OBSTETRICS

# Blunt versus sharp uterine incision expansion during low transverse cesarean delivery: a metaanalysis

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**OBJECTIVE:** We sought to review and update available evidence regarding outcomes after cesarean delivery (CD) using blunt vs sharp expansion of the uterine incision.

**STUDY DESIGN:** We queried the database of PubMed (US National Library of Medicine, 1946 through December 2013), the Cochrane Library Database of Systematic Reviews, ClinicalTrials.gov, and Web of Science. All relevant bibliographies were reviewed. Randomized controlled trials comparing blunt with sharp expansion of the lower segment during CD were evaluated for inclusion and methodological quality. The primary outcome was occurrence of unintended extensions. Secondary outcomes were drop in hematocrit or hemoglobin and estimated maternal blood loss, need for transfusion, operative time, use of uterotonics, rate of endometritis, and neonatal outcomes. Data extraction, analysis, and results were based on the preferred reporting items for systematic review and metaanalysis guidelines.

**RESULTS:** Six randomized controlled trials (2908 patients) were included. Blunt expansion technique was associated with lower drop in postoperative hematocrit (weighted mean difference [WMD], −1.07%; $P = .05$) and hemoglobin (WMD, −0.64 g/dL; $P < .05$), lower rate of unintended extensions (pooled relative risk, 0.47; $P < .05$), and a shorter operative time (WMD, −2 minutes; $P < .05$). Lower estimated blood loss was also observed but the difference was not significant (WMD, −88.07 mL; $P > .05$). There were no differences in the rates of blood transfusion, endometritis, use of uterotonics, and neonatal outcomes between both techniques.

**CONCLUSION:** Blunt expansion of uterine incision during CD is associated with less unintended extensions and favorable maternal outcomes. Although the drop in hemoglobin, hematocrit, and operative times were in favor of blunt expansion, the degree of reduction may not be clinically relevant.

**Key words:** blunt, cesarean delivery, expansion techniques, sharp, uterine incision

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Worldwide, the rate of cesarean delivery (CD) remains high,[1] and in some developed countries such as the United States, one third of all pregnant women are delivered by cesarean.[2,3] Additionally, maternal mortality is on the rise and obstetric hemorrhage remains one of its major etiologies. Compared to vaginal delivery, CD is associated with higher blood loss. Operative techniques suggested to decrease blood loss during CD include blunt rather than sharp expansion of the uterine incision, cephalad-caudad instead of transversal blunt expansion, in situ closure of the uterine incision without exteriorization, and spontaneous extraction or cord traction of the placenta.[4-7] The technique to achieve uterine incision expansion has been the subject of a number of randomized controlled trials (RCTs) including a recent one,[8] and a metaanalysis[9] with conflicting results. It is believed that the blunt technique is less traumatic to the vasculature and myometrium resulting in less bleeding.[8,10-14] Other advantages include less neonatal trauma or cord injury, and decrease in operative time.[15-17] On the other hand, some believe that the blunt technique's imprecision leads to uncontrolled extensions and damage to parametrial and uterine vessels, ultimately resulting in higher blood loss.[4,8,10-14,18] The rate of endometritis may also be increased in the blunt expansion group.[19] Therefore, we aimed to review the current evidence of uterine incision expansion techniques and update the most recent metaanalysis to summarize the evidence of benefit of blunt vs sharp expansion techniques.

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## Materials and Methods

### Data sources

A literature search was conducted in MEDLINE (US National Library of Medicine, 1946 through December 2013) to identify all RCTs with published data regarding blunt vs sharp expansion technique of lower segment uterine incision at time of CD. Key words included: "blunt," "sharp," "cesarean delivery or section," and "finger." Two basic Boolean operators ("AND" and "OR") were used in various combinations to target the search strategies at more specific areas. No date or language restrictions were employed. Bibliographies

of all relevant eligible articles were reviewed for further potential references. In addition the Cochrane Library Database of Systematic Reviews and Web of Science database were also searched and appropriate data were extracted. The ClinicalTrials.gov World Wide Web site was also enquired to identify any additional ongoing or completed trials.

### Study selection and data extraction

Studies were included if they were RCTs comparing blunt vs sharp expansion techniques of the uterine incision at the time of CD. We included trials that assessed our primary outcome, which was occurrence of unintended extensions. We excluded observational studies and trials that assessed vertical uterine incisions. We also excluded trials with quasirandomized allocation to the intervention based on alternate allocation. Two reviewers extracted data independently (A.F.S., M.M.C.) and discrepancies were resolved by agreement. Publications in a language other than English were evaluated by investigators fluent in that language and included as appropriate. Both researchers (A.F.S., M.M.C.) were investigators with appropriate qualifications in maternal-fetal medicine and obstetrics, and were fluent in the foreign languages identified (French). We followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. Eligible studies were assessed for methodological quality using the risk of bias tool developed by the Cochrane Collaboration.[20,21] Evaluated criteria included the method of randomization, allocation concealment, masking conditions, and adequacy of follow-up. Data were extracted utilizing standardized data extraction forms. At the time of data collection and abstraction, the same 2 reviewers verified study eligibility 1 more time.

### Selection of outcomes

For the purpose of this metaanalysis, our primary outcome of interest was occurrence of unintended extension of the uterine incision. We also included prespecified secondary outcomes: drop in hematocrit and hemoglobin, estimated blood loss (EBL), blood transfusion (administration of at least 1 U of packed red blood cells), endometritis, operative time, use of uterotonics, and neonatal morbidity, if they were assessed in at least 2 studies. Each of these outcomes is individually identified in the "Results" section.

### Statistical analysis

Statistical analyses were performed using software (Stata 13; StataCorp, College Station, TX). For dichotomous outcomes, data from each study were extracted and 2-way contingency tables were constructed to calculate the treatment effects expressed as relative risks (RR) with a 95% confidence interval (CI). Empty cells were treated by adding 0.5 to each cell in the table. Separate contingency tables were made for each outcome, if the data were available. For continuous outcomes, means and SD data for each expansion method were extracted and pooled estimates were described using weighted mean difference (WMD) and 95% CI. For each outcome, heterogeneity was assessed using Cochran Q test followed by calculating I2 statistic with I2 $\geq$50% indicating substantial heterogeneity for any of the outcomes of interest.[22] In the presence of substantial heterogeneity, we pooled the data using random effects method.[23] Publication bias was examined using Begg test and by visual inspection of funnel plots. Two-sided $P$ values $< .05$ were considered statistically significant.

## RESULTS

Six RCTs (total of 2908 patients) were eligible for inclusion in this metaanalysis[8,10-14] (Figure 1). The studies' details, methodological quality, and outcomes are summarized in Table 1.

Sharp expansion was achieved in all 6 studies by using bandage-cutting scissors at the lateral and cephalad direction. In all but one study,[14] blunt expansion was achieved by a 1- to 2-cm uterine incision that was expanded lateral and cephalad using the surgeon's index fingers. Javaria et al[14] defined blunt expansion by pulling the margins of incision apart with fingers and did not give further details.

Differences in methodology between the studies are summarized in Table 1 and included eligibility criteria, skin incision, delivery of placenta, oxytocin infusion, antibiotic administration, and anesthesia type. In 2 studies,[8,13] Pfannenstiel incision was used in all patients, whereas another[10] used the Joel-Cohen incision. Three studies did not specify skin incision technique.[11,12,14] One study did not exteriorize the uterus.[14] Three studies documented which postpartum uterotonics were used.[8,11,13] Prophylactic antibiotics were given to all patients in 2 studies[8,10]; another study administered antibiotics after cord clamping to patients who underwent failed active second stage of labor after cord clamping.[12] Although all patients underwent low transverse CD, inclusion criteria were different. Two studies involved CD that were elective or before the onset of labor.[8,14] The most common indications for CD were arrest of active phase of labor, prior CD, malpresentation, and fetal nonreassuring status[12,13]; other indications included cephalopelvic disproportion, preeclampsia, and intrauterine growth restriction.[14] Four studies excluded multiple gestations and conditions that may lead to coagulopathy,[8,10-14] and 1 study only included nulliparous women.[13] In 2 studies, all patients received general anesthesia.[13,14]

### Assessment of risk of bias

Of the 6 included studies, 2 studies[8,10] were judged to have a low risk of bias (Table 2). Two studies[11,13] did not state if blinding to outcome was accounted for and were considered at high risk for detection bias. Risk of bias could not be accounted for or was unclear in 2 other studies,[12,14] since there was no mention of blinding, allocation concealment method, or method of randomization. Keeping this in mind, both studies did not show differences in patient population characteristics between both groups.