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Case Report

Surgical removal of knotted intravascular device in the right femoral artery Case Report and Review of the Literature

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Abstract: We report the case of a 75-year-old female patient who underwent digital subtraction angiography because there was suspicion of cerebral arteriovenous malformation. Fluoroscopy reveals that the Impulse Flextrusion ™ Shaft FR4 6F catheter (Boston Scientific) was completely knotted and entrapped in the right femoral artery. We attempted to remove the catheter through the EN Snare Endovascular Snare System, this being unsuccessful, so we decided the surgical exploration of the right femoral artery could completely withdraw the catheter knotted and entrapped without any complication.
Keywords: catheters, intravascular devices, knotting, surgical removal.

INTRODUCTION

The first knot was described by Johansson et al and published in 1954 [1]. During these more than 60 years, more than a hundred cases have been reported and we have seen the incredible evolution of the endovascular techniques of withdrawal of intravascular devices, which remain the best and most frequent treatment option. However, entrapped and knotted catheters may need to be surgically removed when the knot is large and has many loops [2-4]. Nearly 2/3 of the cases of knotted catheters reported in the literature were successfully removed through endovascular approaches [5]. 1/3 of this population required a surgical approach, with venotomy being the most usual procedure (subclavian vein, jugular vein, femoral vein, basilic vein and saphenous vein) followed by Arteriotomy (femoral artery, axillary artery and carotid artery) and in 5 cases an open cardiotomy was required [6, 7]. In this report, we present a case of right femoral arteriotomy for removal of an intravascular device.

CASE REPORT

We report the case of a 75-year-old female patient who underwent digital subtraction angiography because there was suspicion of cerebral arteriovenous malformation. The patient had a previous history of controlled hypertension and dyslipidemia. The procedure was performed through the right femoral artery track using a 7F introducer (Glidesheath ™ Terumo Medical Introductor) with an Impulse Flextrusion ™ Shaft FR4 6F (Boston Scientific) catheter (Figure 1A and 1B).

Catheter manipulation proved to be very challenging as the patient presented severe tortuosity of the right femoral artery and right iliac artery, requiring the use of a long hydrophilic guidewire. However, we were unable to advance beyond the aortic arch cause to lack of catheter torque. After a prolonged manipulation of the catheter we noticed that it was very difficult to mobilize through it, considering that the fluoroscopy reveals, that the Impulse Flextrusion™ Shaft FR4 6F (Boston Scientific) catheter was completely knotted and entrapped in the right femoral artery (Figure 2A and 2B).

We attempted to remove the catheter using the EN Snare Endovascular Snare System (Figure 3A and 3B) which is designed with three interlocking loops to retrieve and manipulate foreign objects in the body. The EN Snare (Figure 4A and 4B) can be used to retrieve, among other things, inferior vena cava filters, repositioning internal catheters, or to aid central venous venipuncture. The super elastic nitinol provides flexibility, resistance to deformation and torque control. In addition to this, the device is designed to rotate and expand with excellent coverage and recovery in different sizes of vessels; it also has a good visualization under fluoroscopy.

However, despite all these obvious advantages, it was impossible to recover the diagnostic catheter with this treatment modality. Finally, we decided to perform a surgical exploration of the right femoral artery (Figure 5A and 5B). We were able to remove the catheter completely (Figure 6) and close the surgical wound in the right inguinal region without any complications (Figure 7).

Fig 1A and 1B: Impulse Flextrusion™ Shaft FR4 6F (Boston Scientific)

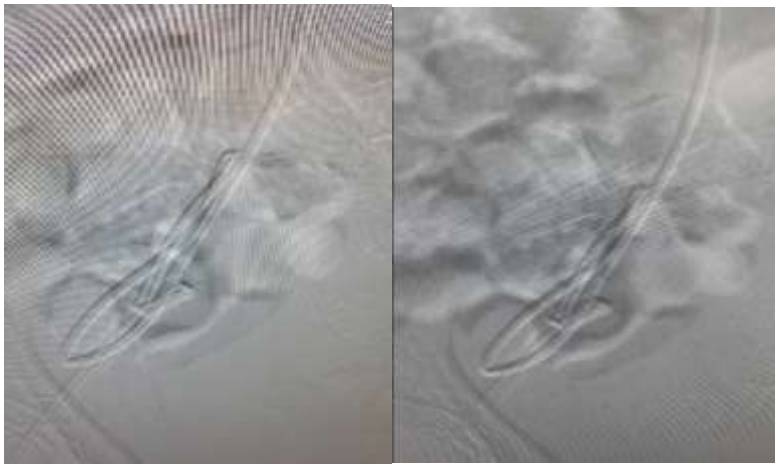

Fig 2A and 2B: Fluoroscopy reveals that the Impulse Flextrusion TM Shaft FR4 6F (Boston Scientific) catheter was completely knotted and entrapped in the right femoral artery.

Fig 3A and 3B: EN Snare Endovascular Snare System

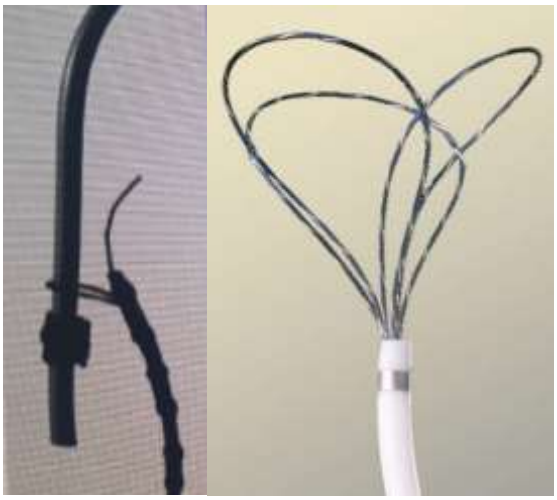

Fig 4A and 4B: EN Snare: It is designed with three interlaced loops to retrieve and manipulate objects.

Fig 5A: Arteriotomy Figure 5B: Right femoral artery suture. (Surgical removal of knotted intravascular device in the right femoral artery)

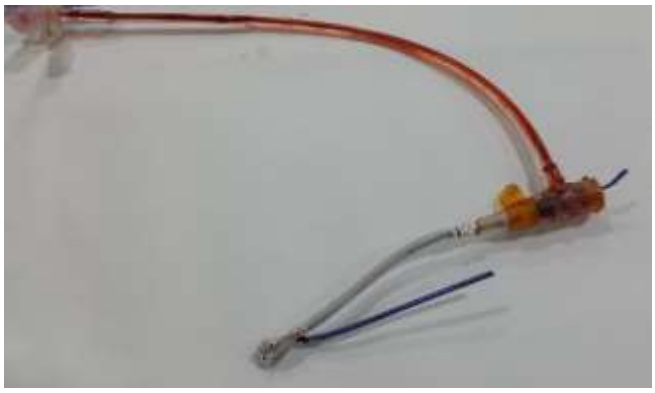

Fig 6: Catheter knotted and entrapped

Fig 7: Surgical wound closure in right inguinal region

DISCUSSION

The surgical approach is an excellent alternative to the usual withdrawal of intravascular devices using interventional radiology techniques. There are many limitations such as the position and severity of the foreign body's knotting that prevent its removal by endovascular techniques, so the surgical option should always be considered.

CONCLUSIONS

Removal of knotted intravascular devices may be difficult because of, on certain occasions, morphological limitations including blood vessel direction, tortuosity, knot severity, and number of turns in the catheter. Despite great advances in endovascular techniques and devices, it is sometimes necessary to resort to a surgical approach that is an excellent non-complication-free option.

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