Original Research Paper

Volume-8 | Issue-10 | October-2018 | PRINT ISSN No 2249-555X

Gynaecology

VACUUM ASSISTED DELIVERY IN CAESAREAN SECTION- A SAFE AND USEFUL TECHNIQUE.

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ABSTRACT Increased use of caesarean section and a lower willingness about vaginal birth post caesarean has prompted the need of alternate delivery techniques. We assess vacuum assisted delivery (of fetal head) for a sample group of 300 patients delivered with LSCS using vacuum, compared against a control group of 300 patients with the fetal head delivered manually or by forceps/ extending uterine incision. In our data, subjects were full term, with 64 % of vacuum assisted group and 69 % in manual extraction were in labour. Incision to delivery interval was 10-30 seconds (average 18 seconds). In comparison to cases with traumatic extension of angle, 9% patients from control and only 1% from sample group had extension. Mean blood loss in control and sample group was 700 ml and 400 ml respectively. None of the babies in sample group had vacuum related scalp injuries. We confirm vacuum assisted LSCS is safe, atraumatic with obstetrician's well familiarity with the technique as a prerequisite.

KEYWORDS : LSCS, Vacuum assisted delivery, Safety

INTRODUCTION

The lower segment caesarean section (LSCS) is becoming increasing common over last few decades, reaching up to a rate of 50% in developed countries (Molina et al., 2015). In spite of consistent efforts to limit the caesarean section rates from multisectoral levels, deliveries by this method continues to rise (Declercq, Young, Cabral, & Ecker, 2011; Spong, Berghella, Wenstrom, Mercer, & Saade, 2012). Difficult fetal extraction is encountered in 1-2 % of caesarean deliveries.

Various techniques to deliver the floating head including application of single blade of forceps, or extending, or uterine incision are developed, however these procedures may involve risk of extension and bleeding. On contrary, vacuum assisted delivery (also known as ventouse) of fetal head not only can reduce the incision to delivery time, but also reduces the incidence neonatal depression, with an added advantage of reducing trauma, and consequent haemorrhage (Declercq et al., 2011; Spong et al., 2012). It is reported that applying vacuum extraction for delivery of fetal head assures a decrease in the volume of fetal head by avoiding delivery by hand (Declercq et al., 2011; Spong et al., 2012). Further, it reduces traumatic and deliberate extension of uterine incision. Furthermore, the ventouse decrease the need for fundal pressure causing maternal discomfort (Declercq et al., 2011; Spong et al., 2012).

Although vacuum assisted delivery is not naïve method, more critical clinical evaluation of the method are encouraged for its expert use in clinics.

RESEARCH QUESTIONS

The study aims at critical clinical evaluation of vacuum assisted delivery of fetal head over conventional method of delivering fetal head. The specific objectives are:

1. To assess advantages/disadvantages of vacuum assisted delivery of fetal head over conventional methods.
2. To assess the time intervals from uterine incision to delivery of fetal head.
3. To determine complication (such as birth asphyxia, trauma and neonatal hyperbilirubinemia) frequency.

DATA COLLECTION AND METHODS:

This is a prospective study carried over a duration of 3 years with over 300 patients attended at the Department of Obstetrics and Gynaecology in Government Medical College Hospital, Sangli from May 2015 to April 2018. This is a tertiary institute, with the total number of deliveries in 3 years recorded as 19275; the rate of LSCS being 30%. The city is situated at the boarded of two states of Maharashtra and Karnataka. The hospital is visited by substantial rural as well as urban residents of both states.

Patients admitted for caesarean delivery were taken detailed history and clinical examination to rule out any contraindication.

A total of 300 patients who delivered by LSCS but the fetal head delivered by manual methods were considered as control. The inclusion and exclusion criteria were:

- **Inclusion criteria**: Full term pregnancy, Floating head, Vertex presentation, Scalp sufficiently visible for application of vacuum, and Patient ready to participate.
- **Exclusion criteria**: Preterm pregnancy, Scalp not visible through incision, Presentation other than vertex, and Not willing for trial.

We used Medisilvacuum extractor with soft silicon vacuum cups as it is known to be associated with less scalp injury (Bofill, Lencki, Barhan, & Ezenagu, 2000). For all patients, the baseline investigation like HB, blood group, HIV, Hbs Agdone. Intraoperative technique used for LSCS were same in both study and control group, with only difference being the application of ventuse in study group. After taking incision over lower uterine segment and rupturing membranes vacuum cup was placed over occiput, and pressure built up to 400 mm hg, and then traction was applied pulling towards the midline of uterine incision when baby was delivered. Vacuum is then discontinued, and pressure removed, and baby was extracted. Maximum 3 attempts carried out to extract head by vacuum failing which delivery carried out in expedious manner.

In the control group, head was delivered either with manual method or with extension of uterine incision or by forceps. The time needed, blood loss, uterine extension, and neonatal outcome by APGAR were noted in both groups. Patients were typically discharged on the 7^{th} postoperative day after removal of stitch.

Both groups were given antibiotic injection of Cefaerazone (dose: 1 gm intravenous, 12 hourly for 5 successive days). No additional analgesia was required in any group.

RESULTS:

The table 1 below indicates different age groups of study and control groups.

Table 1: Age groups distribution (in numbers and percentage) of control and sample groups

Age in years	Vacuum assisted	Manual
<20	12 (4%)	9(3%)
21-25	138(46%)	147(49%)
26-30	132(44%)	126(42%)
31-35	15(5%)	9(3%)
>35	3(1%)	9(3%)
Total	300 (100%)	300(100%)
p value 0.886 not significant; Mean age 25.31 years		

All the subjects in study and control group were full term. A total of 64 % women of vacuum assisted group were in labour whereas 69 % in manual extraction group making the groups comparable. Table 2 shows time between the incision on lower segment of uterus to delivery of head in both groups.

Table 2: Incision to delivery time intervals in control and sample group

Incision to delivery time interval	Vacuum assisted	Manual extraction	Total
10-30 sec	201 (68%)	191 (66%)	392
31-50sec	81(28%)	90(29%)	174
51-70sec	12(4%)	14(2%)	26
71-90sec	0	5(3%)	5
>90 sec	3(1%)	0	3
Failed attempt	3(1%)	0	3
p value 0.203 not significant			

A comparison of the proportion of cases with traumatic extension of angle between two groups suggested that 9 % patients from control group had extension while only 1 % patient from test group had such extension. This had significant p value. Mean blood loss was 700 ml in control group and 400 ml in subject group suggestive of significant p value. No additional analgesia required for any of the group. Table 2 shows the profile of duration of scalp traction showing 93% patients delivered within 20 seconds of application of vacuum.

Table 3: Scalp traction in seconds

Scalp traction (sec)	Vacuum assisted group (300)
<10	51(17%)
10-20	225(75%)
21-30	12 (4%)
31-40	6 (2%)
>40	3(3%)
Failed attempt	3(1%)

Additionally, we also noted the blood loss in both groups, and only 1 % patients from vacuum assisted group needed blood transfusion postoperatively while 4 % patients from control group needed blood transfusion (p value <0.05). Furthermore, the comparison of APGAR score after one minute and 5 minutes in both the groups did not show any significant difference.

DISCUSSIONS

Increasing rates of caesarean section, elective or emergency has simultaneously increased need of different techniques of delivering fetal head. Use of vacuum during caesarean section has helped to combat the problem of nonengaged head delivery, traumatic extension and unnecessary fundal pressure. Vacuum-assisted caesarean section was first described by Solomon in his report of 20 consecutive cases delivered with the 5 cm Malmström cup (SOLOMONS, 1962). Further, Bercovici successfully delivered 20 of 22 (91%) term infants via caesarean section without uterine extensions (Bercovici, 1980). So, for head which is not engaged, the least traumatic and best method is vacuum extraction of head.

In elective LSCS, lower uterine segment is not adequately soft, which makes the incision adequacy compromised. Even in the case of repeat LSCS, head is not engaged. In such situations different methods to deliver head are fundal pressure, extending incision, forceps application, yet all are not without certain disadvantages. They are not only traumatic but can cause more haemorrhage.

In our data, the time interval between incision to delivery was approximately 26 second in vacuum assisted method (ventouse) and 24 seconds in manual extraction. A total of 3 patients required more than 90 seconds in ventouse. The practical experience during the cases also revealed that more caution should be applied while applying this method (a common misconception is that little skill is required to use vacuum device). Awareness of fetal head position is very important to have the best opportunity to position the cup properly to ensure integrity of vacuum application without undue detachments (Nakano, 1981).

In our study, 76 % patient were delivered with 10-20 seconds of scalp traction whereas only 3% needed greater than 40 seconds. Bofill et.al. in their study suggest that cup should be placed over the flexion point app. 3 cm anterior to the posterior fontanelle along the saggital suture (Bofill et al., 2000). This is the point at which mentoverticle diameter crosses the sagittal suture, promoting a flexion of fetal neck, and thus presenting the smallest diameter of fetal head to the uterine incision (McQuivey, 2004). The traction force should be minimized, and the extent of the incision should not limit safe passage of the fetal head and body.

In our study of 300 patients failed attempt of ventuse and extending incision or changing to other method were 3 (1%). As speculated by Solomon's the force required to deliver the fetal head through the abdominal incision is less than the force required to deliver the head across the perineal floor during a vaginal delivery; thus, excessive tractions and pop-offs should be rare with cesarean section (SOLOMONS, 1962). To reemphasize, if there is difficulty delivering the fetal head through the abdominal incision, immediate attention should be paid to the sizes of the skin, fascial, and uterine incisions. The size of the incision should not be limited at the expense of safely delivering the fetus. There was not a single case of injury to the fetus or scalp complications in our data.

There have been few neonatal adverse events reported in the literature related to the use of vacuum-assisted caesarean section. However, complications such as scalp abrasions, retinal haemorrhages, jaundice, and cephalohematomas have been reported with vacuum-assisted operative vaginal delivery (McQuivey, 2004) More serious complications can include intracranial haemorrhages and skull fractures; however, these rare events are likely associated with misplacement of the cup, excessive traction force, and multiple pop-offs during operative vaginal deliveries (Clark, Vines, & Belfort, 2008; Fareeduddin & Schifrin, 2008).

CONCLUSIONS

The combination of a) increasing caesarean section use and b) lower willingness to allow vaginal birth after caesarean section has increased the necessity of using different/alternate techniques for safe delivery of fetal head. This has resulted in an expansion of the use of vacuum assistance. When the vacuum device is used appropriately, the delivery can be facilitated by effectively decreasing the volume delivered through the uterine incision due to the avoidance of a delivering hand or forceps blade. The vacuum may lead to decreased uterine extensions and decrease in blood loss associated with efforts to deliver the head in difficult cases. Without the need for excessive fundal pressure, maternal discomfort can be minimized. Based on the published literature and our pragmatic clinical experience, it is suggested that use of vacuum device is a safe and effective technique to assist delivery during caesarean section.

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