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Role of Cervical Tamponade in Controlling Bleeding During Cesarean Section of Placenta

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Abstract:

Background: Placenta previa and placenta accreta spectrum are important causes of severe hemorrhage during cesarean delivery and remain associated with substantial maternal morbidity and mortality. Uterotonic agents, uterine packing, balloon tamponade, compression sutures, vascular ligation, arterial embolisation, and hysterectomy are examples of conventional management; however, these procedures may be unsuccessful, technically difficult, or linked to serious complications and infertility. A straightforward, conservative surgical method that makes advantage of the cervix as a natural compressive structure is cervical tamponade with cervical inversion. In order to compress the bleeding placental bed while preserving cervical canal patency, the cervical lip is pulled into the uterine cavity and sutured to the matching lower uterine segment. According to available clinical data, this method can quickly achieve haemostasis, minimise blood loss and the necessity for a hysterectomy, protect the uterus and future fertility, and enable direct bleeding point viewing and suturing. Therefore, for women with placenta previa or placenta accreta spectrum, cervical tamponade may be a practical and effective way to reduce heavy bleeding following caesarean surgery.

Keywords: Cervical tamponade; Cervical inversion; Placenta previa; Placenta accreta spectrum; Cesarean section; Postpartum hemorrhage; Conservative surgical management.

Introduction:

Globally, the incidence of placenta previa and placenta previa accreta has significantly increased in recent decades (1). There is agreement in the literature that a number of important factors, such as increased rates of Caesarean sections, a larger incidence of uterine operations, and advanced maternal age, contribute to this increase, even though the exact pathophysiology is yet unknown (2).

Nearly 14% of maternal deaths in low-income nations are caused by postpartum haemorrhage, a serious complication linked to placenta previa (3).

One of the main causes of postpartum haemorrhage associated with a low-lying placenta is the discrepancy between the bottom and upper portions of the uterus. Compared to the top segment, the lower uterine segment exhibits a slower retraction and a robust vascular supply. When uterotonic drugs fail to control blood loss, surgery is required (4).

The literature has reported a variety of methods for controlling severe bleeding that occurs during caesarean sections when placenta previa is present (5).

These techniques include the use of gauze to pack the uterus, balloon tamponade, the B-Lynch suture technique, the use of parallel vertical compression sutures, a square suturing technique, and the closure or embolisation of the internal iliac and uterine arteries. The success rates of various therapies, however, vary widely (5). The most popular method

for treating postpartum haemorrhage (PPH) is oversewing the bleeding location. However, the lower segment and cervical canal haemorrhaging sites are frequently located too deeply, and the severity of the bleeding may mask their precise placements (6).

A straightforward method of suturing an inverted lip of the cervix over the bleeding placental bed was successfully used to control the bleeding, save the patient's life, and preserve her uterus, according to a case report by Dawlatly et al. (7).

In cases of placenta previa, cervical tamponade has become a new and useful technique for managing bleeding during caesarean sections. This method minimises the requirement for drastic surgical intervention while providing a focused, physiological approach to haemostasis by using the cervix as a natural compressive structure (8).

Mechanism of Cervical Tamponade:

Rapid haemostasis results from the cervical inversion procedure's temporary reduction of vascular blood supply to the lower uterine section. Three main arterial branches supply the lower section of the uterus: the uterine artery forms the upper branch, the cervical artery forms the middle branch, and the vaginal arteries create the lower branch. These arteries anastomose in the intramural portion of the cervico-vaginal junction or at the border between the vagina and uterine isthmus. Unusual connections between these arteries develop in some pathologic situations, such as placenta percreta, which can result in problems controlling bleeding and haemostasis (9). The arterial flow between the uterine and vaginal arteries may change in certain circumstances due to uterine anastomotic interactions (10). Suturing the bleeding spots on the placental bed takes longer when the cervix is inverted because the pressure on the arteries in the lower segment temporarily restricts them and lowers blood flow (11).

For a number of reasons, repeated caesarean sections may benefit from the cervical inversion approach. First, the diameter of the prior scar may be reduced because the Kerr incision is made in its center. Second, the lower section will be relatively soft and easily inverted if the surgery is carried out right after the placenta and newborn are delivered. Third, the cervix is almost always unripe and the lower segment is in a tensile state, making it easy to grasp the cervical lip and invert the cervix. This is because nearly all women with placenta previa have a planned caesarean delivery or are referred for an emergency caesarean immediately after the start of parturition bleeding before advanced dilatation or effacement (ripening) of the cervix and severe bleeding occurs (12).

Technique of Cervical Tamponade — Cervical Inversion

The cervical inversion technique was defined as an easy, quick, and successful way to manage serious bleeding from the placental bed after caesarean procedure in cases of placenta previa and placenta previa accreta in the prospective study by El Gelany et al. (8).

To enable cervical elevation and manipulation, the patient was placed in a dorsal lithotomy with hip abduction and flexion while under general or spinal anaesthesia. There was noticeable bleeding from the lower uterine region following the delivery of the foetus and placenta removal. To grip the anterior or posterior cervical lip and pull it upward into the uterine cavity, a long Allis forceps was inserted into the uterine incision. Next, using two to three simple interrupted absorbable stitches (Vicryl or Vicryl rapide No. 0), the inverted cervical lip was sutured to the matching wall of the lower uterine segment (anterior cervical lip to anterior wall, posterior cervical lip to posterior wall). In order to preserve patency and avoid stenosis, a Hegar dilator was retrogradely introduced via the cervical canal during suturing (8).

By squeezing the bleeding placental location, this inversion and suturing approach produced a natural tamponade effect that helped haemostasis while maintaining the cervical canal and surrounding structures. The average time to complete the procedure was 5.4 ± 0.6 minutes. The uterine incision was closed normally once the tamponade was secured, and patients were observed for cervical integrity and bleeding after the procedure (8).

Clinical Evidence Supporting Cervical Tamponade:

N. Sakhavar et al. (12) reported successful use of cervical inversion in cases of placenta previa accreta and increta. Hemostasis was achieved within minutes in all cases, with preservation of the uterus and no significant postoperative complications.

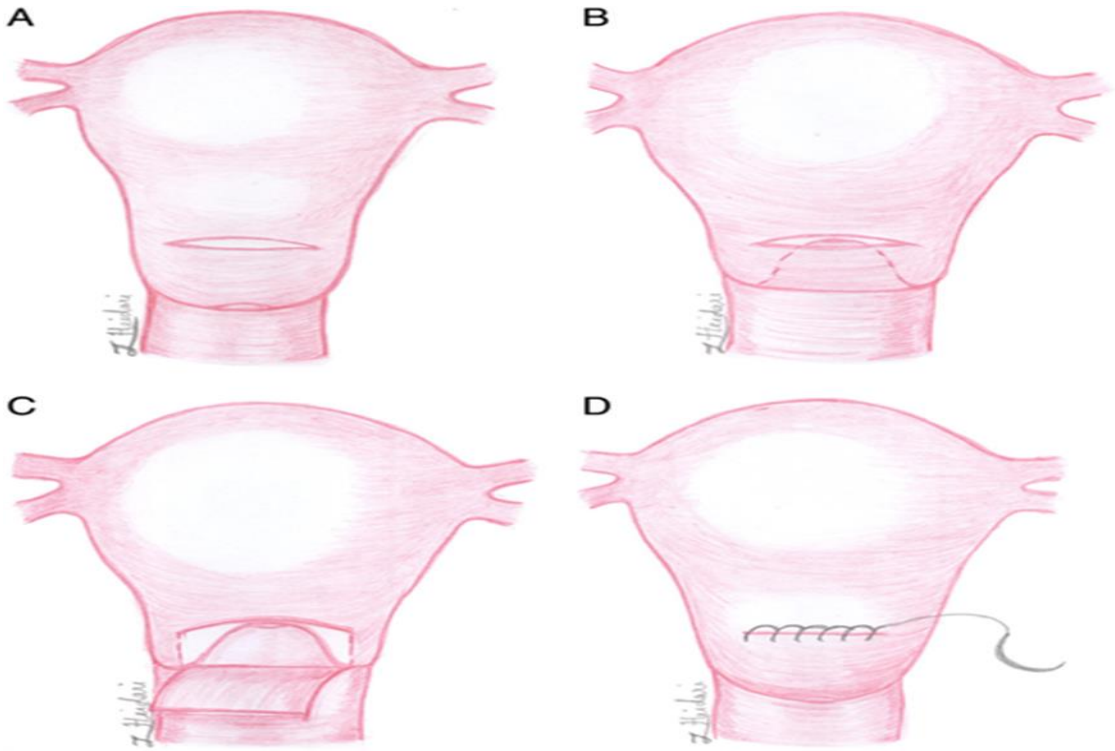

Figure 1 : Schematic illustrations of cervical inversion. (A) Horizontal incision of the uterus (Kerr incision). (B) Inversion of the cervix and lower segment into the uterus; the inverted region is shown as a dotted line. (C) Inversion of the cervix and lower segment into the uterus; a window has been removed for better observation of the inverted region. (D) Repair of the Kerr incision after the cervix has been returned to its Original position.**(12)**

In a similar vein, women receiving caesarean sections for placenta previa and placenta accreta spectrum were included in a prospective research by El Gelany et al. (8). In around 95% of instances, cervical tamponade effectively stopped bleeding, and the rates of hysterectomy and postoperative morbidity were significantly decreased.

Randomised controlled studies provide high-level evidence in favour of cervical tamponade. The usefulness of cervical inversion as a conservative surgical approach was confirmed by Alalfy et al. (13), who showed that it greatly outperformed standard surgical haemostatic procedures in reducing bleeding after caesarean surgery for placenta previa.

Comparison with Other Hemostatic Techniques:

Because the lower uterine segment has reduced myometrial contractility, uterotonic medications are frequently unsuccessful in treating placenta previa (14). PPH can be prevented and managed in a number of ways. The first step in stopping bleeding is to use uterotonics; if this doesn't work, further methods such uterine tamponade and gauze packing, a Foley's catheter, a Sengstaken–Blakemore tube, or a Bakri balloon can be used (15).

Although uterine or hypogastric artery ligation and arterial embolisation are effective treatments for severe PPH, these procedures can be challenging to carry out in practice, and complications have been documented (16). The

small number of contemporary angiography units with a knowledgeable, skilled staff on call around-the-clock and the perceived risk of transferring a patient in an unstable condition to the angiography suite are the reasons for the low use of uterine artery embolisation, as previously reported (17).

A hydrostatic balloon catheter tamponade technique was described by Johanson et al. (18). The greatest drawback of packing the uterus, though, is that the bleeding may continue yet go unnoticed for some time. It may be challenging to pinpoint the exact location of bleeding when there is extensive bleeding. The use of blind compression sutures, such as transverse annular, parallel vertical, or circular isthmic-cervical sutures, may result in additional complications, such as closure of the uterus cavity, infection, and pyometra from intrauterine adhesions, partial uterine wall necrosis, and blood entrapment. Furthermore, more crucial time would be lost if blind sutures are performed repeatedly. In contrast, cervical inversion allows surgeons to directly view the bleeding locations and manage them with fewer sutures (6).

The B-Lynch or brace suturing technique is another conservative surgical method in which compression sutures are used to apply pressure. This procedure may result in myometrial defects and gradual entire or partial myometrial ischaemic necrosis, which could be dangerous during a subsequent pregnancy. Furthermore, it only applies to upper segment haemorrhage (6). Furthermore, there may not always be surgeons with experience doing this technique (12).

In order to preserve uterine integrity and future fertility, cervical inversion was initially used in 2011 as a conservative surgical technique to reduce postpartum haemorrhage in a young lady with placenta previa complicated with localised placenta increta. The method has been effectively used since that first publication, and no intraoperative or postoperative problems have been documented. Cervical inversion seems to be an acceptable and successful treatment for postpartum haemorrhage in clinically recognised cases of placenta previa based on these clinical outcomes. There is less chance of further tissue damage, cervical canal narrowing, and bleeding from suture or needle insertion sites because the treatment is technically straightforward and enables direct observation of the bleeding sites (12).

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