

# A prospective cross-section comparative study between cephal-cauded blunt uterine incision expansions vs. transverse blunt expansion in emergency CS

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## SUMMARY

**AUTHORS' CONTRIBUTION:** (A) Study Design · (B) Data Collection · (C) Statistical Analysis · (D) Data Interpretation · (E) Manuscript Preparation · (F) Literature Search · (G) No Fund Collection

**Background:** A new technique of uterine incision expansion has been studied in different trials in the past few years in elective CS but cephal-cauded is not studied in emergency CS or CS due to arrest in 2nd stage of labor.

**Design:** A prospective cross-section comparative study which was carried in 2 hospitals in Saudi Arabia in the period between January 2022 and June 2022.

**Methods:** Women underwent CS using cephal-cauded expansion (group A; n=40) and transverse expansion (group B; n=40), with each group having undergone it in a different hospital. We included only patients in the 2nd stage of labor with emergency CS (labor arrest or non-reassuring fetal status).

**Measured outcomes were:** Occurrence of uterine over-extension, vessel injury, need for additional stitches, and blood loss.

**Results:** Generally, cephalad-caudal expansion, compared with transverse expansion, had better outcomes, but without statistical significance.

**Conclusions:** In CS at 2nd stage of labor, cephalad-caudal expansion of the uterine incision may be an option.

**Keywords:** Cephal-caudad expansion; Traditional transverse expansion; Emergency caesarean section; Unintended extension

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**Word count:** 1848 **Tables:** 02 **Figures:** 01 **References:** 07

**Received:** 12.11.2022, Manuscript No. gpmp-22-79619; **Editor assigned:** 13.11.2022, PreQC No. P-79619; **Reviewed:** 21.11.2022, QC No. Q-79619; **Revised:** 05.12.2022, Manuscript No. R-79619; **Published:** 29.12.2022

## INTRODUCTION

World Health Organization encourages that cesarean section rates should be between 10% and 15% [1]. In recent decades, the incidence of cesarean delivery has sharply increased, reaching approximately 1,190,000 deliveries in the USA (31.7% of all deliveries), which renders it the most prevalent surgical procedure performed on both elective and emergency indications [2,3].

In metanalysis of Pergalioitiseiet al., 6 RCTs were included in this meta-analysis; these studies included 2818 women who had cesarean deliveries with a low transverse uterine incision followed by a blunt expansion of the uterine incision. This recent systematic review and meta-analysis published in ACOJ 2021, suggested that cephal-cauded blunt expansion of the uterine incision is superior to transverse expansion in reducing unintended incision extension and uterine vessel injury [4]. The limitation of this metanalysis as mentioned by the authors is that it was based on evidence drawn from the six randomized trials of moderate risk of bias that was mainly attributed to the lack of proper allocation concealment of patients. However, they wondered if the cephalad-caudad technique helps to reduce the transfusion rates as the required sample size needed to be reached in their meta-analysis to allow more precise information on this outcome. They believed that future research studies to include women in the second stage of labor, especially those with malpresentation and women who underwent emergency CS.

## AIM

The current work aims to compare cephalad-caudad and transverse expansion as regards the incidence of unintended uterine extension as a primary outcome at emergency cesarean section and CS done in the second stage of labor.

## PATIENTS & METHODS

This was conducted in 2 hospitals in Saudi Arabia. One hospital consultant performed the cephalad-caudad group, and the second group transverse expansion was performed by another consultant in the second hospital (all surgeons were of the same level and experience). The ethical committee of both hospitals approved the study, and properly informed consent was undertaken from the patients.

Patients were subjected to full history taking (personal, menstrual, detailed obstetric & past surgical history), examination (general, obstetric & local pelvic examination), and routine investigations (C.B.C, Rh, blood grouping and albumin in urine) and ultrasonography to select the patients fulfilling the inclusion criteria which are: age 18 till 40, term pregnancy either primigravid or multigravida, patients in labor either induced or spontaneous onset, no previous CS or previous uterine scar Patients excluded from the start are those with malpresentation as breech, Preterm pregnancy, multiple pregnancies, suspected macrosomia, polyhydramnios or cases with oligohydramnios or fetal growth restriction.

### Sample Size Justification

The study included all women fulfilling the inclusion and exclusion criteria who were admitted between January 2022 and June 2022 at the 2 hospitals

The included women were classified into two groups:

**Group A; Cephal-cauded blunt expansion (Cephal-cauded Group):** 40 women who had cephal-cauded blunt expansion of the uterine incision all done in one hospital by one consultant.

**Group B; Transverse blunt expansion (Transverse Group):** 40 women who had transverse blunt expansion of the uterine incision in the second hospital.

### Surgical procedure

Patients were taken for emergency CS only in the second stage of labor due to failure of descent or fetal distress. Skin incision with the sharp opening of subcutaneous tissue and Scarpa's fascia using the scalpel; the opening of the rectus sheath by transverse incision then dissection of the recti muscles then opening the peritoneum bluntly - Dissection of the bladder downward, the uterine incision was made as C shape incision about 3 finger breadth to standardize the length of the incision. The cavity was entered bluntly with a fingertip.

### The intervention at this point:

- A. Cephalad-caudad blunt expansion (Cephalad-caudad Group) (n=40): where the C-shaped uterine incision was widened by separation of the surgeon forefingers in a cephalad -caudad direction along the midline for also a distance finger width.
- B. Transversal blunt expansion (Transverse Group) (n=40): where the uterine incision was widened by the surgeon's thumbs of both hands apart from medial to lateral for a distance about another 4-finger width. Delivery of the fetal head by surgeon's hand, spontaneous delivery of the placenta. Closure of uterine incision was done by vicryl sutures in a continuous double-layer manner. All intraoperative details were recorded; no of ampoules used in closing the uterine incision, time of closure of the uterine incision.

Uterine artery injury was defined as an injury of the vessels that required uterine artery ligation. On the first postoperative day, 24 hours after the operation, the hemoglobin value was determined and compared with the preoperative HB value to evaluate blood loss.

### Statistical analysis

The collected data was revised, coded, tabulated, and introduced to a PC using Statistical Package for Social Science (SPSS 25.0.1 for windows; SPSS Inc, Chicago, IL, 2001). Shapiro Wilk's test was used to evaluate the normal distribution of continuous quantitative data. Quantitative non-parametric variables are expressed as mean and SD. Qualitative variables are expressed as frequencies and percentages. Student t-test was used to compare a quantitative variable between two study groups for parametric data & Mann-Whitney U test was used to compare the two groups for non-parametric data. Chi-square and Fisher's exact test examined the relationship between categorical variables. A p-value <0.05 was considered statistically significant.

## RESULTS

A total of 88 pregnant women were enrolled in the study; 8 cases were excluded from the enrollment as follow

5 of them refused to continue to participate, and 3 cases were excluded as they left for other hospitals before taking the necessary data (**Fig. 1**).

Finally, eighty pregnant women were classified into two groups; 40 women in each group in one hospital: Group A: the cephalad-caudad group in the first hospital, and Group B: The transverse group in the second hospital. As shown in (**Tab. 1**). No statistically significant difference was found between the 2 groups regarding age, BMI, G.A at birth, or fetal weight.

In the current study, there was no statistically significant difference between the 2 groups as regards uterine extension (**Tab. 2**). Also, there was no statistically significant difference between the two groups in regards to the occurrence of uterine vessel injury. There was no significant difference between the two groups as regards the need for blood transfusion, pre-operative Hb value, and post-operative value of Hb level.

## DISCUSSION

### Interpretation of our results and their comparison to similar studies

This study aimed to compare cephalad-caudad and blunt transverse expansion of uterine incision in emergency CS that emerges from urgent indications of the second stage of labor, either failure of descent or fetal distress, and this was the recommendation of the last meta-analysis and review article of Pergialiotiseiet et al. that was published in AJOG [4].

**Tab. 1.** The demographic data of 2 groups.

Variables	Group A [cephal cauded blunt expansion] (N=40)	Group B [Transverse blunt expansion] (n=40)	p-value
Age (Years )			
Range	18 – 38	18 – 38	0.261
Median (IQR)	31 (24 – 35)	29 ( 23 – 33)	
Gestation at Delivery (weeks)			
Range	38 -41	38 – 41	0.317
Median (IQR)	39.4 (38.3 – 40.5)	39.6 (38.5 – 40.3)	

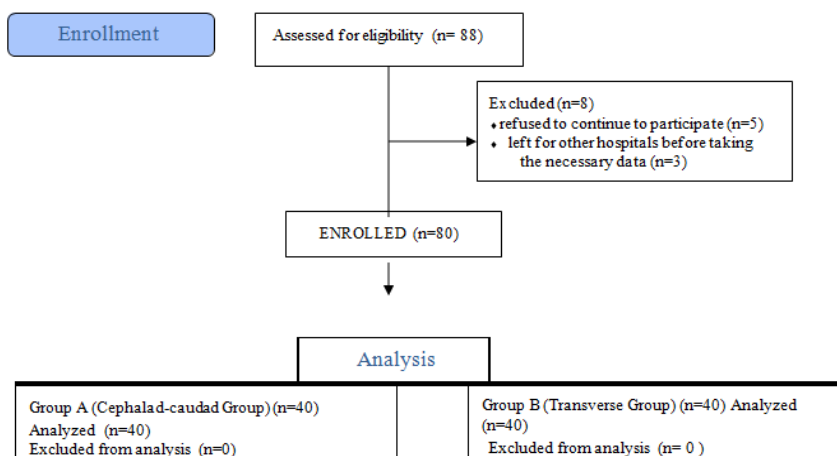
Data presented as range, median & IQR interquartile range (IQR); Analysis using Mann-Whitney's U-Test for age and gestational age; p-value >0.05 is insignificant

**Tab. 2.** The comparison between 2 groups as regard the study outcomes.

Adverse outcomes	Group A [cephal cauded blunt expansion] (N=40)	Group B [Transverse blunt expansion] (n=40)	P-value
Unintended uterine extension Nil	38 (95.0%)	37 (92.5%)	0.646†
Lateral extension	2 (5.0%)	3 (7.5%)	0.646†
Cervical laceration	1 (2.5%)	2 (5.0%)	0.559†
Uterine vessel injury	1 (2.5%)	2 (5.0%)	0.559†
Blood transfusion	1 (2.5%)	2 (5.0%)	0.559†
Pre-operative Hb	11.13±0.78	11.31±0.79	0.308 #
Post-operative Hb	10.88±0.76	10.77±0.75	0.517 #

Analysis using † Fisher's exact; #Independent Sample t-test ; p-value >0.05 is insignificant

**Fig. 1.** CONSORT 2010 flow diagram.



The results of the present study showed a decrease in the occurrence of lateral extension, cervical extension, and uterine vessel injury. Still, they did not reach a statistically significant difference between the two groups. There was no difference between the 2 groups needing a blood transfusion in preoperative or post-operative HB.

The results of the meta-analysis of Pergialiotisei et al. were summarized as follows; Cephalad- caudad blunt expansion was associated with a lower prevalence of unintended incision extension (relative risk, 0.62; 95% confidence interval, 0.45-0.86) and uterine vessel injury (relative risk, 0.55; 95% confidence interval 0.41-0.73). However, these complications were not accompanied by the increased need for additional suture placement (relative risk, 0.62; 95% confidence interval, 0.31e4.12) or transfusion rates (relative risk, 0.75; 95% confidence interval, 0.28-2.03). Similarly,

the intraoperative duration was comparable with cases treated with blunt transverse expansion (95% confidence interval 2.12 to 1.21) and the risk of intentional incision extension in the form of an inverted T (relative risk, 0.38; 95% confidence interval, 0.09-1.52). Trial sequential analysis revealed that the required sample size was reached in the unintended incision extension and uterine vessel injury outcomes.

This trial was done on groups of urgent cases; the consultant in charge was the one performing the urgent CS aided by the senior registrar, who was experienced enough to do the least complications.

There was no statistically significant difference between the 2 groups as regards uterine expansion or injury of uterine vessels. This is in agreement with the study of Mahawerawat

and Jeerasap [5] and that of Ozcan et al., [6], where they stated that there was no significant difference between the same groups as regards the incidence of uterine extension. However, in the study of Mahawerawat and Jeerasap and Cromi et al., they stated that blunt transverse expansion is associated with significantly higher injury of uterine vessels compared to the cephalad-caudad group [5,7].

In this study, we found no significant difference between the 2 groups regarding the need for intra- operative blood transfusion. This agrees with other RCTs, as stated in the meta-analysis of Pergialiotisei et al. [4].

As for comparing the preoperative hemoglobin level between the 2 groups, no statistically significant difference between both groups (P=0.980); this was also applied to postoperative results with no statistically significant difference (P=0.272); this can be attributed to the good experience of consultants performing the cesarean sections in the study.

## STRENGTH AND WEAKNESS OF OUR STUDY

The strength of the current study is that it is the first study to evaluate the cephal-cauded expansion in emergency CS (all studies evaluated it in elective CS). Limitation of this study is the relatively small number of patients and the need for more randomization.

## CLINICAL IMPLICATIONS OF STUDY

As regard clinical practice, we recommend teaching this technique to junior obstetricians as well as traditional technique

## RECOMMENDATION FOR FURTHER RESEARCH

Further studies are needed to be randomized and on larger scale of patients

## CONCLUSION

The cephalad-caudad technique has a lower complication rate than the transverse expansion technique but not reaching the level of statistical significance.

## ETHICS APPROVAL

Study approved by Ethical Committee of 2 hospitals.

## CONSENT FOR PUBLICATION

Non-applicable.

## AVAILABILITY AND DATA MATERIAL

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

## COMPETING INTERESTS

The authors report there are no competing interests to declare.

## FUNDING

This study received no financial support.

## REFERENCES

1. WHO H. WHO statement on caesarean section rates. Geneva, Switzerland. 2015.
2. Centers for Disease Control and Prevention. National Center for Health Statistics. Vital statistics online data portal. Births—method of delivery.
3. Nagy S, Papp Z. Global approach of the cesarean section rates. *J Perinat Med.* 2021;49(1):1-4.
4. Pergialiotis V, Mitsopoulou D, Biliou E, et al. Cephalad-caudad vs. transverse blunt expansion of the low transverse hysterotomy during cesarean delivery decreases maternal morbidity: A meta-analysis. *Am J Obstet Gynecol.* 2021;225(2):128-e1.
5. Mahawerawat S, Jeerasap R. Comparison of unintended uterine extension between cephalad-caudad and transverse blunt expansion techniques for low transverse cesarean delivery. *Thai J Obstet Gynaecol.* 2010:120-125.
6. Ozcan P, Ates S, Guner Can M, et al. Is cephalad-caudad blunt expansion of the low transverse uterine incision really associated with less uncontrolled extensions to decrease intra-operative blood loss? A prospective randomised-controlled trial. *J Matern Fetal Neonatal Med.* 2016;29(12):1952-1956.
7. Cromi A, Ghezzi F, Di Naro E, et al. Blunt expansion of the low transverse uterine incision at cesarean delivery: a randomized comparison of 2 techniques. *Am J Obstet Gynecol.* 2008;199(3):292-e1.