Original Article

Maternal and Neonatal Morbidity after First Vaginal Delivery using One Simpson's Forcep

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Abstract

Objective: To analyse maternal and neonatal morbidity associated with instrumental delivery using One Simpson's forcep

Methods: Between January 2011 and June 2012, 680 nulliparous women with term, singleton, cephalic pregnancies gave birth by either one forcep (n=334) or spontaneous vaginal delivery (n=346) and were studied in a retrospective case-control study. Maternal and neonatal morbidity were compared in the one forcep vs.spontaneous delivery groups.

Results: Women who underwent instrumental delivery using One Simpson's forcep was more likely to have severe perineal tears (OR 5.3, 95% CI 1.1-24.4), occiput posterior position (OS) (OR 3.8, 95% CI 2.09-7.2), birth weight > 4000g. (OR 3.7, 95% CI 1.21-11.4), and extended hospital stay (OR 1.52, 95% CI 1.1-2.0) than women having a spontaneous vaginal birth. No significant difference was noted in neonatal period.

Conclusion: This data supported the safety of One Simpson's forcep on infant outcome. Maternal morbidity observed with One Simpson's forcep was lower than that reported in the literature for other modes of instrumental delivery but the risk for perineal morbidity was higher than for spontaneous delivery. Neonatal morbidity appeared to be limited.

Key words: instrumental delivery, One Simpson's forcep

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Introduction

Recently, instrumental delivery has been implicated in perineal injuries and especially in a higher incidence of third degree tears.[1-3] Perusal of the literature shows that forceps and vacuum extractors are the most widely used instruments for assisted vaginal delivery in the world.

Because One Simpson's forcep, easy applied forcep, is used by a new–technique and is associated with low fetal morbidity in the hands of skilled obstetrician. Simpson's forceps are well-known instruments in many countries of the world.

The main advantage of One Simpson's forcep is to lower the risk of fetal injury and maternal morbidity. In contrast with conventional forceps, One Simpson's forcep does not lock on the fetal head thus avoiding compression. Like vacuum extractors, One Simpson's forcep allows flexion of the fetal head by Spooning technique. The purpose of this study was to compare maternal and neonatal morbidity in primiparas who underwent instrumental delivery using One Simpson's forcep versus spontaneous vaginal delivery.

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Materials and methods

This case-control study was conducted in a tertiary care obstetric hospital between January 2011 and June 2012. Inclusion was restricted to successful singleton vertex instrumental vaginal deliveries carried out in primiparous women after full-term pregnancy (>37 weeks'gestation). Multiparous women were excluded to rule out the confounding effects of previous perineal injury. The cohort of women was divided into two groups according to the mode of vaginal delivery that is, instrumental (case group) versus spontaneous (control group). Controls were defined as the first vaginal delivery in primiparous then One Simpson's forcep was applied for the indication. Our institutional ethical committee was approached and approved the study.

Spontaneous deliveries were performed by midwives or physicians. Instrumental deliveries were performed by attending physicians. One Simpson's forcep was used for instrumental delivery in all cases (334 cases). Failure 54 case (13.9%) were excluded from this study. This device consists of one lever of Simpson's forcep, having a blade, shank and handle (Fig.1). Indications for extraction using One Simpson's forcep is the same as for extraction using conventional forceps or vacuum devices which is either engaged fetal head with fetal distress or lack of progression during second stage of labour or prolonged 2nd stage. In both groups mediolateral episiotomy was performed to assist extraction. Midline episiotomy was never performed.

Maternal characteristics were noted including ethnicity, age, height, weight, body mass index before pregnancy, and weight, body mass index at the time of delivery. The following data concerning labour and delivery were reviewed by an independent researcher: duration of labour components: first, second, or third stage, fetal head position, mode of delivery and episiotomy. In the post-partum period, perineal tears, hemorrhage based on pre and post partum hematocrit values, and length of hospital stay were recorded. The severity of perineal tears was classified as follows: first degree which is simple perineal or vaginal laceration; second degree which is laceration of the perinea muscles; third degree which is lesion of the external anal sphincter; and fourth degree which is involvement of both anal sphincter and anorectal mucosa. Neonatal data included trauma, birth weight, admission to special care baby unit (SCBU), Apgar score at 5 min, occurrence of sepsis, and perinatal death.

A total sample size of 600 patients: 300 cases and 300 controls were chosen to detect a difference in overall complication rate of 10% between the two groups with an 80% power and 5% significance level. The perineal complication rate was assessed on the basis of incidence reported in previous publications.[4-5]

Statistical analysis

Statistical analysis was performed with SPSS software, version 11.0 (SPSS Inc., Chicago, IL). Chi-square or Fisher exact test were used to compare differences between categorical variables. Univariate logistic regression was used to determine whether the chosen risk factors were relevant. Crude ORs were calculated to estimate the strength of association between individual risk factors and instrumental delivery.

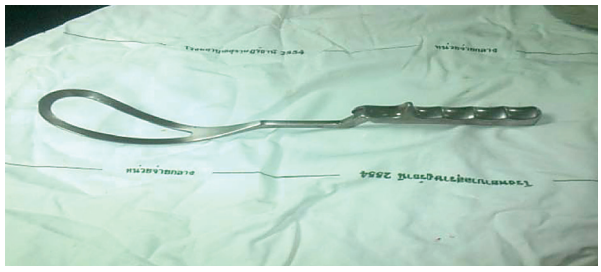

Figure 1 One Simpson' s forcep

Figure 2 Forcep using like Spooning

Results

During the study period, 3765 (34.1%) Caesarean sections, 1076 (9.7%) instrumental deliveries and 6201 (56.2%) spontaneous vaginal deliveries were carried out in our Obstetrics Department. A total of 680 nulliparous women meeting the selection criteria were included in the study: 334 instrumental and 346 spontaneous vaginal deliveries. Characteristics of the patients in each group were listed in Table 1. Age was the only parameter found to be different between the two groups; women undergoing instrumental delivery were more likely to be younger.

Factors associated with instrumental delivery in multiple logistic analyses are listed in Table 2. Occiput posterior position and over birth weight were more frequent in the instrumental delivery group.

Maternal complications were presented in Table 3. One case of perineal tear extending to the rectal mucosa was observed after instrumental delivery. Multivariate analysis showed that third degree tears were significantly higher after instrumental delivery (OR 5.3, 95% CI 1.1-24.4). Prolonged hospital stay was more likely after instrumental delivery than after spontaneous delivery (OR 1.52, 95% CI 1.1-2.0).

Neonatal morbidity was reported in Table 4. The incidences of low Apgar score were similar in the both groups (1.2 vs.0%). Subsequent testing revealed no fetal abnormalities. Two cases of shoulder dystocia were noted after each delivery without any brachial plexus injury in both cases.

Discussion

Despite encouraging previous reports,[6-8] use of vacuum–assisted vaginal birth is more often associated with shoulder dystocia and cephaloheamatoma. Forceps delivery is more often associated with third and fourth degree perineal laceration. This study showed that extraction using One Simpson's forcep was safe for the infant and not more detrimental for the mother than extraction using forceps or vacuum.

Delivery using One Simpson's forcep appears to be more physiological. Unlike other extraction instruments, One Simpson's forcep works by spreading soft tissues since the outer faces of one forcep rest on one inner surfaces of the pelvis bones. Another surface of pelvic bones is free. By guiding the head past any obstacles, one forcep allows the fetus to move freely through the birth canal. By respecting obstetric mechanisms, the ergonomic design of one forcep avoids direct lesions to the fetal brain. The lever action of the one spoon propels the fetus in the suboccipitomental axis. By adapting to the cheekbones the distal part of the blade push against the face rather than the skull and leave the head of the fetus is free. Applied forcep works like the spooning (Fig. 2). This is a major difference with conventional forceps that work by pulling the fetus by the head thereby increasing the risk of bone and brain injuries.[9-10] We observed difference between the case and control groups with regard to the number of infants requiring admission to neonatal intensive care unit or presenting with sepsis. Neonatal morbidity in our series was lower than reported with other instrumental extraction.[11-12] Camus et al observed that facial paralysis was more likely associated with use of forceps. Especially due to an asymmetric purchase, but not with One Simpson's forcep. Neonatal hemorrhage has frequently been associated with the use of vacuum devices for instrumental delivery.[10-14] In their series of 301 vacuum-assisted instrumental deliveries, Bofill et al[10] reported cephalohaematoma in 11.5% of cases and noted the asynclitisme and longer delivery time were significant risk factors.

Instrumental delivery with One Simpson's forcep

Table 1 Patient characteristics at time delivery*

Characteristics	Instrumental delivery n=334 (%)	Spontaneous delivery n=346 (%)	p-value
Mean age (years) (±SD)	25.1±5.3	26.2±5.8	0.01
Mean weight (kg) (±SD)	66.3±13.4	66.4±12.2	ns
Ethnicity			
Thai	276 (82.6)	278 (80.4)	
Burmese	50 (15.0)	62 (17.9)	
Others	8 (2.4)	6 (1.7)	
Mean weight gain>15 kg.	102 (30.5)	111 (32.1)	ns
Mean gestational age (±SD) (weeks)	38.5 (±1.2)	38.4 (±1.2)	ns
Mean body mass index (±SD)	24.6 (±4.9)	24.5 (±4.8)	ns
Normal < 25.1	158 (47.3)	172 (49.7)	ns
Overweight 25.1-28.9	155 (46.4)	151 (43.6)	ns
Obese>28.9	21 (6.3)	23 (6.7)	ns

*Values represent number (%)unless stated otherwise. ns: not significant

Table 2 Characteristics of labour in function of mode of vaginal delivery

	Instrumental delivery n=334 (%)	Vaginal delivery n=346 (%)	Crude odds ratio* (95% CI)
Occiput posterior position (OS)	47.0 (14.1)	14 (4.0)	3.8 (2.09,7.2)
Birth weight>4000G	14 (4.2)	4 (1.2)	3.7 (1.21, 11.4)
Episiotomy	330 (98.8)	286 (82.7)	17 (6.2, 48.2)
Third degree tears	10 (3.0)	2 (0.6)	5.3 (1.1, 24.4)

Table 3 Maternal morbidity in the instrumental vaginal delivery and spontaneous delivery

	Instrumental delivery n=334 (%)	Spontaneous delivery n=346 (%)	Crude odds radio (95% CI)
Extensive second degree vaginal tear	13 (3.9)	12 (3.5)	1.1 (0.5, 2.5)
Third degree rupture	10 (3.0)	2 (0.6)	5.3 (1.1, 24.4)
Urinary retention	7 (2.1)	5 (1.4)	1.4 (0.4, 4.6)
Blood loss>5% (Hct%)	152 (45.5)	126 (36.4)	1.4 (1.0, 1.9)
Hospital stay>4 days	168 (50.3)	138 (39.9)	1.52 (1.1, 2.0)

Table 4 Neonatal outcome after vaginal deliveries

	Instrumental delivery n=334 (%)	Spontaneous delivery n=346 (%)	Crude Odds radio (95% CI)
Apgar score<7 at 5 min	4 (1.2)	0 (-)	-
Ventilation (intubation)	8 (2.4)	6 (1.7)	1.3 (0.4,4.0)
Cranial trauma	0 (-)	0 (-)	-
Sepsis	4 (1.2)	2 (0.6)	2.0 (0.3,11.4)
Death	0 (-)	0 (-)	-

In their series, Towner et al[9] found an increased risk of intracranial hemorrhage (1/860) and a higher rate of subdural and cerebral hemorrhage (OR 2.7; 95% CI 1.9-3.9) after instrumental delivery using vacuum extraction or forceps (OR 3.4; 95% CI 1.9-5.9). Hemorrhagic complications have not been reported after instrumental delivery using One Simpson's forcep

Maternal morbidity in our series consisted mainly of anal sphincter tears. A strong point for our case-control study was to record all perineal lesions. The incidence of anal sphincter lesions associated with one forcep delivery was similar to that usually reported with forceps or vacuum delivery but higher than with spontaneous delivery.[4,5] In their series, Donnelly et al[4] observed a 8.1–fold higher risk of anal sphincter damage after instrumental extraction. Forceps extraction is considered to be associated with a higher risk of perineal lesions than vacuum extraction. In the series of Combs et al[15] the overall incidence of perineal lesions was 31% after forceps and 26.4% after vacuum extraction and the risk of third and four-degree perineal tears was shown to be 1.9 fold higher (95% CI 1.5-2.5) with forceps delivery than vacuum extraction. These incidences are higher than observed with One Simpson's forcep extraction (3%). However, the training and adequate episotomy technique prevent extensive perineal lesion.

In this study, urinary retention was one fold higher in the instrumental delivery group than in the spontaneous delivery group. Instrumental delivery is an independent risk factor of urinary retention.[16] However use of regional analgesia might be a confounding variable.[17] The immediate postpartum urinary retention has been associated with a number of factors including prolonged labour resulting in local edema.[18,19]

Conclusion

This study indicated that One Simpson's forcep was new technique of delivery associated with a lower infant morbidity than with other instruments. However, the using of that instrument in training under the control of a senior obstetrician, can improve the successful rate.

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