Spontaneous fracture and embolization of an inferior vena cava cannula: is it possible?

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Abstract

We present a case of spontaneous fracture and embolization of the distal part of a cannula into the left inferior lobar artery. The embolized fragment was captured with an angioplasty balloon and extracted through the right atrium appendage. No adverse event related to the embolization was observed and the patient was discharged with no sequelae.

Keywords: Cardiac • Intravascular embolization • Cannula fracture

INTRODUCTION

We present a case of spontaneous fracture and embolization of the tip of a cannula for inferior vena cava drainage and the strategy followed to extract the embolized fragment.

CASE REPORT

A 78-year old man with a medical history of smoking and peripheral vasculopathy was referred to our hospital for surgery because of combined severe aortic stenosis and mitral regurgitation. The patient was taken to the operating room for the combined aortic and mitral valve replacement and underwent cardiopulmonary bypass with central cannulation. Both the superior vena cava (SVC) and the inferior vena cava (IVC) were cannulated directly, with a single-stage angled cannula to cannulate the SVC and a single-stage straight cannula for IVC (Stockert cannula model V142-28, S/N 1301550000, Sorin Group, Milan, Italy). Mitral valve replacement through left atriotomy and aortic valve replacement through transverse aortotomy were accomplished with two tissue valves (23 mm aortic Mitroflow, Sorin Group, Milan, Italy, and 27 mm mitral Mosaic, Medtronic, Minneapolis, MN, USA). Postoperative echocardiography depicted proper function of both valves with no significant gradients or perivalvular leaks. After removing the inferior vena cava cannula, the absence of the distal part of the cannula was observed (Fig. 1A). The transoesophageal echocardiography did not identify any foreign body in the right chambers. We tried to localize the cannula with a portable X-ray in the operating room (Philips BV-Pulsera) but we did not find it either. Although we suspected a further embolization, we went on pumping again and a right atriotomy was performed to explore the right atrium and the right ventricle cavity; however, the cannula was not found.

Postoperatively, the patient remained haemodynamically stable and was taken to the radiology suite, while still intubated. A computed tomography confirmed the embolization of the tip of the cannula into the left inferior lobar artery (Fig. 1B). Owing to the characteristics of the part of cannula embolized, a multiperforated cylinder ending with the form of a cone, Loop-snare or gooseneck loop was not used because the smooth shape of the tip of the cannula and an angioplasty balloon was thought to be the best option for capturing the foreign body. The patient was taken to hybrid operating room. The angiography confirmed the location of the embolized fragment and an angioplasty balloon was successfully used to percutaneously capture the tip of the cannula (Fig. 1C). Once the balloon went through the openings of the cannula it was blown up, and the fragment was directed to the right atrium. A resternotomy was performed and through a purse-string suture placed in the appendage of the right atrium the tip of the cannula was finally extracted. The patient had a prolonged postoperative stay in the intensive care unit (ICU) for renal failure and respiratory failure due to a right basal pneumonia which required longer mechanical ventilation and haemofiltration. No other major complications occurred and the patient was discharged 4 weeks after the surgery.

The patient remained asymptomatic with no adverse effects during the 6-month postoperative visit. A transthoracic echocardiogram performed 3 months after the surgery depicted normal ventricular size and function and proper function of both valves.

DISCUSSION

Fracture and migration of a central venous catheter is known as a late complication that occurs in 0.5–3% of patients [1] but the
present case is unique because the fracture is of a cannula used for central cannulation for cardiopulmonary bypass. Cannulas for cardiopulmonary bypass are supposed to be only one piece and no fracture of any part of these cannulae is suspected to occur. After this complication, we have observed that some of the cannulas used for cardiac cannulation are made of different components assembled during the cannula fabrication. These two parts of cannulas can suffer spontaneous fracture during the manipulation of the heart and one of its components can embolize distally. Interventional radiology techniques using goose-neck, conformational loop-snares or balloons may be useful to extract an intravascular foreign body. Despite the low incidence, the migrated catheter may cause severe and potentially fatal complications such as pulmonary embolism, cardiac perforation, sepsis and even death, this complication has been reported with a mortality rate ranging from 24 to 60% [2]. Percutaneous removal of an intravascular embolized fragment and extraction of the fragment through the common femoral vein is the standard therapy [3, 4]. In our patient, the size of the fragment embolized made it impossible for percutaneous extraction so once the fragment was retrieved into the right atrium, a resternotomy was performed and the fragment was extracted through the right atrium. Once a foreign body becomes endothelialized, it is usually impossible to remove percutaneously so if this complication arises we must solve it as quick as possible.

CONCLUSION

Although infrequent, this complication can occur and the use of assembled cannulas must be avoided in our practice. If an embolization of a fragment of an intravascular device occurs, endovascular techniques are very useful to retrieve the foreign body.

Conflict of interest: none declared.

REFERENCES