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.