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CLINICAL ARTICLE

Effects of method of uterine repair on surgical outcome of cesarean delivery

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ABSTRACT

Objective: To compare the rates of intraoperative and postoperative complications of uterine repair when performed *in situ* or extra-abdominally following cesarean delivery. *Methods:* In this prospective randomized study 4925 women who underwent cesarean delivery were randomly assigned to *in situ* (n = 2462) or extra-abdominal (n = 2463) uterine repair (group 1 and group 2, respectively). The study compares drop in hemoglobin concentration (as a measure of intraoperative blood loss). It also compares operating time, time to return of bowel sound, and duration of hospitalization as well as rates of uterine atony, blood transfusion, intraoperative complications, additional use postoperative analgesics, endometritis, and wound infection. *Results:* Uterine atony developed in 96 women (3.8%) in group 1 and 226 women (9.1%) in group 2 ($P = 0.001$). Moreover, the operating time and the time to return of bowel sound were shorter and the rates of both additional use of postoperative analgesics and wound infection were lower in group 1 ($P = 0.001$, $P = 0.002$, $P = 0.001$, and $P = 0.003$, respectively). *Conclusion:* Fewer cases of uterine atony, a shorter operating time, a faster return of bowel function, a lesser need for postoperative analgesics, and lower rates of additional use of postoperative analgesics and wound infections suggest that *in-situ* uterine repair ought to be preferred to extra-abdominal uterine repair following cesarean delivery.

1. Introduction

As cesarean delivery rates increase each year throughout the world [1], obstetricians are always seeking to make cesarean delivery faster and easier and to reduce postoperative morbidity. One ongoing debate centers on whether uterine closure should be performed with the uterus exteriorized or *in situ*. The reported advantages of exteriorizing the uterus are better exposure, faster recovery, and reduced operating time; the reported drawbacks are intraoperative nausea and vomiting, a higher risk of adnexial trauma, and an increased risk of infection [2].

The primary aim of this study was to compare intraoperative blood loss in women undergoing uterine repair with the uterus *in situ* or exteriorized following cesarean delivery. The study also compares operating time, time to return of bowel sound, duration of hospitalization, and rates of uterine atony, blood transfusion, intraoperative complications, additional use postoperative analgesics, endometritis, and wound infection.

2. Patients and methods

This prospective randomized study was conducted from April 1, 2006 to September 30, 2009 at the Delivery Clinic of the Zekai Tahir Burak Female Health Education and Research Hospital, Ankara, Turkey. The mean annual number of deliveries is approximately 25 000 at this hospital, with a cesarean rate of approximately 25%. The participants' pregnancy duration was at least 36 weeks and the indications for cesarean delivery included fetal distress, dystocia, breech presentation, and maternal preference. Exclusion criteria included high-risk pregnancy, third-trimester bleeding, chorioamnionitis, more than 12 hours of membrane rupture, intrapartum antibiotic use, more than 1 previous cesarean delivery, and a history of abdominal surgery other than 1 previous cesarean delivery. The Institutional Review Board approved the study and all patients provided written informed consent.

A total of 4925 women undergoing cesarean delivery were randomly assigned to *in situ* or exteriorized uterine repair after placenta removal (group 1 and group 2, respectively) (Fig. 1). Randomization was achieved using a computer-generated random number table. A statistician placed group assignments in opaque envelopes, which were kept sealed until immediately before the women entered the operating room.

All operative procedures were performed by a fourth-year obstetrics and gynecology resident supervised by an obstetrics and gynecology specialist. After spinal anesthesia was administered and the abdominal skin successively scrubbed with chlorhexidine and a solution of povidone iodine, a Pfannenstiel incision was made, followed by a transverse lower-segment uterine incision. After the umbilical cord was clamped, 1 g of cefazolin sodium (Cefamezine; Abdi Ibrahim, Istanbul, Turkey) was administered intravenously for antibiotic prophylaxis. External uterine massage and gentle traction on the umbilical cord were then performed to facilitate placental

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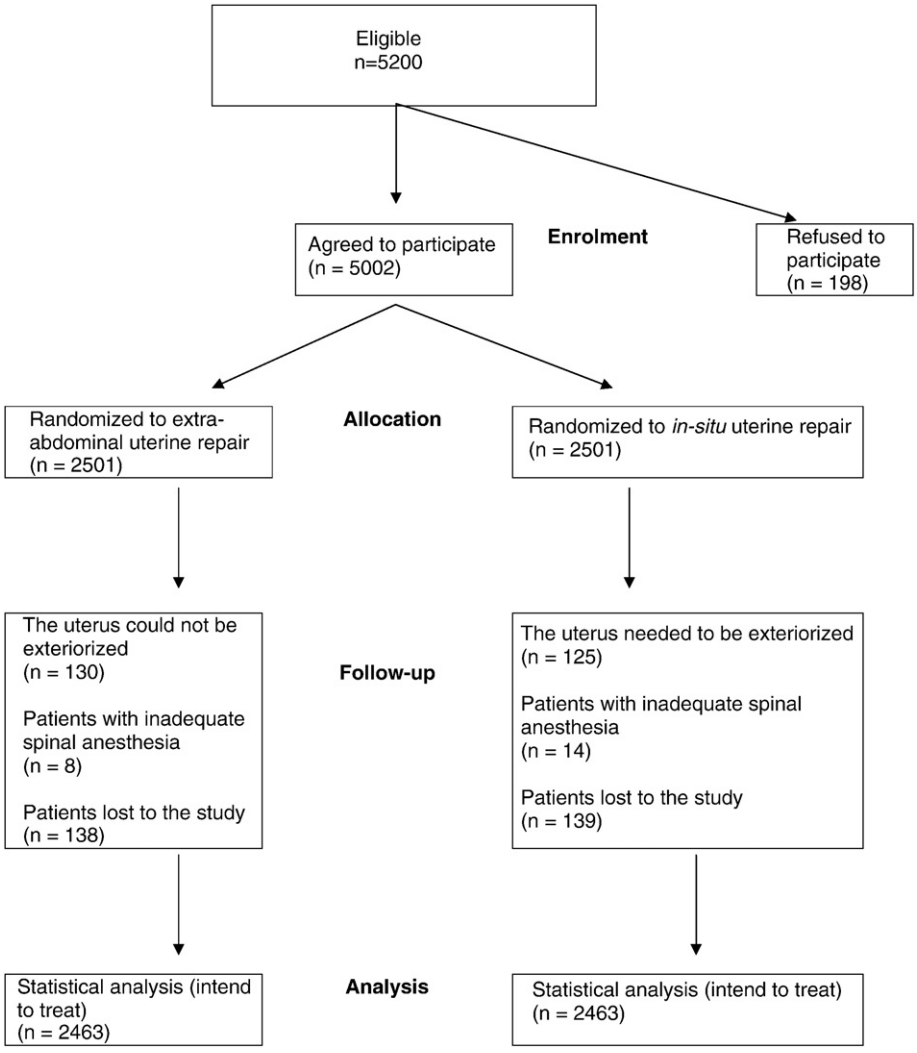

Fig. 1. Study flowchart.

delivery. Following placental delivery, the uterus was closed in a continuous single layer using Vicryl suture No. 1 (Ethicon, Istanbul, Turkey), intra-abdominally (group 1) or extra-abdominally (group 2). Finally, 20 U of oxytocin was added to the infusion of 5% dextrose to prevent uterine atony. For postoperative analgesia, all patients were administered one 20-mg dose of tenoxicam (Tilcotil; Roche, Istanbul) intravenously, followed by 2 tablets of metamizole sodium (Novaljin; Aventis, Istanbul) 4 times daily for until no longer needed.

The intravenous dextrose infusion was administered for 24 hours. During the first 12 postoperative hours the patients were allowed minimal water intake by mouth. Liquids and soft foods were allowed only after intestinal sounds were heard and a normal diet only after the first flatus.

The patients' hemoglobin levels were measured preoperatively and 48 hours postoperatively. The difference between the 2 values was considered a measure of the intraoperative blood loss.

Operating time was recorded as the time from the start of the skin incision to the completion of the last suture. Uterine atony, which occurs when the myometrium does not contract sufficiently after delivery, and can cause severe blood loss, was defined as a soft uterus with a boggy consistency [3,4]. Postoperative need for additional analgesia was defined as a request for intravenous analgesia beyond the routinely administered dose. The patients who requested additional analgesia were administered additional 20-mg doses of tenoxicam. The return of bowel function was established using a stethoscope every 4 to 6 hours postoperatively and noting the presence of 1 or 2 bowel sounds in each quadrant. Hospitalization duration began in the hour when the cesarean procedure was started and was reported in days. A diagnosis of endometritis was established when the body temperature exceeded 38 °C twice, 6 hours apart, and was accompanied by tenderness of the uterus and a smelly discharge. A purulent discharge from the incision was considered a wound infection.

Assuming a statistical power of 94% at an alpha level of 0.05, we estimated that 2400 patients per group would be needed to show a 5% difference in drop in hemoglobin level between the 2 groups. Power analysis was performed using the NCSS Power Analysis and Sample Size software (NCSS, Kaysville, Utah, USA).

The χ^2 test and the Fisher exact test were used to compare frequencies and percentages between the 2 groups. Continuous, normally distributed variables are presented as mean $\pm$ SD and compared using a 2-tailed t test. $P<0.05$ was considered significant. Data analysis was performed using the Statistical Package for the Social Sciences for Windows (SPSS, Chicago, Illinois, USA).

3. Results

There were no significant differences between the 2 groups regarding age, gestational week at delivery, gravidity, parity, or body mass index (BMI, calculated as weight in kilograms divided by