CASE REPORT

A retained pulmonary artery catheter fragment incidentally found lodged in the right heart 16 years after its insertion

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SUMMARY

Sixteen years after a long admission for a serious occupational accident, a 38-year-old man presented with intermittent atypical chest pain. Upon investigations a retained fragment of a pulmonary artery catheter was found in the right ventricle. Throughout the years between his accident and the current presentation he did not have any symptoms or signs of complications associated with the retained catheter such as arrhythmia, sepsis or thromboembolism. Upon presenting his case at the medical/surgical multidisciplinary meeting it was decided that the probability of complications occurring at this stage was low as the catheter fragment would have endothelialised and the risk of retrieval would outweigh the benefits. This scenario highlighted the importance of understanding the possible long-term complications of retained catheter fragments, the importance of being aware of the limitation of these devices and the need to be more vigilant in the emergency setting.

BACKGROUND

This case highlights the importance of understanding the possible long-term complications of retained catheter fragments. The risks and benefits of attempting retrieval should be weighed carefully, as fragments that have remained in situ over a long period may have endothelialised and be at low risk of complication.

CASE PRESENTATION

A 38-year-old man presented to the emergency department complaining of atypical chest pain. Auscultation of the praecordium revealed a soft pan-systolic murmur, heard best at the left sternal edge and suspicious of tricuspid regurgitation (TR), but was otherwise unremarkable. Full blood count and routine biochemistry including cardiac enzymes were normal, as were chest radiography and ECG. Exercise tolerance testing was normal; however, a transthoracic echocardiogram (TTE) revealed an echogenic bright line extending from the right atrium (RA) to the right ventricle (RV).

He was referred to the cardiology clinic, where he reported that he had been involved in a major accident at work in 1996 in South Africa, was admitted to intensive care unit with multiple fractures and during this time had had multiple central catheters inserted. A transoesophageal echo (TOE) was performed to further clarify the nature of the echogenic structure. The TOE confirmed an object retained in

the superior vena cava (SVC), which traversed the tricuspid valve (TV) into the right ventricle and into the main pulmonary artery (PA) (figure 1, AVI 1 and 2). There was mild TR but the heart was otherwise structurally normal. The shape of object observed confirmed to be a retained pulmonary artery catheter, one of several inserted during his intensive care unit admission in 1996.

Of note is a previous non-contrast CT thorax study performed 6 months previously as part of a work up for possible airway disease failed to visualise the catheter which was subsequently demonstrated on a contrast CT angiogram to be radio-opaque object in the SVC and right atrium with calcified linear thrombus extending back into the SVC. Negative blood cultures and inflammatory markers suggested that it was not infected.

The case and the imaging studies were presented to a surgical team at a multidisciplinary team (MDT) meeting where it was thought that surgical removal of the line would be possible; however, the procedure would carry a high risk. Since the line is likely fixed and stable, as it had been in situ for over 16 years, the risk of complication was low. Furthermore, it was argued that patients with permanent pacemaker leads in situ in the SVC, right atrium and right ventricle can retain their leads for years with no complications. After weighing up the benefits and risks it was decided that it would be best to manage him conservatively.

Figure 1 A transoesophageal echo (TOE) probe cut at 75° at the level of the aortic valve (AV) showing the retained sheath traversing the right ventricle (arrow) and the pulmonary valve.

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Video 1 AVI 1 two-dimensional TOE probe cut at 74° demonstrating retained sheath.

INVESTIGATIONS

- ▶ CXR: normal cardiac shadow, lung fields clear.
- ▶ Haematology, biochemistry including inflammatory markers and cardiac enzymes and blood cultures were all unremarkable.
- ▶ ECG: sinus rhythm, normal axis.
- ▶ ETT: good exercise tolerance with no symptoms of ischaemia and no ECG changes.
- ▶ TTE: a line in the right heart with calcium deposit. This was seen in the short axis view in the RV outward tract and through the RV and RA in the full chamber view.
- ▶ TOE: mild TR but otherwise normal heart valves. Normal size and preserved function of atria and ventricles. Intact intra-atrial septum and pulmonary venous anatomy with normal Doppler flow. An echogenic object was seen to enter from the SVC and transverse the TV and then out through right ventricular outflow tract and pulmonary valve to the main PA. The echo appearances were consistent with a retained PA catheter/venous line or guide wire in the right heart.
- ▶ CT thorax: no evidence of significant bronchiectasis or consolidation. No mediastinal abnormality although a persistent left-sided SVC was incidentally noted.
- ▶ CT thorax with contrast: confirmed a radio-opaque object in the SVC and right atrium with possible calcified linear thrombus.

OUTCOME AND FOLLOW-UP

The outcome of the MDT was discussed with the patient, it was explained that it still remains difficult to determine if his initial presentation of atypical chest pain is related to the retained catheter. The patient was educated on possible complications and follow-up has been arranged.

DISCUSSION

Retention of catheter guidewires can occur during central venous cannulation or angiographic procedures, and was recently reported in this journal.^{1 2} Usually this event is obvious to the operator. Embolisation of the catheter itself is estimated to occur at an incidence of 0.2–4.2%^{3–6} the majority of which are found incidentally or due to catheter malfunction. This may

Video 2 AVI 2 three-dimensional TOE probe cut at 74° demonstrating retained sheath.

be occult and present much later. Various underlying mechanisms have been described, including the ‘pinch-off’ syndrome (ie, chronic compression of the catheter between the clavicle and the first rib), disconnection of the catheter from the port chamber, rupture of the proximal catheter, and rarely, trauma.⁷ Migration of catheter fragments distally can occur, especially if the patient vomits, coughs vigorously or sneezes excessively and the final site of lodgement depends on the length, weight and the stiffness of the material.⁸

Potential serious complications have been described. In a series of 220 cases of catheter embolism, morbidity was reported at 71% in spite of catheter retrieval, and mortality at 38% with having left the catheter in situ. Complications included pericardial tamponade, myocardial perforation, sepsis, endocarditis, thrombosis, pulmonary embolism, myocardial infarction and arrhythmias.⁹ Although some patients may remain asymptomatic, such as our patient, the risk of such complications is considerable; and so removal of the catheter should be considered.

Percutaneous transvenous retrieval using loop snares, loop baskets or endoscopy forceps and even surgical retrieval have all been described with variable success. There have been reports in the literature of successful percutaneous extraction of catheter fragments as long as 9 years after embolisation.¹⁰ However, it is believed that fragments that are difficult to be seen on radiographic screening are likely to have become endothelialised, making the risk of late complications very small.¹¹ We advocated this rationale for our patient whose catheter embolised 16 years ago.

Furthermore, to support our approach we argued that, as is generally acknowledged, patients with permanent pacemaker leads in situ have a low risk of thrombotic complications and therefore anticoagulation is not routine in such cases. Extraction of pacemaker leads is challenging, especially where those leads have been in situ for some time, supporting our belief that the fragment is endothelialised and firmly adherent to the endocardium.

Learning points

- ▶ Patients in emergency settings are subjected to multiple lines which if not secured adequately can lead to atypical complications and difficult management scenarios.
- ▶ Recognising the possible late complications to catheter insertions as well as the early, more obvious complications.
- ▶ Patients with retained catheter fragments need to be assessed on individual basis taking into account their clinical presentation and risks of keeping the catheter fragment in situ versus the risks of retrieval.
- ▶ Catheter fragments that have remained in situ over a long period of time may be endothelialised and so the risks of further complications may be very small.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Gunduz Y, Vatan MB, Osken A, *et al*. A delayed diagnosis of a retained guidewire during central venous catheterisation: a case report and review of the literature. *BMJ Case Rep* Nov 19, 2012. doi: 10.1136/bcr-2012-007064
- 2 Harrison E, Lal S. Reminder of important clinical lesion central venous catheter embolisation. *BMJ Case Rep* Nov 21, 2012. doi:10.1136/bcr-2012-007249
- 3 Ballarini C, Intra M, Pisani Ceretti A, *et al*. Complications of subcutaneous infusion port in the general oncology population. *Oncology* 1999;56:97–102.
- 4 Kock HJ, Pietsch M, Krause U, *et al*. Implantable vascular access systems: experience in 1500 patients with totally implanted central venous port systems. *World J Surg* 1998;22:12–6.
- 5 Biffi R, De Braud F, Orsi F, *et al*. Totally implantable central venous access ports for long-term chemotherapy. A prospective study analyzing complications and costs of 333 devices with a minimum follow-up of 180 days. *Ann Oncol* 1998;9:767–73.
- 6 Koller M, Papa MZ, Zweig A, *et al*. Spontaneous leak and transection of permanent subclavian catheters. *J Surg Oncol* 1998;68:166–8.
- 7 Surov A, Buerke M, John E, *et al*. Intravenous port catheter embolization: mechanisms, clinical features, and management. *Angiology* 2008;59:90–7.
- 8 Deep S, Deshpande S, Howe P. Traumatic fracture of central venous catheter resulting in potential migration of distal fragment: a case report. *Cases J* 2008;1:394.
- 9 Fisher RG, Ferreyro R. Evaluation of current techniques for nonsurgical removal of intravascular iatrogenic foreign bodies. *AJR Am J Roentgenol* 1978;130:541–8.
- 10 Oto A, Tokgozoglul SL, Oram A, *et al*. Late percutaneous extraction of an intracardiac catheter fragment. *Jpn Heart J* 1993;34:117–19.
- 11 Andrews RE, Tulloh RMR, Rigby ML. Percutaneous retrieval of central venous catheter Fragments. *Arch Dis Child* 2002;87:149–50.

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