ACUTE UTERINE INVERSION-AN EFFECTIVE MODIFICATION OF HYDROSTATIC CORRECTION WITH CONDOM CATHETER
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ABSTRACT

BACKGROUND
Acute uterine inversion is a collapse of the uterine fundus into the cavity during the third stage of labour or immediately after delivery. It is a rare complication with an incidence of 1 in 2000 to 1 in 20000 deliveries. Shock is out of proportion to blood loss. WHO recommends hydrostatic correction if immediate manual repositioning fails. Hydrostatic method for reducing acute uterine inversion is a simple method with excellent outcome if advocated properly. The key to success of the hydrostatic correction is developing a good enough water seal to allow generation of adequate hydrostatic pressures for uterine replacement. A modification of hydrostatic method by using a condom catheter ensures an excellent water seal and helps to reduce failures during the procedure.

The aim of this study was to use a condom catheter as a modification of hydrostatic method to correct cases of acute puerperal inversion so as to reduce failures during the procedure.

MATERIALS AND METHODS
This study was conducted as a prospective case series at Govt. Medical College, Kozhikode over a 10-year period from 01/01/2008 to 31/12/2017. All cases of acute uterine inversion managed at the hospital during this period were included. Cases of chronic inversion of uterus were excluded from the study.

RESULTS
There were 8 cases of acute inversion of uterus out of a total 1,59,102 births. All of them were multiparas and 6 cases were referred. 5 of them belonged to 26-30 years age group. 6 patients were having third degree inversion and 2 had fourth degree inversion. 6 patients were stable at the time of diagnosis, but 2 of them were in shock at the time of presentation. A total of 4 patients received blood transfusion. 2 patients were diagnosed with acute uterine inversion within 30 minutes of delivery. The remaining 6 cases reached our hospital at 1.5 to 2 hours after delivery. Two patients underwent immediate manual repositioning and six had hydrostatic correction using a condom catheter which was filled from a urobag filled with 2-2.5 litres of normal saline. All six cases were successfully corrected but two patients underwent emergency obstetric hysterectomy for PPH.

CONCLUSION
This modification of hydrostatic correction with condom catheter and urosac filled with normal saline is simple and effective and will definitely reduce maternal morbidity and mortality in cases of acute uterine inversion.

KEYWORDS

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BACKGROUND
Uterine inversion is the folding of the fundus of uterus into the uterine cavity. It is a rare complication identified in the third stage of labour. If undiagnosed, it can lead to serious maternal morbidity and mortality. Four degrees of uterine inversion have been identified. In first degree inversion, the fundus of uterus extends as far as the cervix, but not through it. In second degree inversion, the fundus prolapses through the cervix, but not out of the vaginal introitus. Prolapse of the fundus outside the vagina is called third degree inversion. Complete prolapse of both uterus and vagina is called as fourth degree inversion.

Inversion can also be classified based on the time of occurrence after delivery. If it occurs within 24 hours of delivery, it is called acute inversion. Inversion between 24 hours and 30 days of delivery is subacute inversion and chronic inversion occurs after 30 days.

Inversion occurs in approximately 1 in 3737 vaginal deliveries and 1 in 1860 caesarean sections. However a range of 1 in 4000 to 1 in several hundred thousands can be
found. Maternal mortality is as high as 15%, Active management of 3rd stage of labour has reduced the incidence of acute puerperal inversion.

The present study was undertaken in an effort to correct cases of acute puerperal inversion of uterus with manual reposition or modified hydrostatic method using condom catheter.

**Aim of the Study**
The aim of this study was to use a condom catheter as a modification of hydrostatic method to correct cases of acute puerperal inversion so as to reduce failures during the procedure.

**MATERIALS AND METHODS**

**Study Design**
Prospective Case series.

**Study Period**
01/01/2008 to 31/12/2017.

**Setting**
Dept. of Obstetrics and Gynaecology, IMCH, Govt. Medical College, Kozhikode.

**Subjects**
All cases of acute uterine inversion managed at Govt. Medical College, Kozhikode between 2008-2017. This included patients who delivered at Govt. Medical College, Kozhikode and patients who were referred after delivery from periphery with acute puerperal inversion.

**Exclusion Criteria**
Patients with chronic uterine inversion.

**Methodology**
Once the diagnosis of acute uterine inversion was made, immediate assistance was summoned, including senior obstetrician and anaesthesia personnel. Steps for resuscitation of the patient was started. This included insertion of 2 wide bore IV cannulae, crystalloid IV fluids administration, administration of O2 by mask and close monitoring of patient. The blood bank was alerted and blood products if required were made available. Oxytocin infusion if continuing was stopped, immediate manual repositioning tried by simply pushing up on the inverted fundus with the palm of the hand and fingers in the direction of the long axis of the vagina. Care was taken to prevent uterine perforation during this procedure. If unsuccessful, proceeded with modified hydrostatic reduction using condom catheter connected to a urobag. Two condoms were used together to prevent rupture of condom. The urobag was filled using 2-2.5 litres of normal saline directly from IV bottle. The inflow tube of another urobag was cut and connected to the outflow of the filled urobag and the other end of this tube was connected to a condom catheter and tied with catgut to prevent leakage of saline. The filled urobag was kept on an IV stand for rapid filling of the condom. The condom was then inserted into the vagina and gradually filled. The excellent water seal provided by the condom helped to reduce the inverted uterus back into its position. After correction, oxytocics and uterine massage were given to make the uterus contract and to prevent further inversion. If required, an ultrasound examination was performed to ensure the completeness of correction. In case of failure or refractory post-partum haemorrhage, emergency obstetric hysterectomy was done.

**RESULTS**
From 2008-2017, there were 8 cases of acute uterine inversion. Of this, 2 cases were delivered at Govt. Medical College, Kozhikode, were referred. Total No. of deliveries during this period was 1,59,102.

**Age**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-25 Yrs.</td>
<td>3</td>
<td>37.5</td>
</tr>
<tr>
<td>26-30 Yrs.</td>
<td>5</td>
<td>62.5</td>
</tr>
</tbody>
</table>

Table 1. Age

More patients belonged to 26-30 yrs. age group.

**Parity**

<table>
<thead>
<tr>
<th>Parity</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primi</td>
<td>Nil</td>
<td>0</td>
</tr>
<tr>
<td>Multi</td>
<td>8</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2. Parity

All were multiparas.

**Nature of Admission**

<table>
<thead>
<tr>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Booked</td>
<td>2</td>
</tr>
<tr>
<td>Referred</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 3. Admission

Most of them were referred cases.

All were following vaginal deliveries.

**Risk Factors**- No significant risk factor was noted. All were hospital deliveries.

**Interventions Done for Management**

<table>
<thead>
<tr>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual Reposition</td>
<td>2</td>
</tr>
<tr>
<td>Modified Hydrostatic</td>
<td>6</td>
</tr>
<tr>
<td>Reposition Followed by Hysterectomy</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 4. Intervention
Immediate manual reposition was successful in 2 patients who delivered at our institution. The rest 6 cases were managed by modified hydrostatic method. Inversion was corrected in all 6 patients. Out of this, 2 patients underwent emergency obstetric hysterectomy for post-partum haemorrhage and shock.

There were no cases of maternal mortality in our series.

**Degree of Inversion at Diagnosis**

<table>
<thead>
<tr>
<th>Degree of Inversion</th>
<th>No. of pts</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd degree</td>
<td>6</td>
<td>75</td>
</tr>
<tr>
<td>4th degree</td>
<td>2</td>
<td>25</td>
</tr>
</tbody>
</table>

*Table 5. Degree of Inversion*

Most of the patients were having third degree inversion.

**Condition of Patient at Diagnosis**

<table>
<thead>
<tr>
<th>Condition</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable</td>
<td>6</td>
<td>75</td>
</tr>
<tr>
<td>Shock</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>PPH and Blood Transfusion</td>
<td>4</td>
<td>50</td>
</tr>
</tbody>
</table>

*Table 6. Haemodynamic Status at Diagnosis*

Most of the patients were stable at the time of presentation. However 4 patients required blood transfusion.

**Time Since Delivery**

<table>
<thead>
<tr>
<th>Time Since Delivery</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;30 Mts.</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>1 ½ - 2 Hrs.</td>
<td>6</td>
<td>75</td>
</tr>
</tbody>
</table>

*Table 7. Time Since Delivery*

2 patients who delivered in our institution were diagnosed to be having inversion within 30 minutes of delivery. The referred cases took nearly 2 hours to reach our hospital which indirectly indicates the vast area covered by our hospital.

**DISCUSSION**

Acute uterine inversion is a life threatening complication of third stage of labour. The predisposing factors for puerperal inversion are flaccidity of the myometrium around the implantation site, fundally implanted placenta, and a dilated cervix. Other associated factors are intrapartum fundal pressure, morbidly adherent placenta, fetal macrosomia, vaginal birth after caesarean, intrinsic myometrial weakness, uterine sacculation and use of tocolytics. Some reports suggest precipitate labour as a cause of inversion.

The diagnosis of uterine inversion is usually established clinically. Early onset postpartum haemorrhage and appearance of a vaginal mass followed by maternal cardiovascular collapse is seen in complete inversion. In 60-70% cases, placenta is still attached to the uterus at the time of inversion. The degree of shock appears out of proportion to the blood loss. The physical examination in first degree inversion can be very misleading, hence diagnosis is made with ultrasound. Second degree inversion is diagnosed when the uterine fundus cannot be palpated on abdominal examination and cervix cannot be felt on pelvic examination. Ultrasound is helpful in doubtful cases and MRI findings are very conspicuous.

Management involves treating the sequelae of inversion, i.e. haemorrhage and cardiovascular collapse, along with prompt uterine replacement followed by administration of uterotonics to maintain contraction. The placenta should not be removed before uterine replacement to minimize blood loss. During manual replacement, the last region of the uterus that inverted should be the first to be replaced. Uterine relaxants or in some cases, general anaesthesia with halothane may be needed.

Hydrostatic pressure is another method used to reposition the uterus. This was first described by O’Sullivan in British Medical Journal in 1945. Ogueh and Ayida described a modification of this method by using silicone vacuum cup within the vagina to create a water seal.

Condom catheter can also be used to create an excellent water seal, which is usually attached to a urobag filled with...
2-2.5 litres of saline. When all attempts at reposition fails, surgical methods like Huntington's or Hautain's procedures or using a silastic cup at laparotomy may be tried. After uterine replacement, tocolytics are stopped, oxytocin and other uterotonics are given and uterine incision repaired.

CONCLUSION
Acute puerperal inversion is a life-threatening obstetric emergency, occurring in the third stage of labour. If undiagnosed, it can lead to severe postpartum haemorrhage, neurogenic shock and maternal mortality. Immediate resuscitation and repositioning of uterus is the best treatment to reduce maternal morbidity. Active management of the third stage of labour has drastically reduced the incidence of inversion. Modified hydrostatic method using a condom catheter ensures an excellent water seal and hence it is ideal for repositioning of uterus in a low resource setting. The use of ultrasound during repositioning ensures the completeness of correction and it is a very useful method which can be employed in cases of hydrostatic correction before decompressing the distended condom.

REFERENCES