COMPARATIVE STUDY OF VENTOUSE VERSUS CONVENTIONAL METHOD FOR EXTRACTION OF FLOATING HEAD DURING LOWER SEGMENT CESAREAN SECTION

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ABSTRACT

AIM OF THE STUDY:
- To study the role of vacuum in extraction of floating head in caesarean section.
- To compare the use of vacuum with the conventional method for extraction of floating head in caesarean section.

MATERIALS AND METHODS
This is a study conducted at RIMS Raichur for six months. Vacuum was applied for fifty cases and the maternal and neonatal outcomes were compared with fifty cases done by conventional method.

RESULTS
The I-D interval was significantly prolonged in vacuum group 44.46 seconds compared to 21.84 seconds in manual group. PPH was seen in two cases in vacuum group which is not statistically significant. No neonatal and maternal adverse outcomes noted.

CONCLUSION
Vacuum is a safe and atraumatic method of delivery of floating head extraction in caesarean section.

KEYWORDS
Caesarean Section, Ventouse, Floating Head.


INTRODUCTION
Need for Study
The success of the hand to deliver the head with ease, with allied manoeuvres by the other hand or other’s hand or hands, or with difficulty, is not challenged as a fact. However, this needs to be taken up for examination, assessment and alternatives if found reasonable, suitable and advantageous. This study aims at critical and clinical evaluation of vacuum over conventional method.

The Need for Delivering the Head as Fast as Possible
Though with almost universal use of epidural and spinal anaesthesia for CS that race with Thiopentone for delivering the baby has almost gone.

However, the speed is still required for delivering the baby from the point of making uterine incision and puncturing of the membranes because through this large hole liquor gets drained away very fast causing acute retraction of placental site and consequent foetal hypoxia. Besides, cord also under the circumstances becomes more likely to get compressed due to the same reason. Hence is the importance of precise knowledge of the technique of delivering the head at CS.¹

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Current Scenario and Basic Considerations
Traditionally,
1. The hand is used to deliver the forecoming head including vertex, face and brow presentations. Some modification of technique in each and individual case is employed. This is usually instinctive, or or as a hurried and harried response to difficulty rather than by any designed action plan. It is at this time that the assistant(s), anaesthetist and/or theatre staff lends their solicited or unsolicited efforts bordering on bravado. Attention to verification of presentation, position, station, flexion status of the trapped baby is absent, scant or cursory.²
2. The allied manoeuvres are various.
   a. One’s own other hand around the funds facilitating the other hand to guide the head in and out of the uterine incision first and hopefully out of the abdominal!
   b. Bimanual fundal pressure from the anaesthetist is a vigorous adjunct for some.
3. The use of single blade of forceps, if available, is sometimes made. The purpose is to lever out the transverse/oblique head.
4. Muirless vectis, a specially designed variant, is sometimes employed.
5. Vacuum extractor is substituted by some cases.²

Choice of Instrument
The Vacuum Extractor
The first report of the use of a vacuum device as a traction instrument to assist delivery was by James Yonge in 1705. Malmstrom of Gothenburg, Sweden, presented his vacuum
extractor (The VE/53) to a meeting of the medical society in 1953. Malmstrom (1967) developed his suction device (VE/67) so that the suction outlet was depressed in the cup, making the cup shallower and its introduction into the vagina easier. The most recent instrument designed by O’Neil has traction chain linked to a ring on the cup. This allows the direction of traction to be changed during the procedure without loss of effective traction (O’Neil 1981).

Types of Vacuum Extractors
The modern instrument consists of an all metal cup of four sizes—30, 40, 50 and 60mm in diameter. The largest diameter is in the interior of the cup. A rubber tube extends from cup to a pump, which creates the suction. Attached to the cup and inside the tubing is a chain by which traction on the cup is affected. The scalp is drawn into the cup and an artificial caput succedaneum is formed.

All the cups have several standard features including the following:
- A mushroom shaped cup with a fixed internal vacuum grid or guard.
- An attached vacuum pump (e.g., Kiwi cup) or a vacuum port to permit a vacuum hose attachment.
- A handle, wire, or chain for traction.

Rigid-cup designs include the classic Malmstrom stainless steel vacuum cup and various modifications of this instrument, such as the Bird cup. Rigid plastic cups designed for use with deflexed or posterior positioned heads are also available. Limited data exist comparing the clinical utility or the relative risk of use of the currently popular soft cup VE designs.

Technique of vacuum extraction is virtually important for the safety and success of VE operations. A proper vacuum extraction depends upon:
- The accuracy of cup application.
- The traction technique.
- The foetal cranial position and station at the time of application.
- And the cup design.

Correct positioning of the cup: when correctly applied, the vacuum cup is positioned centrally over the point of cranial flexion, or the pivot point. When the vector of traction force is directed through this pivot, the foetal head is flexed and neither twisted obliquely nor extended as the extraction proceeds. Anatomically the pivot point is an imaginary spot over the sagittal suture of the foetal skull, located approximately 6cm posterior to the centre of the anterior fontanelle or 1-2 cm anterior to the posterior fontanelle.

When correctly positioned, the edge of a standard 60-mm cup lies approximately 3cm or 2 fingerbreadths behind the centre of the anterior fontanelle in the midline over the sagittal suture. Thus, in vacuum operations, the anterior fontanelle becomes the reference point for checking the instrument application because access to the posterior fontanelle is partially blocked once the extractor cup is in place, rendering this familiar landmark unusable. The farther the cup is placed from the midsagittal position on the foetal head over the cranial pivot or flexion point the greater the failure rate.

Fixing the cup on head: once an approximate cup application is established, partial vacuum sufficient to fix the cup to the foetal head is applied. A careful check of cup placement follows. Once the surgeon is convinced of an approximate placement, full vacuum is applied (550-600mmHg) and traction follows.

For soft cups, negative pressure of 0.8kg/cm² over just 1 minute.

Types of force that the cup exerts on the foetal scalp
- Negative outward suction from the vacuum itself.
- Downward force from the traction.
- A circular force if rotation takes place.
- A shearing force occurs when the direction of traction is not perpendicular to the surface of the scalp.

General Recommendations for Standard Vacuum Procedures
- Limit the number of tractions to 4 or 5.
- Limit unintended cup detachments or pops to 2-3.
- Advancement of the presenting part with the initial traction is required.
- Restrict the overall duration of the procedure to less than 30 minutes (Some propose 20min).

Safeguards in use of Vacuum Extraction
- The presentation must be cephalic preferably well flexed.
- The cup is placed as near to occiput as possible.
- Negative vacuum pressure must not exceed 0.7 to 0.8 kg/m².
- The cup should not remain on the foetal scalp for longer than 20 minutes. If the time is shorter, there is less danger of damage to the foetal scalp.
- Traction should be maintained at right angles to the application of the cup. The possibility of damage to the scalp is increased by diagonal or shearing forces and rocking motions.

Neonatal Complications
- neonatal injury: the reported incidence of severe foetal injury or death from vacuum is low, ranging from 0.1-3 cases PER 1,000 extraction procedures.
- subgaleal haemorrhage: the reported incidence ranges from 6-50 per 1,000 cases. It is very rare unless excessive force or multiple instrumentation has been performed.
- Long term neonatal outcomes: studies have found no differences among children delivered by vacuum or by manual method.

MATERIALS AND METHODS
This study consists of an analysis of role of vacuum in extraction of floating head in LSCS in fifty cases of full term pregnancy with fifty controls with manual extraction of head in LSCS matched for other variables like incision delivery interval and any postoperative complications.

The study and control group consists of women admitted to RIMS Raichur. This is a prospective case control study done over a period of six months. All the cases that were available up to the study period have been taken up for the purpose of study.
For all the selected cases thorough history was taken and complete examination was done. Previous obstetric records and ultrasound reports were reviewed. Only those women who remembered their date of last menstrual period correctly with previous regular cycles and the gestational age calculated by clinical examination and ultrasound were corresponding were taken for the study.

Floating head in full term pregnancy was detected clinically and they were taken up for lower segment caesarean section.

**Inclusion criteria**

**Floating head in**
- Primigravida
- Elective LSCS
- Singleton pregnancy Vertex presentation
- Post-dated pregnancy

**The exclusion criteria**

**Floating head in**
- Twin pregnancy
- Previous 2 LSCS
- Malformed foetus
- Congenital malformed uterus
- Malpresentations
- Major degree placenta previa
- Preterm
- Obstructed labour

For all women baseline investigations like haemoglobin, blood grouping, Rh typing, HIV, HBsAg were done. At the time of discharge repeat haemoglobin were done for all women. The intraoperative techniques used for LSCS were same in both study and control groups except for the application of vacuum in the study group. All the newborns were attended by neonatologists and followed up for seven days. All the postoperative patients were given similar analgesia and followed up for seven days.

Various outcome measures recorded were time needed for extraction of head, necessity of bimanual fundal pressure, maternal morbidity in terms of extension of uterine incision, haemorrhage due to extension of uterine incision, blood loss attributable to application of vacuum. Foetal morbidity measured in terms of injury to scalp, soft parts of baby’s face, neonatal neurological behaviour for first postnatal week and serum bilirubin levels of the baby were measured on the fifth postnatal day.

**OBSERVATIONS AND DISCUSSION**

The results were recorded and tabulated. The results were statistically analyzed using parameters like mean, standard deviation and pearson chi square test.

Results were analyzed on fifty cases of conventional method and fifty cases of vacuum method. All the women belonged to reproductive age group. The surgical techniques of caesarean section were same in both groups except for the application of vacuum in vacuum group for the extraction of foetal head. The time interval between uterine incision and the extraction of foetal head was calculated.

<table>
<thead>
<tr>
<th>ID Interval</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
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<tbody>
<tr>
<td>CONTROL</td>
<td>50</td>
<td>21.8400</td>
<td>12.38593</td>
<td>1.75135</td>
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<tr>
<td>VACUM</td>
<td>50</td>
<td>44.4600</td>
<td>21.40590</td>
<td>3.02275</td>
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</table>

P value is 0.00 (significant)

The mean I-D interval in vacuum group is 44.46 seconds whereas the mean I-D interval in conventional method was 21.84 seconds which was significantly lesser than vacuum group. p value is 0.00 is significant.

<table>
<thead>
<tr>
<th>Fundal Pressure</th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>61.290*</td>
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<td>.000</td>
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</tbody>
</table>

P value is 0.000 which is significant.

Extension of angle was noted in only one case among vacuum group but no extension of angle was noted in conventional group. The extension in vacuum group might be due to improper application of vacuum and improper skills in application.

<table>
<thead>
<tr>
<th>E O A</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td></td>
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<tr>
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<tr>
<td>100%</td>
<td>98%</td>
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<tr>
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</tr>
<tr>
<td>Total</td>
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<tr>
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<td>100%</td>
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<table>
<thead>
<tr>
<th>Extension of angle</th>
<th>Value</th>
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<tr>
<td>Pearson Chi-Square</td>
<td>1.010*</td>
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<td>P=0.315</td>
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</table>

P value is 0.315 which is not significant.

Mild Postpartum haemorrhage was noted in two cases of vacuum group and the p value is 0.153 which is not significant.
<table>
<thead>
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<th>PPH</th>
<th>CONTROL</th>
<th>VACCUM</th>
<th>Total</th>
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<td>98</td>
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<tr>
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<td>100%</td>
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<table>
<thead>
<tr>
<th>PPH</th>
<th>Value</th>
<th>df</th>
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</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>2.041 a</td>
<td>1</td>
<td>P=0.153</td>
</tr>
</tbody>
</table>

Neonatal Outcomes:
- No neonatal injuries were noted.
- Capsular formation was seen in four cases of vacuum group which resolved within 24 hours.
- No injuries to soft parts of baby are seen.
- No prolonged NICU admissions noted.
- Serum bilirubin levels were measured on fifth postnatal day in both groups. The mean serum bilirubin levels in vacuum group 13.696 and mean serum bilirubin levels were 13.700 in conventional group. p value is 0.979 which is not significant.

Distribution based on successfulness of vacuum application for fetal head extraction

<table>
<thead>
<tr>
<th>Bilirubin</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
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<tr>
<td>C</td>
<td>50</td>
<td>13.700</td>
<td>.7570</td>
<td>.1071</td>
</tr>
<tr>
<td>V</td>
<td>50</td>
<td>13.696</td>
<td>.7613</td>
<td>.1077</td>
</tr>
</tbody>
</table>

DISCUSSION
This study was conducted for six months at RIMS Raichur in the year 2014. The role vacuum application during cesarean section for extraction of floating head was studied.

The incision delivery interval was more in vacuum group compared to manual extraction. More time is consumed for the application of vacuum to foetal head and increasing the pressure in the vacuum device. Fundal pressure was required only in twelve cases of vacuum group. Extension of angle was noted in only one case of vacuum group and it is due to improper application of device to the presenting part. Only two cases of vacuum group had mild atonic PPH.

Neonates were followed up for one week. No injuries were noted. No prolonged NICU admissions noted. Capsular formation was seen in four cases of vacuum group which resolved in 24 hours. Serum bilirubin levels were noted on fifth postnatal day and it was found to be within normal range in both the groups.

Out of fifty cases, foetal head extraction was successful in forty-eight cases. In two cases foetal head extraction was failed with vacuum application, due to improper application of device and lack of skills in operating surgeon and due to undetected malpresentation.

The instrument needs improvisation for better application and routine use and more number of studies to establish its role in extrarction floating head and its effects on maternal and foetal outcomes.

CONCLUSION
Use of vacuum during caesarean section is a safe and effective method for foetal head extraction. There was no extension of angle and postpartum hemorrhage in the postoperative period. No adverse neonatal outcomes noted.

REFERENCES