

Review Article

Management of Uterine Inversion: An Obstetric Catastrophe

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Introduction:

Acute puerperal uterine inversion is a potentially catastrophic complication of the third stage of labour in which the uterus turns inside out. Uncontrolled post-partum hemorrhage and associated neurogenic shock can cause maternal death if not promptly recognized and corrected. Maternal death has been reported to be as high as 15% in cases of uterine inversion left alone the associated co-morbidities.¹ Reviews of literature reveal that although rare, this phenomenon is more common than generally assumed and nurse-midwives should be familiar with diagnosis and management. In the current context of Bangladesh according to Demographic and Health Survey 2007 and Bangladesh Maternal Health Services And Maternal Mortality Survey 2001, 32 mothers still die each day from obstetric and related complications and majority of deliveries occur at home unattended or attended by untrained "Dai"s/ traditional birth attendants. Comprehensive reviews and confidential reports in developed countries reveal that almost all maternal deaths due to haemorrhage or chronic disease were found to be preventable.² Among the causes of maternal death, puerperal uterine inversion is a preventable condition. The prevention of this condition calls for nothing more than utmost vigilance and strict reliance on the Active Management of Third Stage (AMTCL) protocol. The aim and objective of this review article is to provide a guideline for the prevention and management of uterine inversion, to understand the implications of management on future obstetric outcome and to help to proceed sequentially keeping in mind the important role of conservative management even in this obstetric emergency.

Aim

The aim of this review article is to provide a guideline for the prevention and management of uterine inversion.

Objectives

The specific objectives of this clinical review article are:

1. to acknowledge uterine inversion as a preventable cause of post-partum morbidity and maternal mortality

2. to provide an elaborate working formulation for management of uterine inversion according to type and overall clinical parameters
3. to dissipate the role of conservative management of sub-acute uterine inversion.
4. to disseminate the implications/consequences of delayed diagnosis and also over-treatment.

Materials and methods:

This review article has used published literature, recent journals and relevant text books, books of operative gynaecology, medical memoranda and internet search. This compilation has been inspired by two patients of sub-acute uterine inversion managed in Bangladesh Medical College and Hospital.

Definition and types

Acute puerperal uterine inversion is a rare but potentially life-threatening complication following child birth (third stage of labour) in which the uterus turns inside out, the fundus collapses within the endometrial cavity and may prolapse through the cervix.³ It may complicate vaginal and even abdominal/caesarean delivery.⁴

Two classifications of uterine inversion are used.⁵⁻⁷

The first classification is according to the delay between the delivery and the diagnosis of the uterine inversion:

1. The acute inversion is diagnosed immediately or within 24 hours after delivery. The pre-conditions of acute inversion are: The cervix must be dilated and the uterine fundus must be relaxed for inversion to occur. Therefore acute inversion may be precipitated by maternal exhaustion following birth of the baby along with mismanagement during the third stage of labour.
2. The sub acute inversion is diagnosed after the first 24 hours and within four weeks after delivery. Internal examination reveals a constricted cervix.

3. Finally chronic uterine inversion is diagnosed more than four weeks after delivery.

The second classification is the most commonly used. It is based on the anatomical severity of the inversion. It includes four stages. ⁸

- a) First stage: the uterine base is in the uterine cavity and did not cross the cervix of the uterus.
- b) Second stage: the uterine base crosses the cervix and remains within the vagina.
- c) Third stage: the uterine base is exteriorized at the vulva.
- d) Fourth stage: vaginal walls participate to the inversion along with the uterus.

Some reported papers have merged the third and the fourth stages.

Incidence of uterine inversion:

The reported incidence of uterine inversion following vaginal delivery varies considerably in the literature. Most commonly, the frequency is reported to be approximately 1 in 2000 deliveries; however, a range of 1 in 4000 to 1 in 100,000 deliveries has been found. The prevalence of acute, sub-acute and chronic uterine inversion is 83.4 %, 2.62 % and 13.9% respectively. It is reported that the incidence of uterine inversion following /during caesarean section is much lower than that of uterine inversion following vaginal delivery and occurs in approximately one out of 1860 caesarean sections. ⁴ Maternal mortality from inversion has been reported to be as high as 15%. ^{9,10}

Etiology:

Although the cause of puerperal uterine inversion is unclear, several factors have been described. Intrinsic or predisposing factors ⁷, the presence of which renders the individual susceptible to uterine inversion are primiparity, rapid emptying of the uterus after prolonged distention¹, uterine hypotonia, abnormal placental localizations, fundal implantation of the placenta, abnormal adherence of the placenta (partial placenta accreta), inherent weakness of the uterine musculature(congenital or acquired), congenital uterine anomalies, protracted labour , previous uterine inversion ,fundal myoma or short umbilical cord.

Extrinsic or precipitating factors ^{7,8} which ultimately cause uterine inversion in a susceptible case are failure to administer an oxytocic agents or extraction of the placenta by excessive fundal pressure or abrupt cord

traction on a hypotonic uterine state, intrapartum therapy with magnesium sulphate, jolty traction exerted on the cord, sudden/deliberate intra-abdominal thrust after delivery brought about by retching, strenuous coughing, vigorous manual removal of the placenta. The probable contributing factors of this rare complication during ceasarean section are fundal insertion of the placenta, inherent weakness of uterine musculature, bolus administration of oxytocin and morbidly adherent placenta. ⁴

Diagnosis:

The diagnosis of uterine inversion is based on three elements: post-partum haemorrhage, shock and severe pelvic pain ^{11, 12}. The bleeding is massive in more than 70 % of cases .Shock is the most constant sign which is out of proportion to the amount of blood loss. It results from hypovolaemia which is secondary to bleeding and to vagal reaction associated with stretching of nerves contained in infundibulopelvic and ovarian ligaments. ⁵ There may be bradycardia due to vagal stimulation. The sudden severe pelvic pain is less frequent and is present in 7 to 10% of cases .Whereas clinically, chronic uterine inversion may present with profuse vaginal bleeding and dyspareunia dating from the antecedent delivery. ¹³

The diagnosis of frank/prolapsed inversion is made by visualizing a fleshy mass exteriorized through the introitus. Absence of the uterine base/fundus in the immediate puerperium or the presence of a depression in the fundus (fundic cupula) during abdominal palpation suggests the diagnosis. The diagnosis of lesser degrees of uterine inversion is made by pervaginally feeling the inverted fundus surrounded by a constricting cervical ring. In sub-acute inversion, the soft, oedematous puerperal uterus may be confused with myomatous polyp or a placental polyp. ⁵

Investigations:

Although symptoms will lead to the diagnosis in most cases, diagnostic radiographic methods have also been described in literature. Hsieh and Lee¹⁴ described the sonographic findings of uterine inversion discovered incidentally in an acute condition. Transvaginal sonographic images revealed a hyper-echoic mass in the vagina with a central hypo echoic H-shaped cavity. Longitudinal images showed a U-shaped depressed longitudinal groove from the uterine fundus to the center of the inverted part. Magnetic

resonance imaging (MRI) of inversion has also been reported. The appearance of the uterus is similar but much more conspicuous.² Thus radiographic imaging can help in a clinically stable patient with diagnostic dilemma. Therefore clinical assessment takes precedence over any form of investigation in this obstetric emergency.

Management

According to different guidelines the most important aspect of management of uterine inversion is immediate recognition by vaginal examination and prompt attention to its treatment.^{15, 16} In case of acute inversion, manual repositioning of the uterus takes precedence along with resuscitation.

Correcting Acute Uterine Inversion¹⁵

Senior obstetric and anaesthetic assistance must be sought immediately as soon as the diagnosis of uterine inversion has been considered. General care principles must be reviewed and intravenous access with two 16 gauge cannulas must be instituted for resuscitation with crystalloids or gelatin based colloid, if necessary by a pressure infusion device. Clinical signs of shock must be assessed and at least 4 units of blood must be cross matched for transfusion.

Manual replacement of the inverted uterus by Johnson process:

- Under sedative with I.V pethidine/diazepam or General anaesthesia and after thoroughly cleansing the exteriorized mass, the inverted uterus is compressed with a moist, warm sterile towel until ready for Manual correction by Johnson process.¹⁵

Oxytocin is withheld until after successful correction of inversion. Wearing high-level disinfected gloves, the uterus is grasped and pushed through the cervix towards the umbilicus to its normal position, while the other hand support the uterus which is known as the Johnson process⁸ (Fig 1). The Johnson process comprises of applying sustained pressure on the level of cervico-vaginal cul-de-sacs using fingers and on the base with the palm of the hand. It is important to remember during repositioning that the part of the uterus that came out last (the part closest to the cervix) goes in first. Then the clenched hand is kept in the uterus for several minutes.⁵

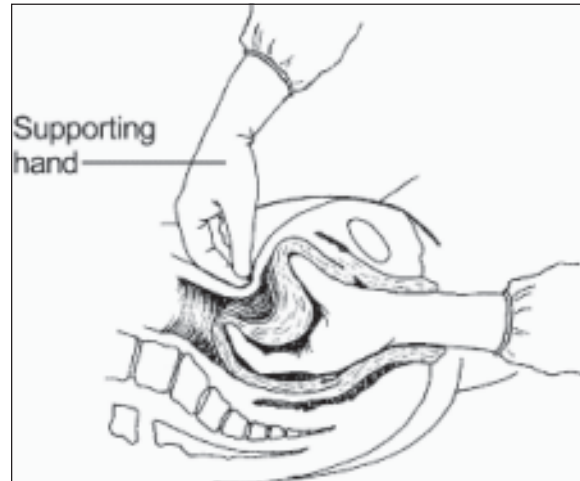


Fig.-1: Manual replacement of the inverted uterus.

- If the uterus is successfully returned to its normal position with the placenta still attached, manual removal of the placenta is performed after correction of inversion in theatre under anaesthesia if necessary. Following removal of the placenta, 10 IU of oxytocin intravenously followed by an oxytocic infusion 40IU in 1000 mL Hartmann's solution or sodium chloride 0.9% should be administered as uterotonics are recommended after desinvagination in order to avoid an immediate recurrence of inversion which was previously reported.^{16, 17}

O'Sullivan's Hydrostatic Manoeuvre¹⁵

If the above measures are unsuccessful then O'Sullivan's hydrostatic manoeuvre first described by O'Sullivan in The British Medical Journal in 1945 may be employed. The hydrostatic method does not always require anaesthesia and may be done in the labour and delivery room while waiting for theatre or on the way to theatre.

- First, the woman is positioned in deep Trendelenburg position with head lowered about 0.5 meters below the level of the perineum or in exaggerated lithotomy position. Then a high-level disinfected douche system is prepared with large nozzle and long tubing (2 metres) and a warm water reservoir (3 to 5 L). or alternatively 2 x 1 litre bags of warmed irrigation fluid (e.g. sodium chloride 0.9%) attached to a wide bore infusion set (or cystoscopy irrigation set) may be used.
- The posterior fornix is identified (where the vaginal rugosity smoothens out) and the nozzle of the

douche or the free end of the infusion set is placed in the posterior fornix. At the same time, the other hand seals the labia over the nozzle while the forearm supports the nozzle/IV administration set.

- An assistant starts the douche with full pressure by gravity by raising the reservoir to at least 2 meters. Water will distend the posterior fornix of the vagina gradually so that it stretches causing the circumference of the orifice to increase and thereby relieves cervical constriction and resulting in correction of the inversion, with rapid resolution of the shock. The placenta can then be removed under anaesthesia and uterine tone is maintained by appropriate oxytocic treatment along with antibiotics.
- In most cases this will reduce the inversion. If this method is unsuccessful the procedure may be repeated under General anaesthesia if necessary. More recently, Ogueh and Ayida have described a novel technique of hydrostatic pressure. Citing difficulty in maintaining an adequate water seal to generate the pressure required, the authors suggest attaching the intravenous tubing to a silicone cup used in vacuum extraction. By placing the cup within the

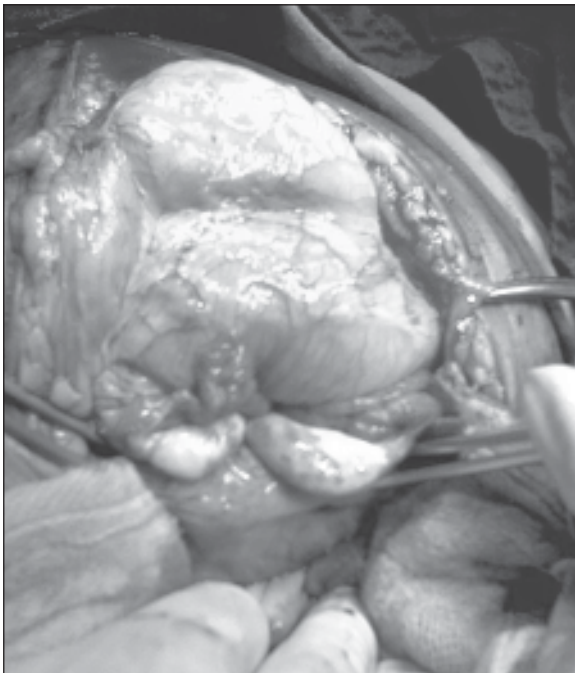


Fig.-2: Laparotomy view of uterine inversion demonstrating the fundal depression with the adnexa invaginating within it

vagina, an excellent seal is created, and adequate hydrostatic pressure for inversion correction is thus produced. Although success with this technique is cited in the literature, there has been no discussion of the theoretical risk of air or amniotic fluid embolus.¹⁷

Manual Correction with Tocolytics or Under General Anaesthesia^{18, 19, 20}

Failed hydrostatic correction calls for manual repositioning under tocolytics or under general anaesthesia. Literature has recommended the use of neuromuscular blocking agents such as magnesium sulphate intravenously and beta mimetic or Terbutaline 0.25 mg I/V to maximize uterine relaxation.³ At present, nitrate based products are mostly used intravenously since they allow rapid relaxation of the cervix even in hypotensive patients.¹⁹ Benefits cited for the use of low-dose (50 microgram intravenously) nitroglycerin which may be repeated once if necessary include quicker onset of uterine relaxation; quick dissipation of the effect, obviating the need for reversal; and minimum effect on hemodynamics than magnesium sulfate.¹² In the event that correction is not established with tocolytic agents, general anesthesia with halothane may be induced to provide uterine relaxation. This approach can be particularly useful when the patient is hemodynamically unstable, because halothane anesthesia has fewer potential adverse effects on hemodynamics than do the β -adrenergic tocolytics.¹⁸ Then the replacement technique is applied (Fig 3). If the placenta is still attached, manual removal may be performed after correction. Regardless of the method of uterine replacement employed, careful manual exploration afterwards is essential to rule out the possibility of genital tract trauma.

Combined Abdominal-Vaginal Correction (CAV correction)^{15, 16}

Abdominal-vaginal correction under general anaesthesia may be required if the above measures fail to achieve correction of inversion. Indications and operative care principles must be reviewed prior to this intervention in this critical situation.

Figure: 3 Laparotomy view of uterine inversion demonstrating the fundal depression with the adnexa invaginating within it.

- After opening the abdomen through a suitable/lower midline vertical incision the peritoneal cavity is extended vertically up and down. The cup of the inverted uterine fundus is identified and tenaculums

are placed without making incision on the uterus gentle upward traction is applied to relieve the constricting cervical ring (Huntington procedure). Repeated clamping and traction continues until the fundus reverts. Synchronously an assistant may assist correction vaginally.^{21,22} If traction fails, the constricting cervical ring is incised posteriorly about 5 to 6 cm which is least likely to injure the bladder or uterine vessels and digital dilatation, tenaculum and traction steps are repeated till reversal of inversion is achieved. (Haultain's operation).^{21,22}

- Anterior median hysterotomy may need to be performed which is called Dobbin's operation.²² Then the uterine incision is repaired with closure of abdomen.

Management of Uterine Inversion Occuring During Cesarean Section ⁴

The inverted uterus is exteriorized at once and the placenta is delivered manually along the plane of attachment. Anaesthesia is deepened and uterine reversion is attempted which can be achieved by gradually rolling the lowermost part of the posterior edge over the uterine fundus, thereby reverting that part that inverted last. The uterus is repositioned intra-abdominally and an oxytocic infusion of 20 i.u oxytocin plus 0.2 mg methylergometrine in 1000 ml Ringer's Lactate to maintain uterine contractions is instituted. Then anaesthesia is reduced progressively to initial concentration. Then the lower uterine incision is closed followed by closure of the abdominal cavity.

Figure: 3 Uterine inversion during caesarean section Post-Procedure Care ¹⁵

Uterotonic agents and broad spectrum antibiotic coverage are recommended after repositioning in order

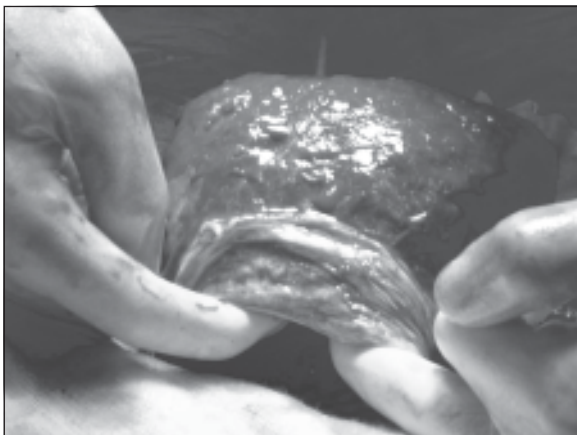


Fig.-3: Uterine inversion during caesarean section

to avoid an immediate recurrence which was previously reported. Therefore once the inversion is corrected, oxytocin 20 units in 500 mL IV fluids (normal saline or Ringer's lactate) at 10 drops per minute is started. If haemorrhage is suspected, the infusion rate may be increased to 60 drops per minute. If the uterus does not contract after oxytocin, ergometrine 0.2 mg or prostaglandins are recommended.

Different regimens of prophylactic antibiotics are to be used after correcting the inverted uterus: such as - Ampicillin 2 g IV PLUS metronidazole 500 mg IV; or cefazolin 1 g IV PLUS metronidazole 500 mg IV. In case of combined abdominal-vaginal correction the postoperative care principles must be strictly followed to avoid puerperal sepsis and haemorrhage.

Management of Chronic Inversion:

Surgical correction by Haultain's /Dobbin's operation is the standard treatment for chronic inversion. As the uterus involutes from its puerperal state, it regains its tone and returns to pre-pregnant state of vascularity. Therefore minimum length of hysterotomy incision after laparotomy can achieve correction of inversion.²⁰ Surgical correction of uterine inversion through the vaginal route can be achieved by the Spinelli method ²² which consists of anterior median colpohysterotomy through the vaginal access for removal of the cervical constriction. Finally, hysterectomy is indicated for a gangrenous or infected puerperal uterus after failed conservative treatment. This should be the terminal resolution.

Individualized Management Of Uterine Inversion

The parameters for assessment of individual case are: haemodynamic status at the time of presentation, stage/type of inversion and parity of the woman.

If haemodynamically unstable: Irrespective of the parity, management should be stepwise starting with urgent repositioning of the inverted uterus. The decision to perform abdomino-vaginal correction /hysterectomy may come forward if it is life-saving, particularly in multiparous woman.

If haemodynamically stable with or without retained placenta:

A) In acute stage;

Repositioning must be attempted starting with Johnson procedure with or without tocolytics /anaesthesia, if failed then CAV (Huntington procedure). The conservative/ non-surgical approach is preferred in primiparous women and achieves the reversal in majority of cases.

B) In the sub-acute stage:

The common scenario in most settings of sub-acute inversion is a primiparous or relatively pauciparous woman presenting more than 24 hours of delivery with partial or complete exteriorization of the inverted uterus with or without retained placenta. Management comprises as follows:

Under prophylactic antibiotics and oxytocic coverage, twice daily Povisep soaked vaginal packing and continuous catheterization followed by attempt of manual repositioning under tocolytics/ GA if necessary. If failed followed by CAV. Conservative management by Aveling's repositor or vaginal packing may be cumbersome and take long time. But this conservative approach is the standard protocol in sub-acute puerperal inversion.²³ The uterus is raised high in the pelvis so as to stretch the round ligaments, which then slowly pulls out the fundus in about a month. The vaginal packing method may be sincerely attempted in young women, as this may satisfactorily achieve reversal of inversion in majority of cases. A long surgical scar over the uterus (particularly on the anterior wall) following an attempt of surgical correction at a state of sub-involution in the midst of sepsis carries a high risk of uterine rupture (4-9%) similar to that of a classical caesarean section in subsequent pregnancy. The uterine incision made during Haultain's operation may inevitably extend in a soft puerperal uterus ending up unfortunately in hysterectomy.²⁴⁻²⁶

Figure: 4 Operative management of sub-acute uterine inversion: inadvertent but inevitable/unavoidable extension of the posterior uterine incision ultimately resulting in hysterectomy.

Figure: 5 Aveling's Repositor, 19 Century gynecologic device placed in the vagina with the red end on the inverted uterus, the other end was tied with straps to keep it in place and thus correct the chronic uterine inversion

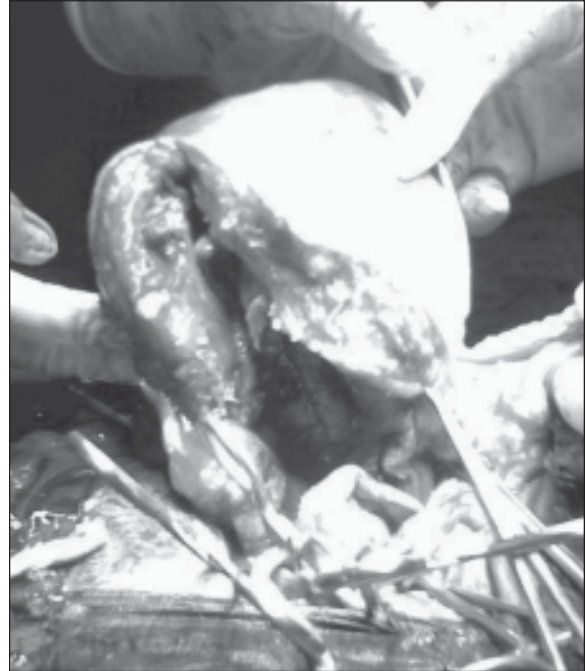


Fig.-4: Operative management of sub-acute uterine inversion: inadvertent but inevitable/unavoidable extension of the posterior uterine incision ultimately resulting in hysterectomy.

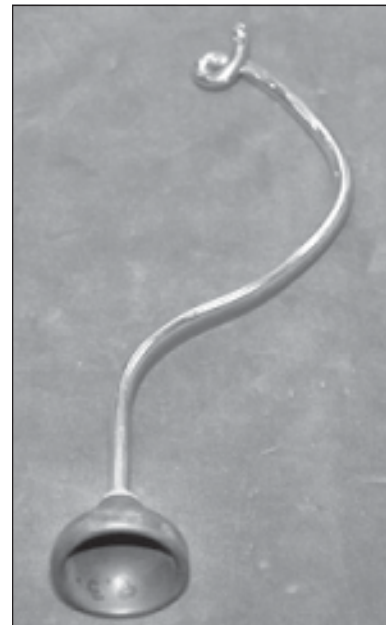


Fig.-5: Aveling's Repositor, 19 Century gynecologic device placed in the vagina with the red end on the inverted uterus, the other end was tied with straps to keep it in place and thus correct the chronic uterine inversion.

Pregnancy Outcome after Operative Correction of Puerperal Uterine Inversion

- Vaginal delivery following surgical correction of uterine inversion may be allowed, especially being watchful for third stage complications like PPH and morbid placental adhesion (placenta accreta) which might necessitate not only manual removal of placenta but also major obstetric interventions such as hysterectomy.²⁶ The consequence of hysterectomy in a pauciparous/ primiparous woman is that of permanent sterility and miserable life. This terrible fate may be avoided by taking a conservative attitude during management of sub-acute uterine inversion.
- The risk of recurrence of uterine inversion in future pregnancies managed in the index case by a posterior median hysterotomy/ Haultain's operation does not seem to be increased, but the uterus should be considered as scared organ in case of anterior surgical reduction imparting the risk of uterine rupture in subsequent pregnancy.²⁷ In a literature, the pregnancy rate after anterior hysterotomy for intrauterine foetal surgery was 62%. Eighteen percent of these cases had spontaneous abortion, 24% delivered preterm and 58% achieved delivery at term. Major obstetric complications after anterior hysterotomy / Dobbin's operation were reported in 12 of 34 pregnancies (35%), including antepartum hemorrhage requiring transfusion (9%), uterine dehiscence/rupture (12%/6%) and, cesarean hysterectomy (3%).²⁷

Prevention Of Uterine Inversion

Prevention is better than cure. Therefore the preventive steps for avoidance of this obstetric catastrophe are:³

- Prior risk assessment based on the presence of predisposing factors.
- Avoidance of precipitating factors during management of labour.
- Strictly following the Active Management of the Third Stage of Labour (AMTSL). That includes the following steps in sequence:
 1. Use of uterotonic drugs after the delivery of the anterior shoulder: –Oxytocin 10 Units IM/ 5 Units by IV bolus followed by 10-20 U per litre IV drip running at 100-150 cc/hr.

2. Early cord clamping and delivery of the placenta by controlled cord traction. The expelled placenta should be inspected for any missing cotyledons or membrane.
3. Ensure continued uterine massage after delivery of placenta.
 - Utmost vigilance to detect the earliest stage of inversion by institutional/ hospital delivery or ensuring delivery by skilled birth attendant.
 - Prevention of delayed presentation of inversion by immediate repositioning of the inverted uterus in acute stage through effective dissipation of the skill of Johnson procedure to all concerned by emergency trial drilling.

Summary and Conclusion:

In summary, uterine inversion is a life-threatening obstetric complication. Although uncommon, if unrecognized, severe hemorrhage and consequent haemodynamic instability can lead to maternal death. Manual manipulation aided by tocolytic or halogenated anesthetic agents is often successful in correcting the inversion. In the most resistant of inversions, surgical correction through the abdomen might be needed. In any case, the best prognosis is achieved by prompt recognition of the condition and immediate attempts to replace the inversion.^{5,6} Thus, it is important that obstetricians should be able to diagnose inversion and provide individualized treatment even in this obstetric nightmare.

References:

1. Joy L. Hawkins M.D. Preventability, The management of obstetric emergencies. *Obstet Gynecol* 2005; 106: 1228
2. Sarah B.H. Poggi. Postpartum hemorrhage and the abnormal puerperium. *Current diagnosis of obstetrics and gynaecology*, Mc Graw Hill 2007 ;485-86
3. Lewin JS, Byran PJ. MR imaging of uterine inversion *J Compt Assis Tomogrpahy* 1989; 13:357-9.
4. Dimitrios Vavilis, D Tsolakidis, D Athanatos, et al. Complete uterine inversion during caesarean section: A case report. *Cases J.*2008;1:127
5. Dawn R. Hostetler, Michael F. Bosworth, DO, Dayton .Uterine Inversion, A Life-Threatening Obstetric Emergency; *J Am Board Fam Pract.* 2000; 13(2):120-123.

6. Pratap Kumar, Narendra Malhotra . Other displacements of the uterus: inversion of the uterus, Jeffcoate's Principles of Gynaecology, Arnold Publishers 2008,300-303
7. R. Johanson. Obstetric Procedures. Dewhurst's textbook of obstetrics and gynaecology for post graduates. Lippincots 1999:320
8. Bouchikhi C, Saadi H, Fakhir B, Chaara H et al. Uterine Inversion; A case report. Libyan Journal of Medicine. 2008.Vol 3, No 1 :58-59.
9. Catanzarite VA, Moffitt KD, Baker ML, Awadalla et al. New approaches to the management of acute puerperal uterine inversion. Obstet Gynecol 1986; 68(3 Suppl):7S-10S.
10. Momani AW, Hassan A. Treatment of puerperal uterine inversion by the hydrostatic method: reports of five cases. Eur J Obstet Gynecol Reprod Biol 1989; 32:281-5.
11. Postpartum Hemorrhage. ACOG Practice Bulletin No. 76. American College of Obstetricians and Gynecologists. ObstetGynecol2006: 108:1039-1047.
12. Rodriguez, Jorge A, Calderon, Adriana P *et al*. Chronic uterine inversion: a case report and review of the literature. Rev Colomb Obstet Ginecol, July/Sept. 2005;.56(3):.249-255.
13. Hsieh TT, Lee JD. Sonographic findings in acute puerperal uterine inversion. J Clin Ultrasound 1991; 19:306-9.
14. Carolyn A. Cameron, Christine L. Robertson. Getting an evidence –based post-partum haemorrhage policy into practice. ANZJOG June 2007;47(3):169-173.
15. [www.health.sa.gov.au/perinatal practice guidelines.Chapter 11c.Uterine inversion](http://www.health.sa.gov.au/perinatal_practice_guidelines.Chapter_11c.Uterine_inversion), Government of South Australia, Department of Health, 2007.accessed on 5.9.11
16. Sinha G, Sinha A. Fertility and reproduction following inversion of uterus. J Indian Med Assoc. 1993 Jun; 91(6):149-50.
17. Ogueh O, Ayida G. Acute uterine inversion: a new technique of hydrostatic replacement. Br J Obstet Gynaecol 1997; 104:951-2.
18. Roy G. Soto, Joan M. McCarthy, Mitchell S. Hoffman. Journal of Gynecologic Surgery, Anesthetic Management of Uterine Inversion, J Gynaecologic Surgery. 2002;18(4):165-166.
19. Dayan SS, Schwalbe SS. The use of small-dose intravenous nitroglycerin in a case of uterine inversion. Anesth Analg 1996; 82:1091-3.
20. Ashma Rana, Neelam Pradhan, Kanti Giri, Dik,Bista,Jay k Thakur. Acute uterine inversion reverted by laparotomy and division of ring anteriorly, Dobbins operation. Singapore J of Obs/Gyn 2002; 33(3):50-54.
21. Christopher N Hudson, Mercus E Setchell, Mwinoglee et al. Operations on the uterus: cervix and cavity, Shaw's text book of operative gynaecology, Elsevier 1997;110 .
22. Antonelli, E, O Irion, P Tolck, M Morales . Subacute uterine inversion: description of a novel replacement technique using the obstetric ventouse ,BJOG .2006 Jul;113(7):846-7
23. D.C .Galloway. Sub-acute inversion of the uterus treated with Aveling's repository , Medical memoranda, Br Med J,1952 Jul 6;2(4777):196-197
24. Hugh A. Hezlett, Hamilton McCleery. A Home-made Repositor for Chronic Inversion of the Uterus. BJOG August, 2005 53 (2):185-186; 24
25. Chandra JA, Zahra F, Qureshi S. Conservative management of subacute puerperal inversion of uterus. Trop Doct. 2009 Jan;39(1):57-8
26. Ashma Rana, Tank Parikshit D, Mayadeo Niranjan YS et al. Pregnancy outcome after operative correction of puerperal uterine inversion. Arch Gynecol Obstet. 2004; 269(3):214-6.
27. Baskett TF. Acute uterine inversion: a review of 40 cases J Obstet Gynaecol Can. 2002 ; 24(12):953-6.