

UTERINE TAMPONADE FOR OBSTETRIC HEMORRHAGE: INTERNAL BALLOONS AND EXTERNAL COMPRESSION STITCHES

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EXECUTIVE SUMMARY

- Uterine tamponade can be a simple and effective intervention for bleeding from the placental implantation site.
- WHO recommends the use of uterine balloon tamponade for treatment of uterine atony-related hemorrhage in situations where uterotonics have not been effective or are not available.
- Uterine balloon insertion and compression suture procedures should be practiced by the clinical team to ensure understanding of the sequence of steps and availability of necessary supplies and equipment.
- The potential for concealed intra-abdominal bleeding must be kept in mind. It is essential to carefully inspect for unrepaired lacerations prior to balloon placement and to monitor vital signs closely after placement, even when visible bleeding is reduced or eliminated.
- For training provider and nursing staff, we recommend sharing this chapter, watching the video and practicing during a drill or simulation.

BACKGROUND

Direct pressure or tamponade on a bleeding site is a long established approach for many types of hemorrhage. In obstetric hemorrhage the large majority of cases involve bleeding from the placental implantation site. A secondary source to always keep in mind is bleeding from trauma (laceration) to the vaginal sidewall, cervix or the uterus itself. These lacerations generally require direct repair. There are three approaches to uterine tamponade: intrauterine packing, intrauterine balloons and uterine (myometrial) compression sutures.

Uterine packing with systematically placed gauze, which is retrieved through the vagina 24 hours later has some disadvantages compared to the use of a balloon; however it might remain a low cost option in resource poor areas, or in experienced hands. Reported disadvantages include the need to pack the uterine cavity tightly and methodically which requires operator experience and adequate anesthesia. Further, there remains concern regarding a delay in recognizing ongoing hemorrhage until the blood loss has saturated

many yards of packing material. Although recent case reports suggest that uterine packing might still play a role, in its updated 2012 guidelines for the treatment of postpartum hemorrhage, WHO recommended against its use.^{1,2}

Uterine balloon tamponade has emerged as a simpler and effective option that can easily be learned. There are many reported retrospective series of uterine balloon tamponade. The postpartum uterine cavity requires a balloon of sizable volume to adequately apply pressure against its walls. The Rusch urologic balloon, designed for bladder tamponade and the Sengstaken-Blakemore esophageal tube were initially used. There are now three commercially available devices designed specifically for uterine balloon tamponade available including the silicone Bakri™ Postpartum Balloon, the silicone BT-Cath® tamponade balloon, and the polyurethane Ebb® double balloon (vaginal and uterine) tamponade system. All three devices have a double lumen shaft, which allows ongoing drainage from the uterine cavity to be quantified externally. The filled balloons are easily visualized with bedside trans abdomen ultrasound, which may be useful to assess development of intrauterine blood and clots or balloon extrusion through a dilated cervix into the vagina. In 2012, WHO updated its guidelines for the management of postpartum hemorrhage to state, “The use of intrauterine balloon tamponade is recommended for the treatment of PPH due to uterine atony. This recommendation is now stronger than the previous guidelines. It can be used for women who do not respond to uterotonics or if uterotonics are not available.”²

The exact mechanism of action of balloon uterine tamponade is not yet clear. Reduction of uterine bleeding may occur by reduction of uterine artery perfusion pressure, by application of pressure directly to the placental bed, or both.³

Successful use of a balloon catheter is defined in most case series as diminished bleeding such that no additional non-pharmacologic interventions are needed. The reported success rates range from 68%-88%, derived from recent cases series ranging from 15-50 patients in a total of 204 women.⁴⁻¹⁰ These case series specifically describe use of the Bakri™ Postpartum Balloon. Some authors have noted a higher rate of success in women who were delivered vaginally compared to by cesarean section.^{4,6,9} Because an intrauterine balloon can fairly rapidly be placed (typically less than 5-8 minutes), even if the balloon is ultimately not successful in completely controlling the hemorrhage, its placement may diminish bleeding while other therapeutic resources are mobilized, such as transferring the patient to the operating room or to an interventional radiology suite. One author noted a significant decrease in the rate of invasive procedures needed among vaginally delivered women once an intrauterine balloon was introduced into the postpartum hemorrhage protocol.⁷

Placement of the balloon via a transvaginal route can be accomplished by holding the balloon in the palm of the operator's hand and manually guiding it through the dilated

cervix and into the uterine cavity, with the patient in a dorsal lithotomy position. The balloon must typically be manually held within the uterine cavity to prevent extrusion through the dilated cervix until the balloon is filled to at least 300 cc or even more. Care should be taken not to inadvertently “kink” the short length of tubing connecting the fill device (syringe or IV bag) and stopcock to the main balloon catheter. Once the balloon is optimally filled, gentle traction on the stem should seat the balloon within the lower uterine segment. This process may involve the operator holding the catheter in place and assessing the uterine filling and tone; and an assistant who draws up the saline syringes, turns the stopcocks and pushes the fluid. Others need to record the fluid placed into the balloon, number of vaginal packs if used, and the blood loss out. The catheter should be attached to a drainage bag. Tight vaginal packing may be needed to adequately retain the balloon within the uterine cavity and prevent hour-glassing through the partially dilated cervix. *Note: such packing must be tied to the balloon catheter so that it is removed at the same time, preventing retained vaginal packing.* The Ebb[®] tamponade system has a separate vaginal balloon which may be inflated to facilitate a vaginal packing effect. The maximal uterine balloon fill volumes are reported to be from 500 cc (Bakri[™] and BT-Cath[®]) to 750 cc (Ebb[®]). Judgment is required to determine the optimal balloon filling volume and will involve an assessment of how well the uterus is contracted to begin with (and therefore the residual uterine cavity volume) and the tone of the uterus as the balloon is filled.

Placement of the Bakri[™] balloon at the time of cesarean section involves threading the catheter end of the device through the abdominal incision, into the uterine cavity, and down through the cervix into the vagina. Care should be taken to ensure that the catheter is threaded through the cervix and is not inadvertently coiled within the lower uterine segment. An assistant, underneath the surgical drapes and with a gloved hand in the vagina may facilitate proper placement of the catheter tube. This assistant can ensure the retention of the balloon within the uterus as the uterine incision is closed and the balloon is then inflated. Inflation of the balloon prior to closure of the uterus can risk needle puncture of the balloon. In contrast, the Ebb[®] tamponade system with its multiple catheters, needs to be placed from the vagina upwards. This can be accomplished with an assistant but usually requires placing the woman in lithotomy position to feed the catheter as cleanly as possible through the cervix.

Post-procedure monitoring includes continuing with the hemorrhage protocol and checklist with the addition of measurement of draining blood. The next 20-30 minutes should be devoted to creating a plan for next steps should the bleeding not be controlled. Fortunately, in 60-80% of cases, the balloon will be the last major intervention needed. Although there is no specific evidence supporting the practice, most manufacturers and authors have suggested the empiric use of a prophylactic antibiotic while the balloon remains in the uterus (usually up to 24 hours maximum) and some have suggested

soaking any vaginal packing used in povidone iodine or antibiotic solution. Whether these measures are necessary is unknown.

Several caveats should be kept in mind: (1) lack of vaginal bleeding does not necessarily mean that the bleeding is controlled—hemorrhage may continue intra-abdominally thru a laceration and be obscured by the balloon. Close attention to vital signs is critical. (2) Uterine atony and lower segment bleeding from a poorly contracted placental implantation site are the most recognized indications for an intrauterine balloon. Experience with focal abnormally adherent placenta (partial accreta) has been mixed, some claim great success others have noted failure with significant obscured blood loss. (3) A critical first step is a thorough and well-lit examination for lacerations. Often this is best done in the operating room with surgical stirrups, long retractors, assistants and multiple OR lights. This is also the opportunity to rule out retained placental fragments. If it is to be done in a delivery room, one should assemble similar resources.

Another approach that should be available in every institution is the use of uterine compression sutures. B-Lynch “suspender-style” suturing with heavy gauge absorbable suture such as 1-Chromic or 1 Monocryl is the most commonly utilized method, but there are several other techniques described that are more locally focused on smaller areas (typically for focal accretas). The B-Lynch suture is typically done at cesarean delivery when uterine atony persists despite uterotonics. It is both easy (takes under 90 seconds to apply and is easily taught) and can be quite effective when initiated early in the treatment of atony. The key step is to manually squeeze the uterus from top to bottom while cinching the stitch rather than use the stitch itself try and compress the uterus while being tied down (pulling extensively on the stitch during tie down is likely to tear the myometrium). At the very least, this simple step can buy time to prepare for other interventions. The placement of an intra-uterine balloon after a B-Lynch suture has been successfully reported in a small number of cases. The combination of external and internal compression can be very effective.

(Photo courtesy of Elliott Main, MD and used with permission)



RECOMMENDATIONS

1. An intrauterine balloon tamponade device should be available on all obstetrical units.
2. All delivery providers (physicians, midwives and nurses) at the institution should be familiar with the technique and instruments for placement of both the intrauterine balloon and the B-Lynch suture, including physically practicing the steps. Appropriate protocols for the timing and method of placement should be added to institutional policies and procedures. (Diagrams with the technique and indications for use may be helpful if clearly posted in the labor and delivery units as well as available in large laminated size in an obstetric hemorrhage kit.) Viewing a manufacturer's commercial animation may also be useful.¹¹
3. The critical first step for evaluation of obstetric hemorrhage should always be a careful and well-visualized examination of the vagina and cervix.

EVIDENCE GRADING:

Level of Evidence: II-3 B. Evidence obtained from multiple time series with or without intervention. Well-done QI studies with statistical process control analyses (or the like) fall into this category. Dramatic results in uncontrolled experiments also could be regarded as this type of evidence. Recommendations based on limited or inconsistent evidence.

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