

CASE REPORT

Occlusion of femoral artery using Foley catheter: A REBOA inspired tale to save a life

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Abstract

In this case report, we emphasized the need to control bleeding in emergency departments by any measure possible, as it is the first step toward successful resuscitation for saving the lives of patients with active bleeding.

KEYWORDS

emergency medicine, general surgery, vascular surgery

1 | INTRODUCTION

Resuscitative endovascular balloon occlusion of the aorta (REBOA) is a procedure, involving the placement of an endovascular balloon into the aorta to obtain proximal control of hemorrhage.¹ In recent years, REBOA has become increasingly popular among trauma surgeons for the management of traumatic noncompressible torso hemorrhage (NCTH).^{1,2} The concept of using a balloon to occlude an artery has been around for decades. A recent example is the use of REBOA for traumatic patients requiring emergency bleeding control; nevertheless, it is not widely available in third world countries. The standard method of bleeding control involves the placement of a tourniquet proximal to the injury site in the emergency room, followed by a definitive measure in the operating room. This sequence of interventions is successful for the majority of cases.^{3–5}

In this case report, a REBOA-inspired method for extremity hemorrhage control was described as the last resort of an emergency physician to save a patient's life in

a rural hospital. The present case emphasizes the need to control hemorrhage in any way possible to save patients' lives in the absence of expertise and tools in rural settings. Also, pneumatic tourniquets of appropriate sizes are essential in emergency rooms, as they accelerate both resuscitation and patient transfer.

2 | CASE REPORT

A 52-year-old man, who had a gunshot wound in both legs and knees, was transferred to the emergency room by ambulance. He was in a state of hemorrhagic shock with the following vital signs: respiratory rate, 24 bpm; blood pressure, 100/60 mmHg; heart rate, 156 bpm; and maximum Glasgow Coma Scale (GCS) score, 13. Although a make-shift tourniquet was placed in the lower thigh by bystanders, he was still bleeding profusely from the injury site. (Figure 1).

The resuscitation process was urgently initiated by inserting two large-bore IV catheters. A large dialysis

catheter was placed in the right subclavian vein, and two units of O-positive blood and 1 L of normal saline were administered as rapidly as possible. No pneumatic or standardized tourniquets were available in our emergency department. Therefore, two elastic bandages were placed as tourniquets on the thigh as tightly as possible; the extremity was then placed in an emergency splint, and pressure was applied to the injured site. Despite



FIGURE 1 Extent of injury.



FIGURE 2 Foley placed in the femoral artery and guided to external iliac.

these efforts, bleeding was not terminated, and mentation and perfusion deteriorated by the minute, with a minimum blood pressure of 60 bpm and heart rate of 175 bpm. We decided to block the blood flow at a more proximal site. Accordingly, the femoral artery, 5 cm distal to the inguinal ligament, was selected due to its accessibility.

Initially, a dialysis catheter kit (25 cm, 2-LUMEN 12 FR Arrowg+ard Blue® Acute Hemodialysis Catheter) was used to insert a needle into the femoral artery. After a guide wire was threaded through the needle, the route was dilated using a standard 12F dilator, and a small skin incision was made. Subsequently, using a small hemostat, a standard 6-Fr Foley catheter was placed over a J-TIP guide wire (0.89 mm) into the femoral artery and guided toward the distal external iliac artery. Next, the balloon was inflated by slowly injecting 5 mL of distilled water. Generally, standard Foley catheters have a side-hole configuration, and there is about 1 cm of rubber at their ends. To better thread the catheter, its end was cut to make an “end-hole catheter” (similar to a hollow tube). (Figure 2).

Hemorrhage was controlled successfully, and the patient's vital signs improved drastically within minutes. The patient was then transferred by ambulance to a level I trauma center, almost 1 h away from our center, in the presence of a nurse and two emergency service (EMS) staff, capable of handling vascular injuries. Due to the fear of bleeding, the Foley catheter was not deflated until arriving at the destination operating room. In the operating room, due to extensive crushing of the injury site, amputation was essential at the knee. After right exposure, the Foley catheter was removed in the operating room, and the femoral artery was repaired. The surgeon observed that the vasculature had been extensively damaged up to the knee (involving the popliteal artery, vein, and crushing of bones); therefore, the leg had to be amputated from the knee. The patient survived the operation and was transferred to the intensive care unit (ICU). He was discharged on a wheelchair on day 15 to continue his treatment with physiotherapy and further follow-up in the outpatient clinic.

3 | DISCUSSION

In this case, our main challenge was hemorrhage control in a rapidly deteriorating patient in a rural setting, without onsite support by any other specialists. Despite the obvious need to control bleeding in this patient, it proved to be quite challenging. The present case emphasized the important role of resourceful and alert emergency physicians. Overall, REBOA is an intervention for the management of bleeding, which is

usually used in cases of noncompressible torso bleeding. However, it is an expensive approach, which is not readily available in Iran.

Extremity arterial bleeding is commonly controlled either by direct compression or application of a tourniquet. Besides, the patient's obesity (130 kg) and high body mass index (BMI = 36.1 kg/m²) made the application of an appropriate tourniquet even harder. Despite conventional efforts to control bleeding, we were unable to occlude the bleeding site; therefore, a technique similar to REBOA was required to control bleeding. Also, considering the patient's obesity, no suitable pneumatic tourniquets were available in our hospital to fit him.

There are surgical techniques to ligate the artery from a more proximal site, such as proximal artery ligation. However, we did not have enough experience to perform this procedure in a time-sensitive manner, as the patient was deteriorating at an extremely alarming pace. Use of a familiar technique (Seldinger technique), which was remarkably similar to the placement of a central venous line (we had extensive experience of central venous line placement), allowed us to rapidly advance a sheath and guide wire into the femoral artery and occlude it with a small Foley catheter. This technique also resembled the use of Fogarty balloons in vascular surgeries. Additionally, the need for adequate resuscitation must be highlighted. Although Foley catheters are used for vascular injuries, they are usually used as compression devices⁶⁻¹⁰ and are not employed inside arteries. Scriba et al.⁶ confirmed the efficacy of this method. Considering the size of injury in our patient, such application of a Foley catheter was not possible.

4 | CONCLUSION

The placement of a Foley catheter into the femoral artery allowed us to rapidly achieve hemostasis and adequately resuscitate a profusely bleeding patient to facilitate his transfer to a higher-level center for definitive care. Given its simplicity, this technique can be a suitable addition to the skill set of emergency physicians. Also, it is essential to have adequately sized pneumatic tourniquets available in every emergency room, as they both accelerate resuscitation and patient transfer.

AUTHOR CONTRIBUTIONS

Amir Mohammad Papan: Conceptualization; writing – original draft; writing – review and editing. **Mofid Husseinzade:** Supervision; writing – review and editing. **Kamran Heydari:** Project administration; writing – review and editing. **Hossein Hamidi:** Conceptualization; writing – original draft.

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None.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

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