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Cephalo-caudal V transverse expansion during caesarean section: Systematic review

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Abstract

Caesarean section is the most common surgical operation worldwide. Haemorrhage is the most common complication of this procedure. One of the methods to decrease blood loss is the blunt expansion of the caesarean incision whenever needed. The aim of this review is to compare the evidence for cephalo-caudal versus transverse expansion during caesarean section.

Medline, Scopus, ClinicalTrials.Gov, EMBASE, the Cochrane Central Register of Controlled Trials, and Google Scholar database were searched for eligible clinical trials with no language restrictions.

6 clinical trials were included published between 2008 and 2019. There was a moderate risk of bias due to absence of allocation concealment in most of the trials. Cephalic-caudal expansion less associated with unintended incision extension (RR 0.62; 95%CI 0.45 - 0.86), less uterine artery injury (RR 0.55; 95%CI 0.41 - 0.73), less need for additional suture placement (RR 0.62; 95%CI 0.31 - 4.12) and less transfusion rates (RR 0.75; 95%CI 0.28 - 2.03).

Thus, this review found that cephalic-caudal expansion is far safer than transverse expansion. Accordingly, this review supports the use of cephalic- caudal expansion whenever needed during caesarean section.

Keywords: Cephalic-Caudal Expansion; Transverse Expansion; Caesarean Section; Unintended Incision Extension; Uterine Artery Injury; Additional Suture Placement

1. Introduction

Most frequently caesarean (LSCS) delivery performed to stop maternal and neonatal morbidity and mortality [1, 2]. The World Health Organization (WHO) suggests that caesarean delivery rates should be kept between 10% and 15% [3]. Nevertheless, in recent decades, a sharp increase in the incidence of caesarean delivery has been observed, reaching more than 31% in United States for example, rendering it one of the most prevalent surgical procedure elective or emergency [2, 4, 5]. Looking worldwide, number of LSCS almost double over the past 15 years [6, 7].

Caesarean delivery is associated with increased risk of maternal death, postpartum infection, formation of wound hematoma and dehiscence, bladder damage, ureteral damage and even fetal injury and death [1, 8]. These complications usually occur in patients with underlying pathology and emergent delivery. Given the increasing prevalence of caesarean delivery, it's easily understandable that improvements within the surgical steps of this procedure are necessary to assist address the increasing rate of obstetrical complications [1, 2, 5, 9]. Several techniques have been developed concerning the abdominal and uterine incisions during caesarean delivery, including the standard

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Pfannenstiel technique and the Joel-Cohen (Misgav-Ladach) technique that involves a straight transverse incision higher than Pfannenstiel incision and manual expansion of the sheath and uterine muscle [1, 8, 10]. There's little information concerning the optimal surgical technique that might help minimize perioperative morbidity [1]. Although blunt uterine incision seems to be related to less blood loss compared with sharp dissection [1, 5, 9]. Comparing the outcomes of women that underwent a cephalad-caudad blunt expansion to those that underwent traditional transverse blunt expansion, is still a dilemma [2, 5]. On the other hand, several articles are published on this subject [2, 11]. This review is conducted to evaluate available evidence comparing Cephalo-caudal versus transverse expansion during caesarean section.

2. Methods

Without applying any language restrictions, search was done for randomized controlled trials (RCTs) assessed the effects of the cephalo-caudal blunt expansion of the low transverse uterine incision during caesarean delivery versus transverse blunt expansion. Search included Medline, Scopus, ClinicalTrials.Gov, EMBASE, the Cochrane Central Register of Controlled Trials, and Google Scholar databases with the reference lists of electronically full-text papers.

Primary outcomes included risk of uterine incision extension, need for additional sutures, and need for transfusion. Secondary outcomes included differences in intraoperative blood loss, uterine artery injury or ureteral injury, uterine atony, use of additional uterotonics, and incision extension. Methodological quality of included studies assessed by 5 domains that include the assessment of (1) randomization bias, (2) selection bias, (3) incomplete outcome data, (4) blinding bias, and (5) selective reporting bias.

Statistical analysis was carried out using Review Manager software and fixed effect meta-analysis was used [12]. Confidence interval (CI) were set at 95%. Risk ratio (RR) was calculated.

3. Results

Search strategy resulted in 634 articles. After removal of duplicates and non-RCT's 19 papers remained. All remaining papers tested for eligibility and only six RCT's found eligible for analysis in this review [6, 7, 10, 11, 13, 14].

Allocation concealment was not stated in most RCT's except one, but all other domains of bias were low risk. Thus, quality of evidence was judged as moderate (Figure 1). All RCT's used Pfannenstiel incision except one were low midline skin incision used [6]. 2818 women included in these RCT's and all needed blunt expansion of the uterine incision. 1413 women were in the cephalic-caudal expansion group, and 1405 were in the transverse expansion group [6, 7, 10, 11, 13, 14]. Methodological characteristics of included studies were comparable (Table 1). Likewise, baseline characteristics of women were comparable (Table 2). Thus, mean maternal age between 26 and 32 years, mean body mass index (BMI) between 26 and 31, and gestational age at delivery more than completed 38 weeks. On the other hand, perioperative characteristics were underreported (Table 3)

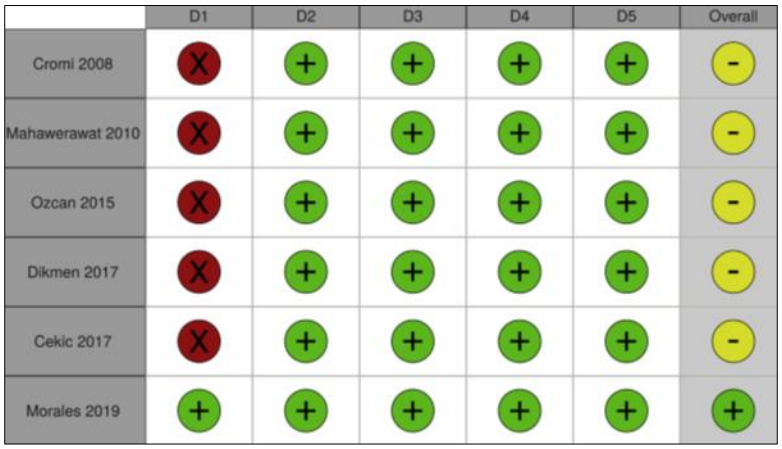

Figure 1 Risk of bias in included RCT's

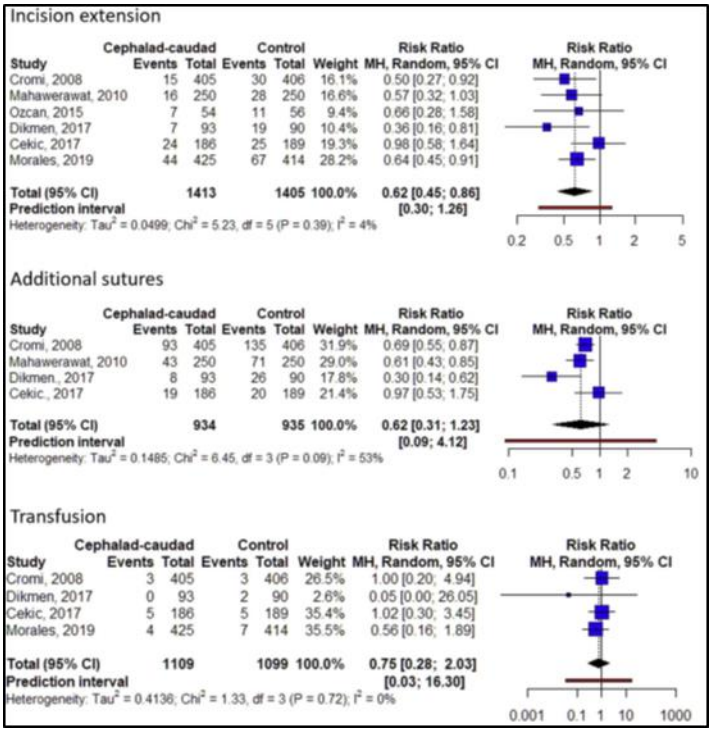

Figure 2 Analysis results

Table 1 Methodology of included studies

RCT	Design	Exclusion criteria	Inclusion criteria	Primary outcomes	Secondary outcomes
Cromi 2008	Prospective RCT	Refuse to participate, antepartum haemorrhage (APH)	Women in labor after 30 weeks gestation	Incidence of unintended extension	Estimated blood loss, blood transfusion, need for additional stitches, operative time, morbidity
Mahaweraw at 2010	Prospective RCT	Refuse to participate, APH	Women in labor after 30 weeks gestation	Incidence of unintended extension	Estimated blood loss, blood transfusion, need for additional stitches, operative time, morbidity
Ozcan 2015	Prospective RCT	APH, sever medical conditions, uterine over distention, anticoagulation therapy	Women in labor, term, 18-40 years, spinal anaesthesia	Incidence of unintended extension	Estimated blood loss, blood transfusion, need for additional stitches, operative time, morbidity
Dikmen 2017	Prospective RCT	Refuse to participate, APH, sever medical conditions, uterine over distention, anticoagulation therapy	Women with repeated cs	Incidence of unintended extension	Estimated blood loss, blood transfusion, need for additional stitches, operative time, morbidity
Cekic 2017	Prospective RCT	APH, sever medical conditions, uterine over distention, anticoagulation therapy, maternal	Nulliparous women in labor after	Incidence of unintended extension	Estimated blood loss, blood transfusion, need for additional

		anemia needs transfusion	34 weeks gestation		stitches, operative time, morbidity
Morales 2019	Prospective RCT	Refuse to participate, APH, sever medical conditions, uterine over distention, anticoagulation therapy, stillbirth	Women in labor	Estimated blood loss, incidence of unintended extension	Blood transfusion, need for additional stitches, operative time, morbidity

Table 2 Participants characteristics of included studies

RCT	Cromi 2008	Mahawerawat 2010	Ozcan 2015	Dikmen 2017	Cekic 2017	Morales 2019
Age Mean	32.6 V 32.7	26.3 V 26.4	30.4 V 29.7	29.5 V 30	26.9 V 27.8	25.9 V 26.2
BMI Mean	26.7 V 27.3	28 V 27.6	28.1 V 28.7	30.2 V 30.7	30.3 V 31.1	NR
Gestational age Mean	38.3 V 38.5	38.5 V 38.2	38.5 V 38.7	38.6 V 38.5	38 V 38.6	38.5 V 38.7
Previous CS %	25.7% V 22.2%	34.8% V 38%	NR	43% V 36.7%	NR	NR
Nulliparity %	84.9% V 86.4%	NR	NR	NR	NR	NR
Gravida Mean	Not reported(NR)	NR	2.8 V 2.4	3.1 V 3	2 V 2	NR
Parity Mean	NR	NR	1.3 V 1.2	1.7 V 1.6	0.7 V 0.7	1.5 V 1.5
Preoperative Hb Mean	NR	NR	NR	11.9 V 12	11.9 V 12	12 V 12.1

Table 3 Perioperative characteristics of included studies

RCT	**Regional anaesthesia %**	**Stage of labor %**		
		Not in labor	**First**	**Second**
Cromi 2008	90.1% V 87.9%	67.6% V 72.9%	15.8 % V 11.3%	16.5% V 15.8%
Mahawerawat 2010	NR	21.6% V 23.2%	65.2% V 65.6%	13.2% V 11.2%
Ozcan 2015	NR	NR	NR	NR
Dikmen 2017	8.6% V 6.7%	NR	20.4% V 25.6%	NR
Cekic 2017	7.5% V 11.6%	NR	NR	NR
Morales 2019	NR	NR	NR	NR

Cephalic-caudal blunt expansion showed associated with a lower prevalence of unintended incision extension (RR 0.62; 95% CI 0.45 - 0.86) and lower prevalence uterine artery injury (RR 0.55; 95% CI 0.41 - 0.73). Moreover, Cephalic-caudal

blunt expansion was not associated with need for additional suture placement (RR 0.62; 95% CI 0.31 - 4.12) or transfusion rates (RR 0.75; 95% CI 0.28 - 2.03) (Figure 2).

4. Discussion

Finding in this review show that cephalic-caudal expansion of lower segment caesarean section (LSCS) is less associated with unintended incision extension. This finding is comparable to previous two reviews done for this subject [2, 5]. The first of these reviews studied only two RCT's, which resulted in an underpowered review due to the small size of the participants [5]. On the other hand, the other review used the same RCT's as this review and the effects were almost the same or comparable to this review [2].

Looking at uterine artery injury, cephalic-caudal expansion seems safer than transverse expansion. Furthermore, transverse expansion results point to being associated with more blood transfusion and additional suture placement compared to cephalic-caudal expansion. Caution should be applied here to interpret blood transfusion outcome since there is only very small sample size and reported only in four studies [7, 10, 13, 14].

Findings of this review exhibit that cephalic-caudal expansion during LSCS seems safer than transverse expansion regarding unintended incision extension, uterine artery injury and blood transfusion. These finding is going with all previous research, RCT's and previous reviews [2, 5-7, 10, 11, 13, 14]. This review also, display for every one the gap of current research RCT's in this area. Future RCT's should be appropriately sized and outcomes should include maternal morbidity, length of hospital stay and need for blood transfusion.

This review was based on random-effect model which reduce variability between studies. Added to that, sample size for most of the outcomes was adequate to permit safe interpretation of result. On the other hand, this review evidence deemed moderate because of the moderate risk of bias due to absence of allocation concealment of participants in five of the six RCT's included. On the contrary, RCT's methodology and participants base line characteristics demonstrate no discrepancies.

5. Conclusion

Results of this review found that cephalic-caudal expansion of LSCS is far safer than transverse expansion. Therefore, this review supports the use of cephalic- caudal expansion whenever needed during LSCS.

There is a real need for RCT's designed to test expansion of the incision of the LSCS whenever needed. These RCT's should be appropriately sized and Outcomes should include maternal morbidity, length of hospital stay and need for blood transfusion.

Compliance with ethical standards

Disclosure of conflict of interest

Both authors declare that they have no conflict of interest.

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