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Research paper

Maternal outcomes following second stage caesarean section in a tertiary hospital in Malaysia: A 6-year retrospective review

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Abstract

Introduction: The trend for second stage caesarean section (SSCS) has been rising, and it carries a high rate of maternal and neonatal morbidity.

Aim: To determine the prevalence of caesarean section (CS) performed during the second stage of labour and identify maternal outcomes and associated risk factors in these women.

Material and methods: This retrospective study was performed in the Hospital University Sains Malaysia (HUSM). Medical records of 207 women with singleton cephalic pregnancies at term who underwent a SSCS between January 1, 2010 and December 31, 2015 were reviewed, and demographic and outcome data were collected.

Results and discussion: During the study period, 8,197 (19.3%) out of 42,546 babies were delivered by CS, including 257 (4.1%) SSCSs. Nearly half (49.3%) the women were nulliparous, 182 (87.9%) experienced spontaneous labour and 123 (59.4%) received oxytocin augmentation. Furthermore, 26 (12.6%) of women had post-partum haemorrhage (≥1000 mL), of whom 22 (10.6%) required blood transfusion. Only 1 (0.5%) woman was admitted to the intensive care unit postoperatively, but 163 (78.7%) had an overall hospital stay length of 3 days. Furthermore, 38 (18.4%) and 33 (15.9%) of women experienced extended uterine tear and uterine atony, respectively. Parity ($P < 0.001$), attempted instrumentation ($P < 0.001$) and baby's weight ($P < 0.004$) were statistically significantly associated with total blood loss. Parity ($P < 0.012$) and attempted instrumentation ($P < 0.001$) were risk factors for extended uterine tear.

Conclusions: The overall outcomes from SSCS were better compared with studies performed in other centres. Current practices must be maintained or improved to provide the best patient caree.

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1. INTRODUCTION

Caesarean section (CS) is the most commonly performed obstetrics procedure. Over the past two decades, caesarean delivery has become more commonly used worldwide. Despite attempts at reducing CS rates, there has been a gradual and steady rise in its use in most developed countries. This is a cause for concern because CS is associated with a higher possibility of adverse outcomes for both the mother and foetus compared to vaginal delivery.[1] The World Health Organisation issued a consensus statement in 1985, stating that there were no additional health benefits associated with a CS rate greater than 10%–15%.[2] The current CS rate worldwide is approximately 10%–20%.[3] CS can be performed before labour, or during the first and second stages of labour. Govender et al.[4] defined second stage CS (SSCS) as that performed following full cervical dilatation. SSCS accounts for approximately 4.8% of all CS deliveries.[4] SSCS is associated with higher morbidity for the mother and foetus compared with first stage sections (FSCS).[1–5] Despite many concerns over the increasing CS rate, little attention has been paid to the rising rate of CS during the second stage of labour.

2. AIM

The aim of this study was to determine the prevalence of CS during the second stage of labour and to identify the maternal and neonatal outcomes associated with SSCS in the HUSM.

3. MATERIAL AND METHODS

We conducted a retrospective study of SSCS in the HUSM. All CSs performed from January 1, 2010 until December 31, 2015, were reviewed to determine which cases met our inclusion criteria of singleton and live pregnancies. Patients with morbidly adherent placenta, uterine fibroids in pregnancy and coagulation disorders were excluded from this study.

The data were derived from a retrospective case review of patients who underwent CS during the second stage of labour in the HUSM between 2010 and 2015. Data were collected in four categories, namely, patient demographic data, delivery details, and maternal and neonatal outcomes.

The data were analysed using statistical package for social sciences (SPSS) software v. 22. Descriptive statistics were used to express categorical data described as percentages and continuous data as mean (standard deviation – SD) or median (interquartile range – IQR). Multiple logistic regression analysis was used to describe the association between risk factors and maternal outcomes, and the results were expressed as the odds ratio (OR). A *P* value of less than 0.05 was considered statistically significant.

Table 1. Maternal characteristics (*N* = 207).

Variables	*N* (%)	Mean (SD)
Age, y	–	29.6 (5.4)[a]
Gravida/Parity		
1 (primigravida)	102 (49.3)	
2–4 (multipara)	84 (40.6)	
≥5 (grandmultipara)	21 (10.1)	
Gestational age at delivery (weeks)	–	39 (1.0)[b]
Previous scar	48 (23.2)	
Referred in second stage of labour	48 (23.3)	
BMI, kg/m^2		31.2 (5.2)[a]
Comorbidities		
Gestational hypertension/pre-eclampsia	14 (6.8)	
Gestational diabetes/diabetes mellitus	40 (19.3)	
Anaemia (Hb < 11 g/dL)	16 (7.7)	

Comments: [a] Mean (SD); [b] Median (IQR).

Table 2. Labour and delivery characteristics (*N* = 207).

Variables	*N* (%)	Mean (SD)
Onset of labour		
Spontaneous	182 (87.9)	
Induced	25 (12.1)	
Pitocin augmentation	123 (59.4)	
Duration of labour (minutes)		
1st stage		375.2 (200.5)[a]
2nd stage		143.8 (56.2)[a]
Position prior to CS		
Occipitotransverse	80 (38.6)	
Occipitoanterior	66 (31.9)	
Occipitoposterior	61 (29.5)	
Station prior to CS		
−2	9 (4.3)	
−1	51 (24.6)	
0	129 (62.3)	
+1	16 (7.7)	
+2	2 (1.0)	
Indication for caesarean section		
Foetal distress during second stage which is not suitable for instrumentation	9 (14.5)	
Prolonged second stage	168 (81.2)	
Failed instrumentation	30 (14.5)	
Attempted instrumentation	30 (14.5)	
Level of surgeon		
Medical officer	188 (90.8)	
Registrar	14 (6.8)	
Specialist	3 (1.4)	
Consultant	2 (1.0)	

Comments: [a] Mean (SD).

4. RESULTS

During the six-year study period (January 1, 2010 to December 31, 2015), there were 42456 total deliveries. The overall CS rate was 19.3% (8197 out of 42546 deliveries). Of all the CSs, 6343 (77.4%) were emergency CSs. A total of 257 (4.1%) emergency lower segment caesarean sections (EMLSCSs) were performed during the second stage of labour, of which 207 were analysed. Due to incomplete data 50 patients were excluded. The maternal characteristics are described in Table 1 and the labour characteristics are described in Table 2. The maternal and foetal outcomes are listed in Tables 3 and 4, respectively.

Risk factors for post partum haemorrhage (PPH) were assessed and significantly associated with parity and attempted instrumentation ($P < 0.001$). Parity 5 and more patient has 18.375 times the risk of developing PPH compared with a Parity 1 patient). Meanwhile, those with attempted instrumentation before SCCS had a 0.199 times increased risk of developing PPH compared with patients without attempted instrumentation.

Significant associations were noted between parity ($P = 0.017$) and attempted instrumentation ($P < 0.001$) with extended uterine tear. A Parity 5 and more patient has 4.136 times the risk of experiencing an extended tear compared with a Parity 1 patient, and patients with attempted instrumentation had a 0.036 times increased risk of experiencing an extended uterine tear compared with patients without attempted instrumentation. No significant association between foetal station and extended tear ($P = 0.697$) and PPH were analysed ($P = 0.258$). The other risk factors for PPH and extended uterine tear, such as body mass index (BMI), previous CS, duration of the second stage of labour, and the baby's weight, were not statistically significant in this study.

Table 3. Maternal outcomes associated with SSCS ($N = 207$).

Variables	*N*(%)	Mean (SD)
Estimated blood loss, mL		545(357)[a]
≥1000	26(12.6)	
Complications		
Uterine atony	33 (15.9)	
Extended uterine tear	38 (18.4)	
Cervical tear	0 (0)	
Bladder injury	0 (0)	
Blood transfusion	22(10.6)	
Admission to ICU	1(0.5)	
Length of hospital stay postdelivery, in days		3(1)[a]
Duration of caesarean section, in minutes		45(22)[b]

Comments: [a] Mean (SD); [b] Median (IQR).

Table 4. Foetal outcomes associated with SSCS (N = 207).

Variables	*N*(%)	Mean (SD)
Birth weight, kg		3.43 (0.40)[a]
Apgar score (at 1 minute)		8 (1)[a]
<5	16(7.7)	
5–7	23(11.1)	
≥8	168(81.2)	
Intubation	16(7.7)	
NICU admission	56(27.1)	

Comments: [a] Mean (SD); [b] Median (IQR).

5. DISCUSSION

The prevalence of CSs during the second stage of labour is increasing. SSCSs are associated with significant psychological and physical maternal morbidities.[6–8] Avoiding the first CS in a woman's life minimises risks in subsequent pregnancies and increases the chance of a normal vaginal delivery in future.[7,8] SSCS is associated with more than twice the risk of intraoperative trauma compared with FSCS. Vousden et al. reported that maternal intraoperative trauma, such as laceration to the bladder or bowel, or extension of the uterine incision, occurs in 10%–27% of deliveries.[9] They also mentioned that maternal PPH occurs in 4.7%–10% of women with increased rates of haemorrhage compared with FSCS (4.7% vs. 2.9%).[9] In the HUSM, this study indicated that SSCS comprised 4.1% of CSs with an overall CS rate of 19.3%. This incidence is in line with a report stating that SSCS delivery accounts for approximately 4.8% of all deliveries by CS and between 12% and 29% of emergency CSs in labour.[2] A large prospective study conducted in United Kingdom study by Murphy et al. reported an SSCS incidence of 2.0% of all deliveries, with an overall CS rate of 18%.[10] The Royal College of Obstetricians and Gynaecologists reports that approximately 6% of CSs for singleton pregnancies occur at full dilatation.[11] Most of the women in this study were obese (53.6%), with a mean BMI of 31.2 (5.2) kg/m^2; 23.2% had one previous lower segment CS scar. Furthermore, 59.4% of the patients were labour-augmented, whereas 40.6% naturally progressed into the second stage.

Previous studies have suggested that the longer the second stage of labour, the higher the risks of specific maternal outcomes such as extended uterine tear and postpartum haemorrhage.[7] These complications may be more frequent for CSs performed after 2 or 3 h of pushing efforts than CSs performed during the first 2 h of the active second stage of labour.[12] In this study, the mean duration of the second stage of labour for all women was 143.8 ± 56.2 minutes. Fifty-three patients (25.6%) had a second stage lasting more than 3 h (≥180 minutes) before the CS commenced. About 48 (23.3%) of the cases were referred from the district hospital, contributing to the higher mean duration of second stage labour even though half of these patients had underlying comorbidities. That also explained the lower morbidity of CS involving extended tears, as the longer duration was contributed by the travel time, not by the active pushing duration.

PPH incidence was (12.6%), which is lower than those reported by Asicioglu et al.,[1] Unterscheider et al.,[7] and McKelvey et al.,[13] but higher compared with those reported by Vousden et al.[9] and Pergialiotis et al.[14] PPH can be influenced by multiple factors. Our transfusion rate was 10.6%, which is higher compared with those of other studies, except for that by McKelvey et al.,[13] which reported 19.8%. The reason for the higher transfusion rate could be the underestimated blood loss and underlying anaemia (7.7%).

The attempt for instrumentation (14.5%) was statistically associated (P <0.001) with PPH and extended tears, which was comparable with the findings of Davis et al.[15] The two types of instruments used in this study were the vacuum and forceps. The majority of cases of attempted instrumentation were by vacuum. The foetal presentation usually became more impacted in the pelvic cavity, creating a challenging delivery situation during SSCS. The vacuum delivery failure rate was higher when compared with forceps delivery. Doctors should also be trained in surgical vaginal delivery, as it will reduce the CS rate and associated morbidity. Furthermore, the correct assessment is very important, as failed instrumentation will usually amplify the risk of SSCS both for the mother and the foetus. A previous study reported that a higher BMI, presence of a uterine scar, lower station of presenting part before CS, longer duration of Pitocin augmentation, and longer duration of the second stage of labour will lead to a more difficult SSCS, causing more blood loss and extended uterine tears.[16] However, in this study, we noted that only parity and attempted instrumentation were statistically significantly associated with the increased risk of postpartum haemorrhage and extended uterine tear in SSCS. This is likely due to the presence of other confounding factors that may affect the overall results compared with other studies. Furthermore, this study noted that a higher parity was associated with an increased mean blood loss intraoperatively. These findings were consistent with the postulation that as parity increased, the risk of uterine atony also increased, thus leading to increased blood loss. Improvement and standardisation of the documentation of clinical and intraoperative findings should be implemented for better interpretations and comparisons in the future.[15]

The positive outcomes of this study include only one case of Intensive Care Unit (ICU) admission, no cases of bladder injury, cervical tears, or hysterectomy, and no maternal mortality from SSCS. Our hospital is one of the specialist training centres in Malaysia. SSCS is usually performed by a well-trained surgeon (registrar, specialist or consultant), and if the CS were performed by a medical officer, their immediate superior or higher reporting person should be present in the operating theatre. There is insufficient evidence to recommend any specific technique for CS delivery in the second stage of labour. The nature of emergency deliveries makes it challenging to study different techniques, but their prevalence and importance justifies investigations. It is unlikely that CS rates will fall significantly soon; therefore, we must explore other ways of reducing the morbidity related to these procedures. One possible way is by improving the training for vaginal instrumental delivery. A recent study of translabial ultrasound use in the second stage of labour indicates that it might be a better indicator of failed instrumental delivery than clinical assessment.[16] Apart from that, the innovation of specific devices, as described in the literature to aid CS delivery at full dilatation should be considered. The Fetal Disimpacting System,[17] the Fetal Pillow,[5] and the C-snorkel,[18] are examples mentioned in the literature. Despite all the devices innovation, none of these devices are available in our hospitals. These devices should be cost-effective and clinically practical for both surgeon and patient. In this study, we were not able to analyse the position of the patient during operation as it is not standardly documented in the operative notes. Some of the surgeon practice different position to obtain optimal positioning of the patient before CS. It is also essential to consider the ease of the surgeon performing the SSCS, and thus to minimise injury to the patient. The 'Whitmore position' was described in the literature; in this position, the patient is placed in a modified lithotomy; the thighs are moderately abducted and flexed to 135° from the trunk.[19]

Several methods discussing the modification of delivery techniques for CS at full dilation have been reported in the literature.[9,19–22] The 'push' method describes the woman being placed in a semi-lithotomy position and the foetal head being pushed up from the vagina by an assistant while the operating surgeon applies traction upward on the baby. The reverse breech or 'pull' method involves grasping one or both foetal feet at the fundus of the uterus and applying steady traction in the downward direction; this method is associated with lower maternal morbidity.[20] Patwardhan's method is described less commonly. This involves the delivery of both foetal shoulders through the incision followed by the trunk, breech and then finally lifting the head out of the pelvis.[9,19] A study compared the push method and Patwardan's method in SSCS and concluded that there was no significant difference between the incidence of uterine incision extension between the two methods (24.9% vs. 26%).[21] Seven randomised controlled trials involving 582 women undergoing CS compared the extraction method during the second stage and concluded that there is limited evidence that reverse breech extraction may improve maternal and foetal outcomes.[22] In this study, the delivery technique was not especially emphasised. The standardisation of CS delivery records would be ideal for a more accurate assessment of outcome audits.

Most neonates had an Apgar score greater than 8 at 1 minute (81.2%), whereas only 7.7% had an Apgar score less than 5, which is comparable with a previous study.[15] A total of 27.1% of neonates were admitted to the Neonatal ICU (NICU), which may be associated with other factors such as risk of infection and maternal illness that can affect neonates. Information on cord blood pH and NICU admission should be documented properly in the patient's notes for more accurate analysis. Further study involving the neonatal unit can result in a better review of SSCS outcomes.

6. CONCLUSIONS

Overall, we can conclude that SSCS performed in the HUSM from 2010 to 2015 had better maternal outcomes compared with previous studies, as reflected by the incidence of bladder injury, cervical tear, ICU admission and mean duration of hospital stay being nearly the same as non-SSCS. These good outcomes were most likely the result of proper patient assessment and selection prior to CS and diligent supervision by the consultants, specialists and well-trained trainees in charge before the CS. The neonatal outcomes were comparable with other studies; however, further evaluation must be performed.

Conflict of interest

Authors declare no conflict of interest.

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Ethics

Ethical clearance approval was obtained from the Human Research and Ethics Committee of HUSM and consistent with tenets of the Declaration of Helsinki.

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