



Significance of accidental extensions in the lower uterine segment during cesarean delivery

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KEY WORDS

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Objectives: This study was undertaken to determine risk factors and perioperative complications associated with accidental extensions in the lower uterine segment during cesarean deliveries (CDs).
Study design: This is a retrospective chart review of all CDs performed at Jackson Memorial Hospital/University of Miami between the years 1999 and 2002. Operative reports were reviewed to abstract data on the occurrence of extensions. Indication for CD, cervical status at the time of CD, birth weight, and fetal presentation and position were included in the analyses. Post-operative hematocrits, length of surgery, estimated blood loss, decline in hematocrit by 10%, need for transfusion, or hysterectomy were compared among CD with and without extensions.

Results: A total of 2,811 CDs were available for this study. Accidental extensions in the lower uterine segment occurred in 6.6% of the cases. Extensions were more commonly found in primary CD (8% vs 5%, $P < .01$). Extensions were more frequent if cervical dilatation was 8 cm or greater (18.3% vs 7%, $P < .01$), complete effacement (15% vs 8%, $P < .01$) station greater than +1 (16% vs 6.9%, $P < .01$), and if the fetal position was noted to be in the occiput posterior position (10% vs 5%, $P < .01$). When extensions were present, length of surgery was longer (56 vs 49 minutes, $P < .01$) and estimated blood loss was greater (994 ± 675 mL vs 936 ± 370 mL, $P < .01$). Arrest of descent as indication for CD was found to be an independent risk factor for the occurrence of extensions during CD (odds ratio 2.6, 95% CI 1.5–4.5, $P = .001$).

Conclusion: Extensions in the lower uterine segment during CD do not increase maternal morbidity.

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The overall rate of cesarean delivery in the United States has risen dramatically, from 5% of all deliveries in 1970 to a high of 26% in 2002.¹

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Cesarean section is the most common surgical procedure performed in the United States. The incidence of maternal intraoperative and postoperative complications varies in the literature.^{2–4} Recent data suggest that cesarean delivery (CD) in labor is associated with increased maternal morbidity such as early postpartum hemorrhage when CD without labor (3.9%) was

Table I Maternal demographics in patients with and without extensions

Variables	Extension n = 2625	No extension n = 186	Significance
Maternal age (y), mean \pm SD	29.1 \pm 6.5	28.9 \pm 6.8	NS
Parity median (range)	2 (0-5)	1 (0-4)	NS
Hispanic ethnicity (%)	70%	68.5%	NS
Gestational age at delivery (wk), mean \pm SD	38.0 \pm 3.2	38.6 \pm 3.1	NS

Table II Indications for CD in patients with and without extensions

Indications	Extension n = 2625	No extension n = 186	Significance
Nonreassuring fetal heart tracing	43%	32.4%	.003
Arrest of active phase	39.3%	24%	<.001
Arrest of descent	14.2%	3%	.034
Breech	7%	8.2%	.001

compared with spontaneous onset of labor (6.2%).⁵ Most CDs can be performed through a low transverse incision on the uterus. Rarely, classical CD or low vertical are performed for preterm deliveries with mal-presentations. T and J vertical extensions in the low transverse uterine incision may be performed purposely to facilitate delivery in cases of malpresentation, preterm birth, and poor development of the lower uterine segment.⁵ They have been associated with increased intraoperative complications and prolonged hospital stays.⁶ But no previous study has described accidental extensions in the lower segment during CD. The purpose of this study was to determine risk factors and perioperative complications associated with accidental extensions in the lower uterine segment during CD.

Material and methods

This study is a retrospective chart review of all CDs performed at Jackson Memorial Hospital/University of Miami between the years 1999 and 2002.

Operative reports were reviewed to abstract data on the occurrence of extensions. Indication for CD, cervical status at the time of surgery, (cervical dilatation, effacement and station), fetal birth weight, fetal presentation, and position were included in the analysis. Maternal demographics such as age, parity, and estimated gestational age at delivery were also abstracted.

Data on postoperative course were abstracted from medical records. Postoperative hematocrits, length of surgery, estimated blood loss, decline in hematocrit by 10%, need for transfusion, rate of chorioamnionitis, endomyometritis, or need for cesarean hysterectomy were compared among CDs with and without extensions.

Crude associations between potential risk factors and complications rates were obtained by χ^2 . All continuous variables were analyzed by sample *t* test. Logistic regression analyses were used to identify independent risk factors. Statistical analyses were performed by means of the

Table III Perioperative complications and accidental uterine extensions during CD

Complication	Extension n = 2625	No extension n = 186	Significance
Cesarean hysterectomy	0%	0.5%	NS
Postoperative transfusion	0.6%	0.8%	NS
10% decline in hematocrit	61%	59%	.001
Chorioamnionitis	16.2%	7.5%	.001
Endomyometritis	9.1%	6.2%	NS

Statistical Packages for the Social Sciences (SPSS-PC, Version 10.0; SPSS Inc, Chicago, IL).

Results

A total of 2811 CDs were available for this study. Accidental extensions in the lower uterine segment occurred in 6.6% of the cases. Table I describes the study population. No significant difference was noted in maternal demographics such as age, parity, and ethnicity. Ninety-six percent of the CDs were low segment transverse, the remainder were classical or low vertical incisions. Birth weight was statistically higher in cases with extensions (3437 ± 675 g vs 3227 ± 818 g, $P < .01$). Extensions were more commonly found in primary cesarean sections (8% vs 5%, $P < .01$). Table II contains the indications for CD in the study. Extensions were more frequent if cervical dilation was 8 cm or greater (18.3% vs 7%, $P < .01$), complete effacement (15% vs 8%, $P < .01$), station greater than 1 (16% vs 6.9%, $P < .01$), and if the fetal position was noted to be in the occiput posterior position at the time of delivery (10% vs 5%, $P < .01$).

When extensions were present, length of surgery was longer (56 vs 49 minutes, $P < .01$) and estimated blood loss was greater (994 \pm 675 mL vs 936 \pm 370 mL, $P < .01$).

Table III contains common perioperative complications in women having CD with or without extensions. Only the rate of chorioamnionitis was found to be significantly higher in women with extensions during CD. Women with extensions had a higher rate of 10% decline in hematocrit compared with women with no extension. But no significant difference was noted in postpartum hematocrit, 31.2 versus 31.1, $P = .376$, or maternal length of stay 3.3 versus 3.2 days, $P = .352$. A total of 31 bladder injuries were found, of these only 8 were in the extension group. No ureteral injuries were reported. After logistic regression, arrest of descent was found to be an independent risk factor for the occurrence of extensions during CD (odds ratio 2.6, 95% CI 1.5-4.5, $P = .001$).

Comment

With the significant rise in the rate of CD in the United States, one can anticipate an increase in maternal morbidities. This is the first study to address risk factors and perioperative complications in CDs complicated by extensions in the lower uterine extensions. We identified labor itself as a significant risk factor for the occurrences of extensions, particularly if advanced labor such as cervical dilatation 8 cm or greater, complete effacement, or station at +1 or greater was present. Allen et al² found that compared with CD at less than full dilatation, women undergoing CD at full dilatation were more likely to have complications of intrauterine trauma that included severe extensions of the uterine incision. Compared with CD at less than full cervical dilatation, after adjusting for potential confounders, these authors found that women undergoing CD at full dilatation were 2.57 times more likely to have complications of maternal intraoperative trauma.

Fetal occiput posterior position was associated with higher rate of extensions during CD. Similarly, Senecal et al⁷ found that fetal malposition at full dilatation was associated with a significantly increased risk of instrumental vaginal delivery, CD, oxytocin administration before full cervical dilatation, episiotomy, severe perineal laceration, and maternal blood loss of more than 500 mL. In our study, women with arrest of descent had a 2-fold risk of having an extension during CD. Careful flexion and delivery of the fetal head in the occiput posterior may reduce the incidence of extension

of the incision. Although blood loss and length of surgery during CD was statistically higher in the extension group, these differences were not clinically significant. Length of stay was similar in both groups.

Limitations to our study include those inherent to a retrospective study. Anatomic description of the extensions were not recorded in most cases in the operative report. The use of a 10% decline in hematocrit as an indicator of postpartum hemorrhage is not an accurate measure because it may overestimate the incidence of this complication. Although the group with extensions had a higher rate of 10% decline in hematocrit, there was no difference in postoperative hematocrit. Information on the level of training of the surgeon or period of time in which these CDs were performed was not abstracted. This information would have been useful because training residents of different levels were involved in all cases. Although not addressed in this study, it would be interesting to evaluate whether patients with extensions in previous CDs are at greater risk of uterine rupture during trial of labor.

In summary, women with extensions in the lower uterine segment during CD are not at increased risk for serious morbidities.

References

- Hamilton BE, Martin JA, Sutton PD. U.S. Department of Health and Human Services Centers for Disease Control and Prevention. Preliminary Data for 2002. *Natl Vital Stat Rep* 2003;51:1-20.
- Allen VM, O'Connell CM, Baskett TF. Maternal and perinatal morbidity of caesarean delivery at full cervical dilatation compared with caesarean delivery in the first stage of labour. *BJOG* 2005;112:986-90.
- van Ham MA, van Dongen PW, Mulder J. Maternal consequences of caesarean section: a retrospective study of intra-operative and postoperative maternal complications of caesarean section during a 10-year period. *Eur J Obstet Gynecol Reprod Biol* 1997;74:1-6.
- Hager RM, Daltveit AK, Hofoss D, Nilsen ST, Kolaas T, Oian P, et al. Complications of cesarean deliveries: rates and risk factors. *Am J Obstet Gynecol* 2004;180:428-34.
- Allen VM, O'Connell CM, Liston RM. Maternal morbidity associated with cesarean delivery without labor compared with spontaneous onset of labor at term. *Obstet Gynecol* 2003;102:477-82.
- Boyle JG, Gabbe SG. T and J vertical extensions in low transverse cesarean births. *Obstet Gynecol* 1996;87:238-43.
- Seneca J, Xiong X, Fraser WD. Pushing Early Or Pushing Late with Epidural Study Group. Effect of fetal position on second-stage duration and labor outcome. *Obstet Gynecol* 2005;105:763-72.