Percutaneous removal of intracardiac and intravascular foreign bodies

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MJAFI 2011;67:367–369

INTRODUCTION

The first transluminal recovery of an intravascular foreign body, as well as the first such recovery done percutaneously can be credited to Porstmann in connection with his catheter technique for ductal closure.¹ Porstmann's foreign body was a guide spring deliberately passed across the ductus and not an accidentally embolised fragment of guidewire or tubing. The first non-invasive transluminal removal of unwanted errant foreign body locked in the depths of the cardiovascular system was done in 1964 by Thomas who used bronchoscope forceps passed through a saphenous vein cut down.² In 1971, it was possible to repeat a total of 29 guided transvascular foreign body retrievals, six done percutaneously.³ With the widespread use of plastic tubing for continuous intravenous fluids, maintaining central venous pressures, haemodialysis, and arterial catheterisation there is an increasing incidence of "lost" tubing within the vasculature. This study presents the successful

removal of embolised catheter fragments in five cases lodged in the right-hand side of heart, one in the femoral vein, and one in the bronchial artery.

CASE REPORT

The first patient is a 24-year-old female suffering of chronic renal failure and who was on intermittent haemodialysis. She had a left subclavian access catheter since three months. On presenting for haemodialysis it was found that the catheter had fractured and the distal portion of the catheter had embolised.

Figure 1 Homemade snare assembled with a double loop of wire through a catheter.

Figure 2 Broken catheter snared by a homemade snare in the aorta.

Figure 3 The broken catheter (Figure 2) with the retrieved two pieces.

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Received: 22.10.2010; Accepted: 31.03.2011
doi: 10.1016/S0377-1237(11)60088-9

Radiograph checking did not reveal any abnormal radio-paque shadow. Exploration was done at the site of puncture but in vain and the patient was referred to our centre. On ultrasound, the embolised catheter was seen as parallel echogenic lines extending from the right atrium across the tricuspid valve to the right ventricle. Fluoroscopy confirmed the position of the catheter fragment.

As we did not have a snare or basket retriever, a snare was made in the laboratory with a 0.032" guidewire looped through a 7 Fr renal catheter. The guidewire was folded in half at its mid section and the free ends of the wire were inserted through the distal end of the renal catheter. The loop wire was then bent laterally so that the plane would be about 90° to the end of the embolised catheter (Figure 1).

As there was a dialysis catheter in the right-hand side, the left femoral vein was punctured, and an 8 Fr vascular sheath introduced. The loop snare was introduced through the left femoral sheath and the embolised fragment lassoed. The snare was tightened by pushing the renal catheter forward thereby holding the embolised fragment. The catheter fragment was withdrawn through the inferior vena cava down in to the pelvis. On reaching the femoral vein the whole assembly of sheath, catheter, snare loop, and the fractured fragment were removed as one unit and haemostasis achieved.

The second patient is a 65-year-old male, again a patient of chronic renal failure. A subclavian access catheter was placed in the right subclavian vein from where the catheter sheared. Ultrasound showed the embolised catheter fragment to be lying in the right atrium. The third patient is a 67-year-old male who had been operated for right common iliac artery aneurysm. He had undergone coronary artery bypass graft in 1989. In this patient, the central venous pressure line in the right internal jugular vein got sheared and lodged in the right atrium. The fourth patient is a 24-year-old male who was taken up for bronchial artery embolisation. During the procedure, the cobra catheter broke in the right bronchial artery with its proximal tip hanging in the aorta (Figures 2 and 3). The fifth patient is a 49-year-old male in whom, while placing the central venous line in the internal jugular vein, the guidewire slipped into the superior vena cava. The sixth patient is a 56-year-old patient of carcinoma bladder in whom the central venous line was accidentally sheared and got lodged into the right atrium. The seventh patient was a 38-year-old male, a case of Hodgkin's lymphoma with a peripherally inserted central catheter (PICC) that had got sheared and reached the main pulmonary artery (PA) (Figure 4).

All the above embolised fragments were successfully removed via the transluminal route without any complications.

DISCUSSION

The most frequent cause of catheter embolisation used to be the severing of the catheters by the needle tip of the introducer set. Since the introduction of the new puncture systems, either based on the Seldinger technique or on the use of sheaths, these complications have been noted to occur during catheter removal.

Figure 4 Peripherally inserted central catheter line trapped from the pulmonary artery to the superior vena cava being snared by a snare.

In most cases they are caused by the severing of the catheter while cutting the fixation suture.⁴ Catheter associated problems are due to insertion of the catheter in a medial location, where the clavicular—first rib window forms the widest possible angle. When the patient is upright, the weight of the shoulder narrows the window and pinches off the medially positioned catheter. The pinching action and the friction on the catheter by the clavicle and first rib movements can eventually wear through and transect the catheter tubing.⁵

Removal of a centrally embolised foreign body is indicated in almost all cases because of the high incidence of complications. Mortality is highest with the embolised fragment located in the right-hand side of the heart, slightly lower in the vena cava, and lowest in the PA. Amongst the causes of death, cardiac wall perforation ranks first followed by septic endocarditis, arrhythmia with cardiac failure, thrombosis of the vena cava with subsequent pulmonary embolisation, and cardiac wall necrosis or sepsis.⁴ The overall potential risk of death as a serious complication from retained catheter fragments is 71 %.

The basic retrievers used for removing intravascular foreign bodies are loop snare catheters, hook tip guidewires or catheters, basket retrievers, and grasping forceps or catheters. We have presented the removal of six embolised fragments from the right-hand side of the heart, the bronchial artery, and the inferior vena cava using self-made snares in five cases and the goose snare in one case. Removal of the embolised intravascular fragments by homemade snares is simple and safe, and requires equipment available in most radiology departments.

CONFLICTS OF INTEREST

None identified.

REFERENCES

1. Porstmann W, Wierny L, Warulce H. Closure of persistent ductus arteriosus without thoracotomy. *German Med Monthly* 1967;12:1.

2. Thomas J, Sinclair SB, Bloomfield D, Darachi A. Non surgical retrieval of broken segment of steel spring guide from right atrium and inferior vena cava. *Circulation* 1964;30:106–108.
3. Henly FT, Ballard JW. Percutaneous removal of flexible foreign body from the heart. *Radiology* 1969;92:176.
4. Grabenwoeger F, Bardoch G, Pock W, Pinterihis F. Percutaneous extraction of centrally embolized foreign bodies: a report of 16 cases. *Br J Radiol* 1988;61:1014–1018.
5. Aitken DR, Minten JP. The “Pinch off sign”: a warning of impending problems with permanent subclavian catheters. *Am J Surg* 1984;148:633–636.

Book review

Handbook of undergraduate psychiatry, fourth edition. Editors: Surg Cmde VSSR Ryali, Dr (Mrs) K Srivastava, Col PS Bhat, Lt Col R Shashikumar, Lt Col Jyoti Prakash, Col S Chaudhury (Retd). Publisher: Internal Publication of the Department of Psychiatry, Armed Forces Medical College, Pune. Publication: 2011. Pages: 183 (Softbound). ISBN: 9788184657319.

“Life is short, the art (of medicine) long, opportunity fleeting, experience treacherous and judgement difficult.”
Hippocrates

It becomes much more difficult when an inadequately trained doctor has to face a sea of patients with symptoms he/she is unable to comprehend. The World Health Organisation predicts that depression will be second only to coronary artery disease as the most common cause of morbidity by 2020. Even though Medical Council of India does not entail psychiatry to be taught as a separate subject, it is for premier institutions like the Armed Forces Medical College (AFMC), to adequately train the undergraduate students so that once graduated, they are not found lacking in relieving their patients often and comforting them always, besides curing them sometimes, as the dictum goes. This handbook gives the medical students, a comprehensive initiation into the subject of psychiatry.

This is the fourth edition of the handbook, and has been well updated. The book has been published out of the training grants received by the Department of Psychiatry, AFMC, and is distributed free of cost to the undergraduate students. In order to simplify the comprehension, and to make it further more lucid, tables, text boxes, case vignettes, and multiple choice questions have been added.

In the initial chapters, the book gives the basics of symptomatology, classification, and examination. In subsequent chapters, the editors have dealt with the common psychiatric disorders. As well brought out in the preamble, there is an increased number of older population and in view of this a chapter on geriatric psychiatry has been aptly included. Considering the book has been written for students of the AFMC, there is a chapter on Military Psychiatry, which suitably primes the undergraduates about the unique stresses in military settings. At the same time, the editors have thoughtfully also included another chapter on “Community Psychiatry”, which gives an overview of the existing mental health services, including the roles of health care professionals in mental health care at various levels in the civilian set-up.

In keeping with the literal meaning of a handbook, it has been kept comprehensive. The editors have done a good job in their attempt at keeping it concise yet informative, without making it bulky, both in technicality as well as volume of content. It would definitely help in honing the clinical case-taking skills as well as polishing the soft-skills of the undergraduates in their formative years as medical students. Such a book can also be incorporated in the curriculum of students in the medical colleges elsewhere, so as to help bridge the gap between demand of adequately trained medical practitioners and supply of the same.

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