

Uterine tamponade balloon for the management of massive hemorrhage during cesarean section due to placenta previa/increta

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Summary

Objective: Uterine tamponade with the Bakri catheter is effectively used as a treatment in postpartum hemorrhage and as a means to prevent fertility. **Case:** We present a case of a 40-year-old pregnant woman who had a massive hemorrhage during cesarean section who was successfully treated with a tamponade balloon. Furthermore, we comment on a similar technique – Logothetopoulos pack – which was first developed and used in our department in the early years of the previous century. **Conclusion:** A conservative technique such as the Bakri catheter is an alternative intermediate step to control postpartum hemorrhage when pharmaceutical methods fail and before proceeding to obstetric hysterectomy.

Key words: Bakri catheter; Tamponade balloon; Postpartum hemorrhage; Obstetrical bleeding; Placenta previa; Placenta accreta; Placenta increta; Logothetopoulos pack.

Introduction

Postpartum hemorrhage (PPH) is a life-threatening complication and is defined as blood loss greater than 500 ml in a vaginal delivery or than 1000 ml in a cesarean section [1]. It leads to obstetric hysterectomy in 0.35 per 1,000 births [2]. It accounts for 24% or more of maternal deaths [3] and is mainly caused by uterine atony, traumas, retained placenta and coagulation disorders [4].

Placenta accreta is an obstetrical pathology characterized by morbid adherence of the placenta through the endometrium and into the myometrium [5]. Placenta accreta and placenta previa increase the risk of PPH [6]. The first line of PPH treatment embraces pharmaceutical methods that include oxytocin, ergometrin or prostaglandins [7-10]. Further steps that conserve the uterus include embolization of the uterine vessels, uterine tamponade, the B-Lynch suture and internal iliac artery ligation [11-13]. When conservative methods fail PPH is treated with the rather undesirable obstetric hysterectomy [14]. However, conservative approaches are being gradually more used.

One of the earliest methods of achieving intraoperative hemostasis with tamponade was by uterine or pelvic packing applied in our institution, the 2nd Department of Obstetrics and Gynecology of the University of Athens that was founded in 1906 at the Aretaieion Hospital of Athens [15]. K. Logothetopoulos (1878-1961) was professor and head of the department in the early 20th century [16]. He was the first to describe, in 1926, a method using a pelvic package to control pelvic hemorrhage in heavy gynecologic surgery [16]. He noted that “this method never failed” [16]. His method included a pack that was

constructed by filling a bag with gauze tied rolls and with the tail of the gauze protruding from the neck of the pack [17]. This pack was introduced from the pelvis to the vagina via the abdominal route and the neck was grasped through the vagina and pulled down off the foot of the bed by using a heavy weight [17]. The concept of pelvic packing in gynecologic patients introduced by Logothetopoulos was later applied successfully in obstetrics, with uterine gauze packing and intrauterine balloons (e.g., Sengstaken-Blakemore balloon), which are used to control bleeding in cases of atonic uterus or low-lying placenta.

Conservative techniques of postpartum hemorrhage including the uterine gauze tamponade have been used in our hospital since the era of Logothetopoulos, however, the use of a novel intrauterine tamponade catheter, the Bakri catheter, in a massive hemorrhage is an alternative conservative agent.

We present the case of a pregnant woman with severe postpartum hemorrhage who was successfully conservatively managed with the use of the Bakri catheter.

Case Report

A 40-year-old woman (para 2, gravida 2) presented at 24 weeks and four days of gestation with vaginal bleeding. An ultrasound (US) scan showed that the placenta was low. Urine and vaginal fluid cultures were sterile. The bleeding stopped and she was discharged. The patient was readmitted at 28 weeks and one day of gestation with chorioamnionitis (temperature up to 39°C and abdominal pain). The abdominal US scan showed hydramnios and a low lying placenta. The white blood count was increased from $12.7 \times 10^3/\text{mm}^3$ to $24.5 \times 10^3/\text{mm}^3$ within 24 hours. Blood cultures, urine culture and vaginal swabs were taken and they were negative. The patient was started on antibiotics. After balancing the pros and cons and as there was no improvement in her condition and per vaginam

bleeding was noted, she underwent a cesarean section with a low segment uterine incision. A male newborn was delivered weighing 1,250 g with an Apgar score of 7 at the 5th min.

The placenta was anterior, and covering the cervical os. There was difficulty in separating and delivering the placenta. Subsequently, increased bleeding was noticed from the placental site. Due to the difficulty in placental separation a diagnosis of placenta increta was made. Thus, manual dissection of the placenta was tried and the placenta came out in pieces, as no cleavage plane was found. Ergometrine and oxytocin intravenously were already used to control hemorrhage. As the bleeding continued, hemostatic sutures were placed at the bleeding placental bed.

As the above was not effective, a Bakri tamponade balloon was tried. The total blood loss prior to application was estimated to be 1800 ml and the patient showed signs and symptoms of hypovolemia (tachycardia and oliguria). The patient was resuscitated with fluids and transfused with four units of blood. The balloon was introduced from the uterus to the cervix, via the abdominal route. The shaft of the balloon was pulled through the vaginal canal until the deflated balloon base reached the internal cervical os. The uterus was closed in two layers and the balloon was filled with 400 ml sterile saline through the stopcock. We used 400 ml of sterile normal saline to inflate the balloon as the inflation volume should not exceed 500 ml. The above volume was chosen on the basis of the size of the uterus (28 weeks) prior and after the removal of the placenta. The oxytocin and ergometrine infusion continued and misoprostol was given. The choice to increase the balloon size if the bleeding continued was available. Postoperatively the patient was transferred to the intensive care unit for one day and placed on antibiotics. The balloon stayed in place for 20 hours and the hemorrhage was controlled after the first few hours of placement. It should be mentioned that the balloon was deflated but it remained in the uterus for 30 min in order to have the option to reinsufflate in case of hemorrhage. A Foley catheter remained in the bladder for the above period (Figure 1).

Postoperatively the patient was afebrile. Concerning the drainage of the Bakri balloon, 200 ml of blood was collected in the first 12 hours into the bag while in the next ten hours 50 ml was collected. No cramping and/or vaginal bleeding were mentioned. Blood pressure, pulse and urine output were within normal levels. The catheter was slowly deflated prior to gentle removal. The patient was released from the ward without any other problems. The baby was transferred to the neonatal intensive care unit.

Histopathological analysis revealed placenta accreta measuring 15 x 10 x 2 cm with chorioamnionitis, angiitis and local infarcts.

It is worth noting that the woman developed postnatal depression on the 15th postpartum day, but she recovered within two weeks.

Discussion

The diagnosis of placenta increta by US scan is difficult, although magnetic resonance imaging can be a useful modality in such pathology. Usually, the diagnosis is made during the third stage of labor as in our case. Nevertheless placenta increta may be part of the spectrum of placenta previa. Placenta previa increases the relative risk for endometritis or sepsis 5.5 times [18].

The Bakri catheter (Cook Medical, IN, USA) is made of 100% silicone and has a ductile shape in a way to

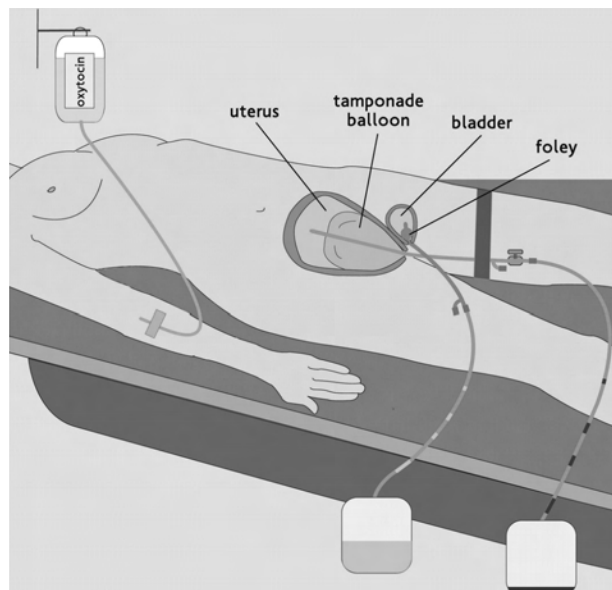


Figure 1. — The Bakri balloon is gently tracted and secured to the patient's thigh. A Foley catheter is placed in the bladder.

match the inside of the uterine cavity [19]. Its length is 58 cm and the tested capacity of the balloon reaches the 800 ml. Bakri *et al.* were the first to publish the idea of an intrauterine balloon catheter in the management of postpartum hemorrhage in 1992 [19]. The Bakri balloon works in a similar way to the Sengstaken-Blakemore catheter which is used for esophageal varicocele tamponade [20].

Transabdominal placement of a Bakri catheter has been proposed in cases of hemorrhage during cesarean section [8]. The uterus should be clear of any retained placental fragments, arterial bleeding or lacerations. It should be mentioned that although there was a history of chorioamnionitis in our case, no purulence was detected during the operation, as such a finding would prevent the team from placing the catheter [21, 22]. Other contraindications include cervical bleeding due to trauma or cancer, untreated uterine anomaly, and coagulopathies [21, 22].

In a case series [23], 15 patients who underwent a Bakri catheter tamponade were retrospectively reviewed. The method was effective in all the cases of vaginal delivery and 80% of cesarean sections. It is proposed that special attention should be taken to avoid balloon rupture secondary to damage by the suturing needle. In another review, it was shown that 97/106 cases of postpartum hemorrhage were successfully managed by intrauterine tamponade balloons [22]. Combination of the Bakri catheter with a B-Lynch suture in controlling postpartum hemorrhage due to uterine atony has been described with excellent results (bleeding controlled in 5 out of 5 patients) [24]. This is the first time that a Bakri catheter was used by our team for placenta previa/accreta. It is a promising tool that can be used for conservative treatment of postpartum hemorrhage as a means to preserve

female fertility. Teaching the effective application of Bakri in emergency obstetric practical courses is important, and in Greece the Advanced Life Support in Obstetrics program has run a relevant training station on balloon tamponade from 2009 onwards.

Conclusion

The Bakri tamponade catheter effectively achieved hemostasis in this case of severe postpartum bleeding during cesarean section that was caused by placenta previa/increta.

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