



Entrapped arterial sheath during transfemoral angiography

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ABSTRACT

Arterial sheath entrapment is a potential complication during Trans Femoral Angiography. Here we are presenting a nine-month-old boy, a candidate for surgical repair of Tetralogy of Fallot, with complicated sheath entrapment. As the problem was not resolved initially by pharmacological approaches, later a transverse incision on the artery was made at the mid-length of the sheath. Subsequently, the device was splitted into two halves and both were successfully removed through the incision. This method facilitated the sheath withdrawal and diminished the trauma applied to the artery during surgery.

1. Introduction

Angiography plays an essential role during preoperative evaluation in the majority of cardiovascular system abnormalities. Numerous studies have been investigated the complications following this procedure like thrombosis, bleeding, emboli and aneurysm formation. Here we are reporting an uncommon complication that occurred during transfemoral diagnostic angiography of a nine-month-old infant and an effective method to resolve the problem. The patient's guardian agreed to allow the authors to publish all the case details and images.

2. Case report

A nine-month-old boy infant who was a candidate for the Tetralogy of Fallot (TOF) reconstruction surgery had undergone transfemoral angiography (TFA) for his preoperative evaluations. There was no remarkable detail in the patient's medical and prenatal history other than the TOF.

Following standard preparation tasks for TFA, a 5 fr diameter and 7 cm length radial artery sheath (Merit Medical, South Jordan, Utah, USA) was introduced at the femoral artery puncture site. After the angiography was successfully performed, the surgeon felt great resistance toward the arterial sheath withdrawal. Upon any attempts for device removal including pharmacological agents and tractions, it was tightly attached to the vascular lumen. In this circumstance, furtherer active tractions may produce serious complications.

In the fluoroscopic pictures, the sheath was seen at the site of femoral artery bifurcation.

Due to emergent contact with vascular surgeons, the patient was referred to the vascular surgery operating room.

The patient was intubated before the angiography, his heart rate was 112 beats per minute and blood pressure was 84/53 mmHg. The examination of lower extremities was indicative of impaired blood flow in the right lower limb. Following the exploration of the para-inguinal site through an anterior longitudinal incision, proximal and distal arterial controls were placed at iliac and femoral arteries, as shown in Fig. 1.

To decrease the friction force between the sheath and arterial walls, the surgeons decided to cut the sheath into two halves. Above the mid-length of the sheath, on the ventral wall of the femoral artery, a partial transverse incision was made, which led to exposure of the device. Then the surgeons with the use of metz scissors cut the sheath into two halves. Both parts were pulled out successfully by the first subsequent attempt for device removal. As the friction force is proportionate with the device length in the arterial lumen. The application of this strategy resulted in uncomplicated removal of both two halves of the sheath. The video of the procedure is available on the QR-code available below.

Supplementary video related to this article can be found at <https://doi.org/10.1016/j.epsc.2021.101806>

Total surgery time was 35 minutes and after completion of the procedure, the blood flow of the lower limb showed to be normal immediately and the patient was discharged in stable condition.

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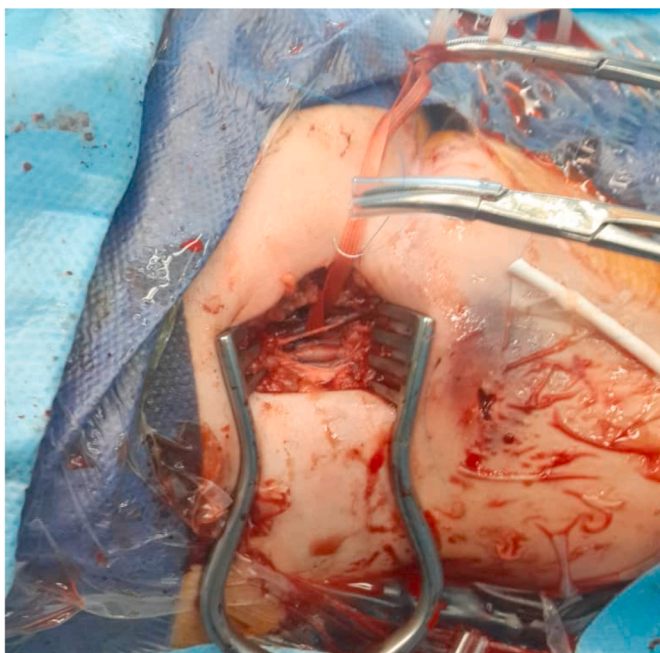


Fig. 1. Para-inguinal site exploration and the removed sheath.

3. Discussion and conclusion

Although sheath entrapment during TFA can be considered as a rare complication, the lack of experienced algorithms to resolve the problem makes it a potential harmful risk which is rising at shadows.

Sheath entrapment is more common in the Radial artery than the Femoral artery.

Remarkable valuable techniques have been reported for such a problem focusing more on radial artery angiography. The use of local or systemic vasodilators owns more records among different methods. Recent admirable reports about the usage of lubricates like ViperSlide™ [1] and Rotaglide™ [2] are so promising but still have some limitations like the maximum accepted dose for injection and also contraindications of their use in patients with a history of egg allergy, anaphylaxis or cardiac arrhythmias.

Another reported strategy is to produce temporary local ischemia by inflating a sphygmomanometer cuff proximal to the site of entrapment [3], the vasodilatory effect of ischemia will help in sheath removal without any need to pharmacological agents but this strategy is limited to radial artery as it is not possible to cut the blood flow with such device in femoral artery because of the anatomic properties.

All explained efforts above are following one particular purpose, which is reducing the need for open vascular surgery. However, while their effectiveness is still under question, another perspective is to reduce the invasiveness of open surgery which is accepted as the last chance to remove the complicated sheaths.

Cutting the sheath into two halves is one reasonable plan to remove the long device through the smallest incision on the artery.

There are few more invasive surgical techniques that are available for such a complication, one is a longitudinal incision of the artery along the trapped sheath and a primary closure afterward. Another option is a complete transverse cut of the artery and anastomosis of the two ends, which might be helpful for shorter devices. Resection of the artery and sheath together with an Aortofemoral bypass was also considerable. These highly invasive techniques could result in more morbid outcomes like growth impairments specially in pediatrics.

The presenting idea, will result in less friction force required for sheath withdrawal, less shear stress and trauma applied to the artery wall. Hence, diminished consequent possible systemic or local complications, improved healing process, and fewer hospitalization days could be expected.

Apparently more reliable studies are required for such complications in TFA.

Sheath entrapment is not common during TFA so it is not feasible to be studied at one center so some multicenter studies may hopefully bring better knowledge about this problem.

Patient consent

Consent to publish the case report was not obtained. This report does not contain any personal information that could lead to the identification of the patient.

Authorship

All authors attest that they meet the current ICMJE criteria for Authorship.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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