

## Conservative management of a recurrent puerperal uterine inversion with bakri<sup>®</sup> balloon tamponade

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### ABSTRACT

Puerperal Uterine Inversion (PUI) is a rare but potentially life-threatening delivery complication in which the uterine fundus collapses within the endometrial cavity. This “glove-finger” introflexion of uterine walls generally occurs as an immediate postpartum complication and is responsible of different degrees of vaginal bleeding, shock and hypogastric pain that can cause serious maternal complications, including death. There are few reports of recurrent postpartum uterine inversion like the one we present here, and its causes remain unclear. Early diagnosis of this complication is crucial as it is the only one measure that can allow a successful and conservative treatment: an inverse relationship between the time that uterus keeps inverted and the probability of repositioning has been firmly established. This case report describes the exceptional and innovative use of the SOS Bakri<sup>®</sup> balloon (Cook Medical Incorporated) in the management of a recurrent puerperal uterine inversion. To our knowledge it is one of the first reports in the world of this procedure, perhaps the second one after Soleymani's *et al* description; and the first one in a third degree recurrent puerperal uterine inversion.

**Keywords:** Balloon Tamponade; Intrauterine; Management; Postpartum Haemorrhage; Uterine Inversion; Review; Treatment.

### 1. CASE REPORT

A 31-year-old healthy gravida 2, para 1 in established labour presented at the delivery suite at 39 weeks' + 5 weeks' gestation. Her pregnancy had been uncomplica-

ted and all stages of labor progressed uneventful and spontaneously, delivering a healthy 2400 gr male. Twenty units of units of intravenous oxytocin were injected as conventional early postpartum haemorrhage prophylaxis.

One minute after delivery, the patient became restless. She experienced severe pain and strong vaginal bleeding started. She kept pushing and felt like bearing down again. Some seconds later an elongued irregular and bloody mass protruded through the vulva and an unexpected finding of third degree puerperal uterine inversion was diagnosed (**Figure 1**). Few seconds later the patient was in hypovolaemic shock, pale and cold. At this moment her blood pressure was 85/50 mmHg and heart rate 143 bpm.

Resuscitation maneuver were established immediately. A facial mask oxygen was given (8 liters/minute) and other 18 G intravenous cannula was inserted. Intravenous colloid infusion commenced, a urinary catheter was inserted and an attempt to replace the uterine inversion was made, but this was not possible because of inadequate analgesia and great cervical ring strength.



**Figure 1.** Acute third degree puerperal uterine inversion. Note the elongued irregular and bloody mass protruding through the vulva.

The patient was transferred to theatre and an halothane-based anaesthetic technique was performed. Complete reduction was finally achieved by manual replacement with Johnson maneuver (**Figure 2**) and the patient was thoroughly examined to ensure that no other injuries were sustained. At that point, the estimated blood loss was about 1500 ml. After confirming successful replacement of the uterus, which was now well contracted, prophylactic intravenous antibiotics were administered (1 gr ampiciline, 120 mg gentamicine and 500 mg methronidazol), so as the administration of forty units of oxytocin and 0.250 mg of ergometrine maleate, in a 500 ml saline solution. Thirty minutes later, the patient became haemodynamically unstable again, with a blood pressure of 81/45 mmHg. At this time bleeding was poor and vaginal examination confirmed that uterus had re-inverted again showing fundus within vaginal cavity. Once again the patient was transferred to the treatre were previously described procedures were repeated. At this moment uterine fundus appeared atonic, and there was a suspicion of great propensity to invert again (**Figure 3**). As additional measure to prevent it a Surgical Obstetric Silicone (SOS) Bakri<sup>®</sup> tamponade balloon catheter (Cook Medical Incorporated) was inserted into the uterus with



**Figure 2.** Johnson manoeuvre: It consists of pushing the inverted fundus through the cervical ring with pressure directed toward the umbilicus.



**Figure 3.** Repositioned uterus before Bakri<sup>®</sup> balloon and vaginal packing insertion.

450 mL of normal saline solution to help preserving the position of the fundus. A vaginal packing was also performed. At that stage, the uterus was contracted and there was no bleeding or abdominal pain. The patient was transferred to a close puerperal observation area from were she came back to the delivery suite 24 hours later. Previously, the Bakri<sup>®</sup> balloon (Cook Medical Incorporated) was deflated gradually and removed (oxytocic and antibiotic infusion were kept during this procedure). Recovery was uneventfull and patient was discharged home on day 3 with a short course of oral antibiotics. Any additional complication happened.

## 2. DISCUSSION

### 2.1. Definition

Puerperal Uterine Inversion (PUI) is a rare but potentially life-threatening complication in which the uterine fundus collapses within the endometrial cavity. This “glove-finger” introflexion of uterine walls [1] generally occurs as an immediate postpartum complication and can be either complete or partial.

Inversion of the uterus was more than likely first recognized by Hippocrates (460 a.C. - 370 a.C.) [2] but other authors believe that Sorano (200 a.C.) was the first one in describe this process and associating it with strong traction on the umbilical cord [3].

### 2.2. Classification

Uterine inversion can be classified in some [2,4-6] degrees according to the intensity of introflexion. The most extended classifications differences following types of inversion (**Table 1**):

There are few reports of recurrent PUI [7] like ours. Causes of PUI remain unclear but there are two main factors contributing: cervical dilation and smooth muscle relaxation. That is why uterine inversion often happens during the third stage of labour [8], particularly when a strong cord traction is applied.

### 2.3. Incidence

Reported incidence of uterine inversion varies considerably in literature from one in 8537 cases in Indian hospitals to one in 27,902 childbirths in British hospitals [9]. Van Vugt *et al.* reported 13 cases in 363,362 deliveries [4] and Baskett reported puerperal inversion ranging from 1 in 1860 after caesarean section to 1 in 3737 vaginal deliveries [10].

### 2.4. Etiology

Even when the cause of uterine inversion remains unclear, several predisposing factors have been described [11-12] (**Table 2**): Anyway, most cases are idiopathic [13]. According to the previous, PUI has traditionally

**Table 1.** Different classifications for uterine inversion.

<b>According to the intensity of introflexion [2]</b>	
First-degree	The inverted wall extends to (but not through) the cervix.
Second-degree	The inverted wall protrudes through the cervix but remains within the vagina.
Third degree	The inverted fundus extends outside the vulva.
<b>According to the existence or absence of tractions or other external strengths during the third stage of labour[5]</b>	
Spontaneous	
Secondary	
<b>According to the inverted portion [6]</b>	
Complete	Inverted portion protrudes through the cervix.
Partial	Inverted portion doesn't protrude through the cervix.
<b>According to the moment in which occurs considering delivery as a reference [4]</b>	
Acute	Inversion occurs immediately after child birth.
Chronic	Inversion occurs after a minimum of 30 days.
Subacute	The inversion occurs between acute and chronic limits.

**Table 2.** Predisposing factors for uterine inversion.

<b>DELIVERY RELATED FACTORS</b>	<b>PATIENT RELATED FACTORS</b>
Credé maneuver.	Previous uterine inversion.
Low uterine tone.	Uterine tumours and other anomalies.
Fundal insertion of placenta.	Low parity.
Administration of oxytocin, particularly when is administered in bolus and traction of the cord with the placenta, either partially or completely attached to the uterus (adherent placenta).	Young age.
Use of uterus-relaxing drugs.	Inherent weakness of the uterine musculature and ligaments.
Cord shortness.	Some authors <sup>12</sup> suggest primiparity as a predisposing factor, when it is associated to a fast second stage of labour, after a slow cervical dilatation.
Macrosomia.	
High intraabdominal pressure.	

been associated to “risky” interventions during the third stage of labour. This belief is now being questioned due to the poor incidence of this entity, compared to the great amount of deliveries in which cord traction and external pressure over uterine fundus are applied [13-15].

Causes of few cases of recurrent inversion like the one we present are even unclearer. It can be speculated that some abnormalities of fundic myometrium may cause ineffective retain [16] after uterine replacement.

## 2.5. Diagnosis

Is usually based on the presence of vaginal bleeding, shock and hypogastric pain. Haemorrhage is the most frequent symptom and shock seems to be secondary to the blood loss and neurological response to the pelvic ligamentary traction [17]. Occasionally, when time permits and equipment is urgently available, sonography may help in diagnosis. Sonographic findings are striking

and can be easily understood if the pathologic process of the uterine inversion is known. In the immediate postpartum, the fluid-filled endometrial cavity must be easily seen. Partial or complete inversion will result in poor visualization of the fluid content, or in a Y-shaped configuration caused by the invaginated fundus displacing the two opposing uterine walls [18].

Early diagnosis of acute PUI allows a successful and often conservative treatment, as there is an inverse relationship between the time uterus keeps inverted and the probability of repositioning it as we previously signed [19].

## 2.6. Treatment

Hypovolemia and shock must be immediate and appropriately corrected with crystalloids while aetiological treatment should consist on manual manipulation of the uterus to reposition it. Oxytocic agents must be avoided in

this moment and sometimes other pharmacologic agents can be employed to assist uterine relaxation for achieving correction (tocolytic agents like terbutaline, magnesium sulphate and glyceryl trinitrate). If correction is not obtained with tocolytic agents, general anaesthesia with halothane may be induced to provide uterine relaxation. This approach may be specially useful when the woman is haemodynamically unstable, because halothane anaesthesia has fewer potential adverse effects on haemodynamics [17,20]. About this concern, it is interesting to note here that epidural analgesia does not help in uterine reposition, as it does not affect uterine tone [21]. When uterus is replaced, further agents are recommended to achieve a powerful-enough uterine contraction able to prevent uterine reinversion and decrease blood loss. If these methods fail, surgical intervention might be necessary.

In our case, manual correction of uterine inversion was made through the vagina by the Johnson maneuver, that consists on pushing the inverted fundus through the cervical ring with energetic pressure directed toward the umbilicus [21,22]. It is generally suggested that removal of the placenta before correction will result in increased blood loss, so it is not recommended removing it, until uterus has been replaced. Rates of immediate reduction vary from 22% to 43% [17].

Apart from Johnson manoeuvre, some authors have reported the use of hydrostatic pressure [23] caused by warm water infused into the vagina to reduce uterine inversion reduction.

When all attempts at manual reduction of the inversion are unsuccessful, surgical correction is often necessary. The three most common procedures are the Huntington, Haultain and Spinelli ones, but the first one is considered the eligible. It consists on a laparotomy to traction round ligaments and uterus to restore normal anatomy. Occasionally, as a life-saving measure, emergency peripartum or obstetric hysterectomy is needed to achieve control of haemorrhage [24].

In our case surgical procedure was not necessary and patient's reproductive potential was kept, even being a recurrent case of uterine inversion. This conservative management of recurrent uterine inversion was based in uterus reposition and insertion of a SOS Bakri<sup>®</sup> balloon (Cook Medical Incorporated), which conformed to the contours of the uterine cavity to prevent re-inversion of the uterus.

The Bakri<sup>®</sup> tamponade balloon is 58 cm long silicone-made inflatable balloon with a double lumen shaft, that is easily removed transvaginally after deflation. Balloon maximum capacity is 800 mL. and never should be inflated with less than 250 mL. However, the recommended use is up to 500 mL. The tip of the shaft has two holes for drainage, so ongoing haemorrhage can be de-

tected after application of the balloon [25].

This case describes the exceptional and novel use of the SOS Bakri<sup>®</sup> balloon (Cook Medical Incorporated) in the management of recurrent puerperal uterine inversion. To our knowledge it is one of the first reports in the world of this procedure, perhaps the second one after Soleymani's *et al* description [16] and the first one in a third degree recurrent puerperal uterine inversion.

### 3. CONCLUSIONS

Insertion of intrauterine balloon tamponade may be an effective measure to treat uterine inversion and prevent its recurrence.

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