary hypertension. Isolated tricuspid regurgitation does not lead to a serious problem during pregnancy.[18]

Physiological changes induced by normal pregnancy may complicate the diagnosis of cardiac diseases. Changes such as systolic murmurs, effort dyspnea, exhaustion and lower limb edema seen during normal pregnancy may be perceived as cardiac diseases. However, cardiac diseases should be considered in some symptoms such as progressive dyspnea or orthopnea, night cough, hemoptysis, syncope and chest pain, and in some clinical findings such as clubbed fingers, cyanosis, persistent dilatation in neck veins, systolic murmur being 3/6 and above, diastolic murmur, cardiomegaly, and persistent arrhythmia. In pregnant women, the diagnosis of diseases can be established by non-invasive methods such as ECG, ECO and chest radiography, but invasive techniques can be used in some cases; however, ECO is a diagnostic tool that can be used at first if cardiac disease is suspected. In our case, ECO was sufficient to establish the diagnosis of valvular insufficiency.

Conclusion

Valvular heart diseases are still the reasons of serious maternal morbidity and mortality in developing countries. Hemodynamic changes induced by pregnancy may reveal advanced asymptomatic cardiac diseases. As the changes during pregnancy may sometimes show similarities with the symptoms of some cardiac pathologies, preconceptional cardiac evaluation would be an appropriate step if women planning pregnancy have cardiac risk factors and especially in the presence of suspicious clinical findings.

Conflicts of Interest: No conflicts declared.

References

1. Sciscione AC, Ivester T, Largoza M, Manley J, Shlossman P, Colmorgen GH. Acute pulmonary edema in pregnancy. Obstet Gynecol 2003;10:511–5.
2. Ware LB, Matthay MA. Clinical practice. Acute pulmonary edema. N Engl J Med 2005;353:2788–96.
3. Sedy J, Zicha J, Kunes J, Jendelova P, Sykova E. Mechanisms of neurogenic pulmonary edema development. Physiol Res 2008;57:499–506.
4. Cobaugh DJ, Gainor C, Gaston CL, Kwong TC, Magnani B, McPherson ML, et al. The opioid abuse and misuse epidemic: implications for pharmacists in hospitals and health systems. Am J Health Syst Pharm 2014;71:1539–54.
5. Porcel JM, Light RW. Pleural effusions due to pulmonary embolism. Curr Opin Pulm Med 2008;14:337–42.
6. Simpson LL. Maternal cardiac disease: update for the clinician. Obstet Gynecol 2012;119:345–59.
7. Berg CJ, Callaghan WM, Syverson C, Henderson Z. Pregnancy-related mortality in the United States, 1998 to 2005. Obstet Gynecol 2010;116:1302–9.
8. Small MJ, James AH, Kershaw T, Thames B, Gunatilake R, Brown H. Near-miss maternal mortality: cardiac dysfunction as the principal cause of obstetric intensive care unit admissions. Obstet Gynecol 2012;119:250–5.
9. Chapman AB, Abraham WT, Zamudio S, Coffin C, Merouani A, Young D, et al. Temporal relationships between hormonal and hemodynamic changes in early human pregnancy. Kidney Int 1998;54:2056–63.
10. Capeless EL, Clapp JF. Cardiovascular changes in early phase of pregnancy. Am J Obstet Gynecol 1989;161:1449–53.
11. Robson SC, Dunlop W, Moore M, Hunter S. Combined Doppler and echocardiographic measurement of cardiac output: theory and application in pregnancy. Br J Obstet Gynaecol 1987;94:1014–27.
12. Roeder HA, Kuller JA, Barker PC, James AH. Maternal valvular heart disease in pregnancy. Obstet Gynecol Surv 2011;66: 561–71.
13. McFaul PB, Dornan JC, Lamki H, Boyle D. Pregnancy complicated by maternal heart disease. A review of 519 women. Br J Obstet Gynaecol 1988;95:861–7.
14. Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP 3rd, Guyton RA, et al.; American College of Cardiology/American Heart Association Task Force on Practice Guidelines. 2014 AHA/ACC guideline for the management of patients with valvular heart disease: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol 2014;63:e57–185.
15. Joint Task Force on the Management of Valvular Heart Disease of the European Society of Cardiology (ESC); European Association for Cardio-Thoracic Surgery (EACTS), Vahanian A, Alfieri O, Andreotti F, Antunes MJ, Baron-Esquivias G, Baumgartner H, et al. Guidelines on the management of valvular heart disease (version 2012). Eur Heart J 2012;33:2451–96.
16. European Society of Gynecology (ESG); Association for European Paediatric Cardiology (AEPC); German Society for Gender Medicine (DGesGM), Regitz-Zagrosek V, Blomstrom Lundqvist C, Borghi C, Cifkova R, Ferreira R, Foidart JM, et al.; ESC Committee for Practice Guidelines. ESC Guidelines on the management of cardiovascular diseases during pregnancy: the Task Force on the Management of Cardiovascular Diseases during Pregnancy of the European Society of Cardiology (ESC). Eur Heart J 2011;32:3147–97.
17. Sugrue D, Blake S, MacDonald D. Pregnancy complicated by maternal heart disease at the National Maternity Hospital, Dublin, Ireland, 1969 to 1978. Am J Obstet Gynecol 1981;139: 1–6.
18. Akpınar O. Pregnancy and heart valve disease. [Article in Turkish] Anadolu Kardiyol Derg 2009;9 Suppl 1:25–34.

Türk Perinatoloji Derneği
Turkish Perinatology Society

Perinatal Medicine Foundation
Perinatal Tıp Vakfı

16. ULUSAL PERİNATOLOJİ KONGRESİ

28 Eylül - 1 Ekim 2017

Titanic Deluxe Bodrum

www.perinatoloji2017.org

Organizasyon Sekreteryası

BROS
Congress, Incentive and Events

Alen Demirel
Halaskargazi Cad. Tavukçu Fethi Sok. No:28/3 Osmanbey - Şişli / İstanbul
Tel: +90 212 296 66 70 - 112 / Fax: +90 212 296 66 71
www.brosgroup.net e-mail: alen.demirel@brosgroup.net

PERINATAL JOURNAL

www.perinataljournal.com

The Official Publication of Perinatal Medicine Foundation, Turkish Perinatology Society and Turkish Society of Ultrasound in Obstetrics and Gynecology

Publication Ethics and Malpractice Statement

Perinatal Journal is committed to upholding the highest standards of publication ethics and observes the following principles of Publication Ethics and Malpractice Statement which is based on the recommendations and guidelines for journal editors developed by the Committee on Publication Ethics (COPE), Council of Science Editors (CSE), World Association of Medical Editors (WAME) and International Committee of Medical Journal Editors (ICMJE).

All submissions must be original, unpublished (including as full text in conference proceedings), and not under the review of any other publication synchronously. Each manuscript is reviewed by one of the editors and at least two referees under double-blind peer review process. We reserve the right to use plagiarism detecting software to screen submitted papers at all times. We check for plagiary and fraudulent data; falsification (fabrication or manipulation of research data, tables, or images) and improper use of humans or animals in research. All manuscripts not in accordance with these standards will be removed from the publication. This also contains any possible malpractice discovered after the publication. In accordance with the code of conduct we will report any cases of suspected plagiarism or duplicate publishing.

We follow the COPE Ethics Flowcharts for dealing with cases of possible scientific misconduct and breach of publication ethics.

Author Responsibilities

Authors should ensure that submitted work is original. They must certify that the manuscript has not previously been published elsewhere or is not currently being considered for publication elsewhere, in any language. Applicable copyright laws and conventions should be followed. Copyright material (e.g. tables, figures or extensive quotations) should be reproduced only with appropriate permission and acknowledgement. Any work or words of other authors, contributors, or sources should be appropriately credited and referenced.

The author(s) of the original research articles (including short communications) must declare that they were involved in at least 3 of the 5 stages of the study as "designing the study", "collecting the data", "analyzing the data", "writing the manuscript" and "confirming the accuracy of the data and the analyses". All authors should disclose all issues concerning financial relationship, conflict of interest, and competing interest that may potentially influence the results of the research or scientific judgment. All financial contributions, supports or sponsorship of projects should be clearly explained.

When an author discovers a significant error or inaccuracy in his/her own published paper, it is the author's obligation to promptly cooperate with the Editor-in-Chief to provide retractions or corrections of mistakes.

Responsibility for the Reviewers

Reviewers evaluate manuscripts based on content without regard to ethnic origin, gender, sexual orientation, citizenship, religious belief or political philosophy of the authors. They should have no conflict of interest with respect to the research, the authors and/or the research funders. Their judgments should be objective.

Reviewers should identify relevant published work that has not been cited by the authors. They must ensure that all the information related to submitted manuscripts is kept as confidential and must report to the Editor-in-Chief if they are aware of copyright infringement and plagiarism on the author's side.

A reviewer who feels unqualified to review the topic of a manuscript or knows that its prompt review will be impossible should notify the Editor-in-Chief and excuse himself from the review process.

Editorial Responsibilities

Editors evaluate manuscripts for their scientific content without regard to ethnic origin, gender, sexual orientation, citizenship, religious belief or political philosophy of the authors. They provide a fair double-blind peer review of the submitted articles for publication. They ensure that all the information related to submitted manuscripts is kept as confidential before publishing.

Editors are responsible for the contents and overall quality of the publication. They should publish errata pages or make corrections when needed.

Editor-in-Chief does not allow any conflicts of interest between the authors, editors and reviewers. Only he has the full authority to assign a reviewer and is responsible for final decision for publication of the manuscripts in Perinatal Journal.

deomed®

PERINATAL
JOURNAL
Volume 25 | Issue 1 | April 2017

Contents