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Internal Uterine Tamponade

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INTRODUCTION

The origin of the word tamponade appears to have come from an old French word for tampon, which carries the connotation of a plug, a bung or a stopper inserted into an open wound or a body cavity to stop the flow of blood[1]. Today, the common usage of this term includes the collection of menstrual effusion by insertion of a preformed sanitary pledget into the vagina.

In the context of postpartum hemorrhage, tamponade refers to plugging the uterus with some type of device to stop the flow of blood. Normally, this is in the form of a gauze pack or a balloon catheter. Internal tamponade procedures have been used successfully alone[2–5] or in combination with the Brace suture[6] to reduce or arrest massive postpartum hemorrhage.

PRINCIPLES OF UTERINE TAMPONADE

Uterine tamponade requires developing intrauterine pressure to stop bleeding. This can be accomplished in two ways:

(1) By insertion of a balloon that distends in the uterine cavity and occupies the entire space, thereby creating an intrauterine pressure that is greater than the systemic arterial pressure. In the absence of lacerations, the blood flow into the uterus should stop the moment the pressure in the tamponade balloon is greater than that of the systemic arterial pressure.

(2) By insertion of a uterine pack consisting of a gauze roll that is tightly packed into the uterus in such a manner that pressure is applied directly on capillary/venous bleeding vessels or surface oozing (of the deciduas) from within the uterus, thereby resulting in either a significant reduction or stoppage of uterine bleeding.

BASIC GENERAL PRINCIPLES

After failure of medical intervention to stop or reduce postpartum hemorrhage, one should consider performing internal uterine tamponade. This should be carried out in the operating theater with anesthetic and nursing staff present as well as blood transfusion service back-up. The woman should be placed in the Lloyd Davies or lithotomy position with an indwelling urethral catheter. Examination under anesthesia should be carried out to exclude lacerations, retained placenta, and to empty the uterus of clots. Only then should tamponade procedures be attempted. Uterotonics and hemostatics are advised as adjunct therapy and may be given simultaneously. Any of the internal uterine tamponade methods described below can be embarked upon before resorting to surgical interventions.

The following is a description of the 'tamponade test' and various other methods of tamponade with their potential advantages and disadvantages.

THE TAMPONADE TEST

This test, first described in 2003 by Condous and colleagues[7], was proposed as a prognostic index as to whether laparotomy would be needed in patients with major postpartum hemorrhage unresponsive to medical therapy. In the original description, a Sengstaken–Blakemore esophageal catheter was inserted into the uterine cavity via the cervix, using ultrasound guidance when possible, and filled with warm saline until the distended balloon was palpable per abdomen surrounded by the well-contracted uterus, and visible at the lower portion of the cervical canal. The position of the Sengstaken–Blakemore esophageal catheter was checked to ensure it was firmly fixed *in situ* within the uterine cavity by the application of gentle traction. If no or only minimal bleeding was observed via the cervix or there was only minimal bleeding into the gastric lumen of the Sengstaken–Blakemore esophageal catheter, the tamponade test result was considered to be positive. If this were the case, surgical intervention, with possible hysterectomy, was avoided. On the other hand, if significant bleeding continued via the cervix or the gastric lumen of the tube, the tamponade test was deemed a failure and laparotomy was performed. In this study, 14 out of 16 women (87%) with intractable hemorrhage responded positively. Of the women who did not respond, one continued to bleed because of an overlooked cervical extension of the lower transverse uterine incision at cesarean delivery. The balloon was inadequately inflated in the other. The Rüsch urological balloon has also been used successfully for the tamponade test[3]. Chapter 47 describes in more detail a longitudinal

study still in progress to determine the effectiveness of the Rüsch urological balloon for the tamponade test.

SENGSTAKEN–BLAKEMORE TUBE

The Sengstaken–Blakemore esophageal catheter was originally designed for the treatment of esophageal variceal bleeds and the introduction of contrast media. It is a three-way catheter tube with stomach and esophageal balloon components (see Figure 1). It can be inflated to volumes greater than 500 ml. Several reports on its successful use to arrest major postpartum hemorrhage are available[2,7,8–11]. Before insertion of the tube, the distal end of the tube beyond the stomach balloon is severed to minimize the risk of perforation. The main advantage is its simplicity of use and, therefore, junior residents can easily learn and perform the test while waiting for help.

The main disadvantages are that it is not purpose-designed for postpartum hemorrhage and may not easily adapt to the shape of the uterine cavity. Moreover, it contains latex and may not be affordable in resource-poor settings.

RÜSCH HYDROSTATIC UROLOGICAL BALLOON

This is a two-way Foley catheter (simplastic 20 ch, 6.7 mm, 30 ml), which can also be used for postpartum hemorrhage. It has a capacity greater than 500 ml (see Figure 2)[3]. The technique of insertion is similar to the description already given for the Sengstaken–Blakemore esophageal catheter. A 60-ml bladder syringe can be used for inflating the balloon with warm saline via the drainage port. It is a simple technique and therefore junior residents can easily learn and become adept in its use, especially if practised after a manual removal of the placenta.

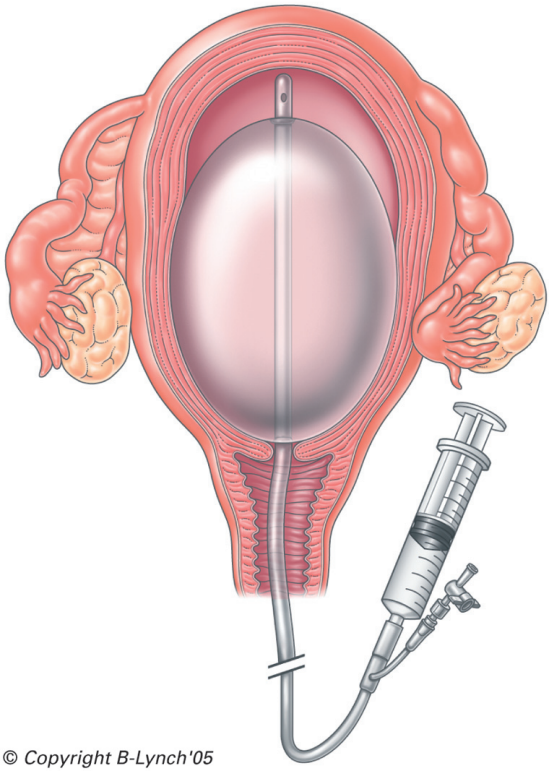

Figure 2 Rüsch hydrostatic balloon catheter

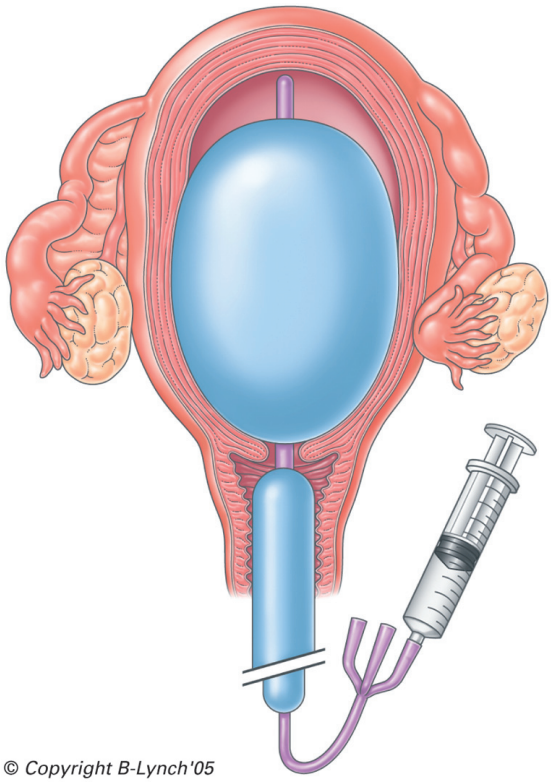

Figure 1 Sengstaken–Blakemore tube

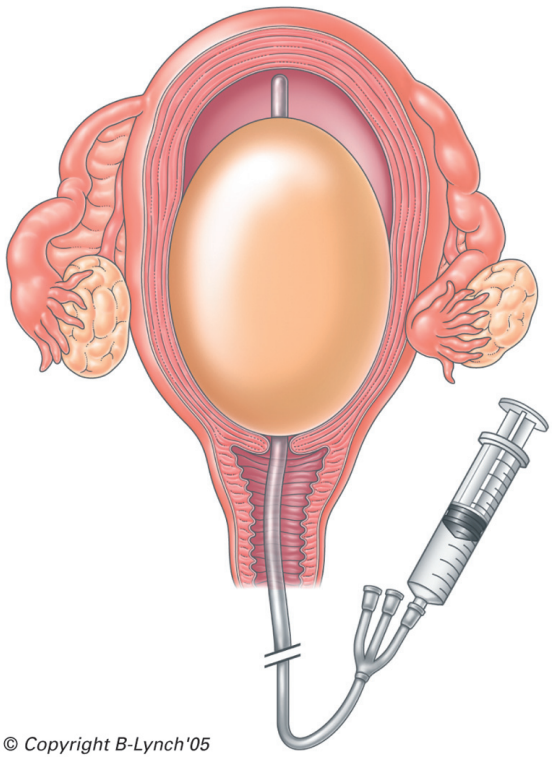

Figure 3 Bakri balloon

BAKRI BALLOON

The SOS Bakri tamponade balloon catheter (Cook Ob/Gyn) is marketed as 100% Silicon (no latex), purpose-designed two-way catheter, to provide temporary control or reduction of postpartum uterine bleeding when conservative management is warranted (see Figure 3)[4]. Again, the insertion technique is simple. Insert the balloon portion of the catheter in the uterus, making sure that the entire balloon is inserted past the cervical canal and internal os, under ultrasound guidance if possible. At cesarean delivery, the tamponade balloon can be passed via the cesarean incision into the uterine cavity with the inflation port passing into the vagina via the cervix. An assistant pulls the shaft of the balloon through the vaginal canal until the deflated balloon base comes into contact with the internal cervical os. The uterine incision is closed in the usual fashion, taking care to avoid puncturing the balloon while suturing. A gauze pack soaked with iodine or antibiotics can then be inserted into the vaginal canal to ensure maintenance of correct placement of the balloon and maximize the tamponade effect. The balloon is then inflated with sterile fluid to the desired volume for tamponade effect. Gentle traction on the balloon shaft ensures proper contact between the balloon and the tissue surface and may enhance the tamponade effect. Success can be judged by the declining loss of blood seen through the drainage port and the fluid connecting bag.

The main disadvantage of this method is that it may not be affordable in resource-poor countries because of the expense.

FOLEY CATHETER

The successful use of the Foley catheter balloon for internal uterine tamponade is also described[12,13]. A Foley catheter with a 30-ml balloon capacity is easy to acquire and may routinely be stocked on labor and delivery suites. Using a No. 24F Foley catheter, the tip is guided into the uterine cavity and inflated with 60–80 ml of saline (anecdotally, a volume of 150 ml can be reached before it bursts). Additional Foley catheters can be inserted, if necessary, until bleeding stops. As attractive, easy and cheap as this method is, some concerns have been raised regarding the use of the Foley catheter for uterine tamponade. First, the capacity of the immediate postpartum uterine cavity, especially if term, is too large for effective tamponade to be achieved with one inflated balloon, and the risk of one balloon falling out of the uterus is increased[14]. Second, significant bleeding may occur above the Foley bulb, as it may not fill the entire uterine cavity. Even the use of multiple Foley catheters cannot ensure a complete compression effect on the entire uterine surface.

HYDROSTATIC CONDOM CATHETER

This innovative approach from Bangladesh uses a sterile rubber catheter fitted with a condom as a tamponade balloon device[14]. The sterile catheter is inserted within the condom and tied near the mouth of the condom with a silk thread, and the outer end of the catheter is connected to a saline set. In its original description, after placement in the uterus, the condom is inflated with 250–500 ml normal saline according to need, and the outer end of the catheter was folded and tied with thread after bleeding had stopped[14]. Vaginal bleeding is observed and further inflation is stopped when bleeding has ceased. To keep the balloon *in situ*, the vaginal cavity is packed with roller gauze and sanitary pads. Success is gauged by the amount of blood loss per vaginum. Hemorrhage was arrested within 15 min in all 23 cases in the original series[14]. Although the sample size was small, this method represents a cheap, simple and quick intervention which may prove invaluable in, especially, resource-poor countries.

UTERINE PACKING

Uterine packing entails placing, carefully and systematically, several yards of gauze inside the uterine cavity to occlude the whole intrauterine space and, thus, control major hemorrhage. The technique fell out of favor in the 1950s, as it was thought to conceal hemorrhage and cause infection. It re-emerged in the 1980s and 1990s after these concerns were not verified[15]. The main disadvantages of this technique are:

(1) Experience is required to pack properly and tightly and therefore junior residents may not be able to perform proficiently, especially if they have large hands. Speed is also necessary because the intrauterine/vaginal hand becomes numb rapidly;

(2) Delay in recognizing continual hemorrhage as blood needs to soak through yards of gauze before it becomes evident;

(3) Success of the procedure will not be known immediately, as the blood must soak through the pack to reveal itself;

(4) The tightness of the pack is difficult to determine, especially if blood soaks through, leading to a loss of the tamponade effect;

(5) Potential risk of trauma and infection;

(6) Removing the pack may often require a separate surgical procedure to dilate and extract the intrauterine material, thus falling short of an ideal option.

Notwithstanding, uterine packing remains an option, especially, if balloon catheters or balloons are not available. The risk of intrauterine infection can be minimized by prophylactic antibiotics.

CARE AFTER SUCCESSFUL UTERINE TAMPONADE

All patients should be managed in a high-dependency or intensive care unit with very close monitoring of their vital signs, fluid input/output, fundal height and

vaginal blood loss. Continued oxytocin infusion may be necessary to keep the uterus contracted over 12–24 h. Prophylactic broad-spectrum antibiotic cover should be administered. The mean time for leaving tamponade balloons or uterine packs ranges from 8 to 48 h[2,7,9–12]. A graduated deflation of the balloon is advised to reduce the potential risk of further bleeding.

In summary, tamponade procedures are simple, cheap, easy to use, and effective measures that should be considered in women with intractable postpartum hemorrhage, especially when other options may be unavailable.

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