OBSTETRICS

Extraperitoneal versus transperitoneal cesarean section: a prospective randomized comparison of surgical morbidity

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OBJECTIVE: We sought to test the hypothesis that an extraperitoneal cesarean section (ECS) technique reduces postoperative pain without increasing intraoperative and postoperative complications.

STUDY DESIGN: In a single-center, single-blinded prospective trial we randomized 54 patients with an indication for primary or first repeat cesarean section at term pregnancy to an ECS (n = 27) or transperitoneal cesarean section (TCS) (n = 27) procedure. Patients with suspected abnormal placentation, a history of >1 cesarean section, or major abdominal surgery were excluded. The primary endpoint of the study was maximum abdominal pain measured by numeric rating scale ranging from 0—10.

RESULTS: Patients after ECS had significantly less maximum surgical site pain than patients after TCS. Median peak pain scores on postoperative day 1 were 4.00 (interquartile range, 3.00—5.00) for ECS and 5.00 (interquartile range, 4.00—7.00) for TCS, respectively ($P = .031$). Analgesic requirements, intraoperative nausea, and postoperative shoulder pain were significantly less after ECS. Overall operative time was significantly shorter in ECS, with no difference in delivery time. No bladder injury occurred in either group. There were no differences in estimated blood loss and neonatal outcome. Urogenital distress, urinary tract infection, and bowel dysfunction did not differ at discharge from hospital and 6 weeks after.

CONCLUSION: An extraperitoneal approach to cesarean section appears to reduce postoperative pain, usage of analgesics, and intraoperative nausea without an increase in significant complications.

Key words: extraperitoneal cesarean section, postoperative pain, surgical morbidity

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Cesarean section is the most frequent major abdominal surgery among women worldwide.[1] Delivery of a baby by cesarean section commonly leads to postoperative abdominal pain and may cause a variety of surgical complications.[2] With high cesarean section rates,[1,3] obstetricians are challenged to reduce perioperative and postoperative morbidity by adapting their surgical skills and techniques.

The standard technique for cesarean section in medical centers around the world is a low transverse cesarean section modified by the Misgav Ladach method.[4] This approach entails opening the parietal peritoneum and delivering the baby transperitoneally through a transverse incision in the lower uterine segment. Exposure of the peritoneal cavity to blood, amniotic fluid, vernix, and mechanical irritation is thought to potentially aggravate pain, nausea and vomiting, dysfunction of intestines, voiding disturbances, adhesions, and infertility.[5-8]

It has been speculated that an extraperitoneal approach to cesarean section may protect intraperitoneal organs and the peritoneum by avoiding potential harmful effects and thus reduce morbidity.[9-11]

Anecdotal reports of extraperitoneal sections date back to the year 1821.[12] In the era before antibiotics, extraperitoneal cesarean section (ECS) was thought to protect the peritoneal cavity from spreading intrauterine infection.[13] There is very limited modern literature on the extraperitoneal procedure in the English language and the majority of the literature peaks in the 1940s and 1950s, focusing on technical details.[14-16] In 1949, Cacciarelli[14] introduced a method applying a paravesical approach, which was later modified by Waters[16] to a technique with a supravesical access. Wallace et al[17] and Hanson[18] in 1984 and Zabransky and Grossmannová[19,20] in 1985 and 2001 aimed at a reduction of septic morbidity. They concluded that the extraperitoneal section was beneficial but had never been introduced as a routine method due to a lack of training.

The more recent observational studies of ECS reported quick postoperative recovery and reduced need for analgesics.[17-20] In 2009 the technique was relaunched combining a horizontal Pfannenstiel-like skin incision with a vertical fascial incision and a left paravesical dissection of the space inferior and lateral to the vesicouterine fold.[21] This procedure is advertised as "outpatient cesarean section" with no supporting evidence for that statement.

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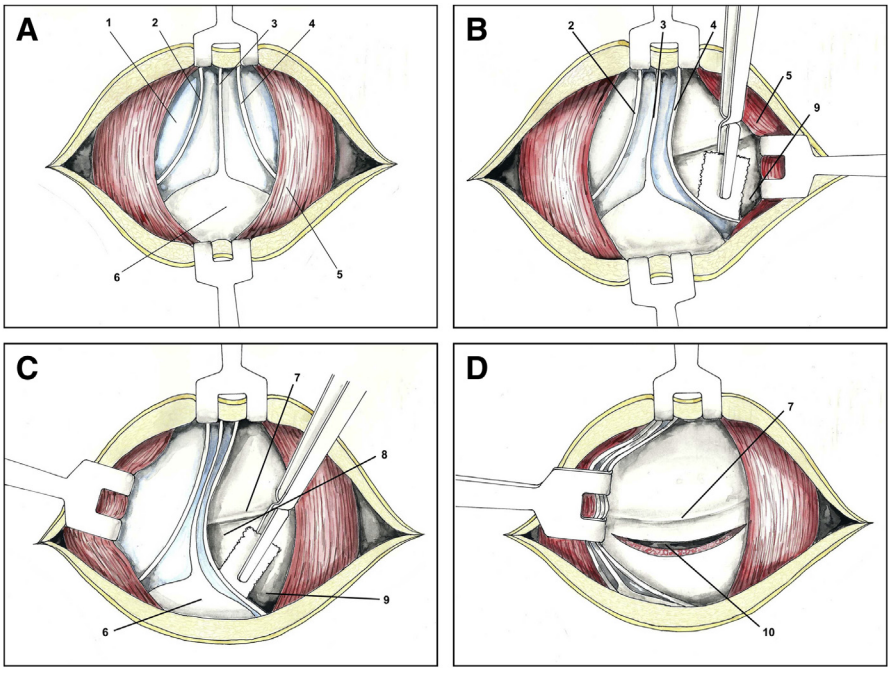
FIGURE 1
Surgical anatomy and technique of ECS



A and **B,** ECS: with blunt dissection, left paravesical space is opened and bladder is separated from lower uterine segment. **C,** Tongue of peritoneum of vesicouterine fold becomes visible superiorly. **D,** Exposed lower uterine segment is incised. 1 = Preperitoneal fatty tissue. 2 = Right medial umbilical fold/obliterated umbilical artery. 3 = Urachus/median umbilical fold. 4 = Left medial umbilical fold/obliterated umbilical artery. 5 = Rectus muscle. 6 = Bladder. 7 = Peritoneum/vesicouterine fold. 8 = Uterus. 9 = Paravesical space. 10 = Uterine incision.

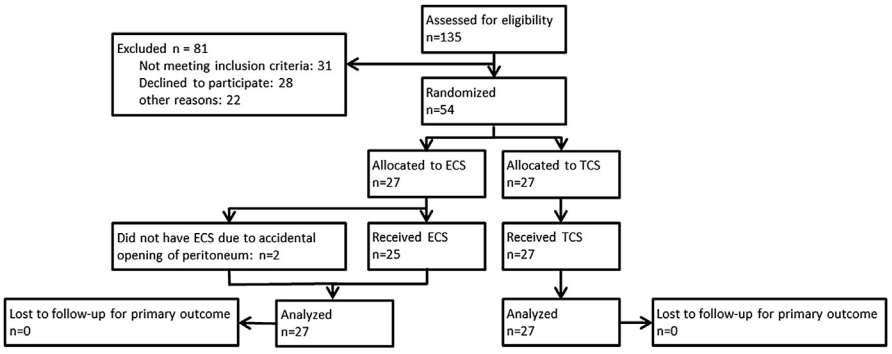
ECS, extraperitoneal cesarean section.

Tappauf. Extraperitoneal cesarean section. Am J Obstet Gynecol 2013.

Possible complications of ECS do not appear to differ from those of transperitoneal cesarean section (TCS).[18,22] In the extraperitoneal procedure, injuries to the bladder have been reported in <1%[18]; injuries to the ureters are anecdotic. Endometritis remains a rare condition in any cesarean section in medically well-developed countries.[18] Delivery time is reported to be equal among different techniques.[18]

To date there has been no prospective, randomized study comparing traditional TCS with ECS. The aim of the present study was to compare TCS with ECS with respect to a variety of intraoperative and postoperative complications and fetal outcome. It was hypothesized that ECS would lead to less postoperative abdominal pain.

FIGURE 2
Flow diagram of study participants



Extraperitoneal cesarean section (*ECS*) = 2, transperitoneal cesarean section (*TCS*) = 1. Three patients were lost to long-term follow-up for 6-week postpartum outcomes.

Tappauf. Extraperitoneal cesarean section. Am J Obstet Gynecol 2013.

Materials and Methods

This prospective, randomized, single (patient) blinded study was conducted at a single academic tertiary care center (Department of Obstetrics and Gynecology, Medical University of Graz, Graz, Austria). Patients were invited to participate if they were age ≥18 years and presented with an indication for an elective cesarean section (primary or first repeat cesarean section) at ≥37 weeks of gestation. Patients with suspected abnormal placentation (placenta accreta, increta, or percreta), placenta previa, previous vertical uterine incision, a history of >1 cesarean section, a history of major abdominal surgery, or fetal macrosomia (estimated fetal weight >4500 g) were excluded. Eligible patients were approached by members of the research team when they were scheduled for cesarean deliveries. Informed consent was obtained from all participants; the trial was conducted in strict accordance with the protocol and was approved by the local institutional review board. Randomization and treatment allocation was done before entering the operating room. Spinal anesthesia with a uniform protocol based on ropivacaine and fentanyl was suggested to all patients. Surgeries were done by attending physicians and residents. Resident physicians as primary surgeons were assisted by attending physicians until the closure of the oblique muscles' aponeurosis.

The primary endpoint of the study was maximum abdominal pain (peak pain) on postoperative day (POD)1. Postoperative abdominal pain was measured