Non-surgical Retrieval of a Broken Segment of Steel Spring Guide from the Right Atrium and Inferior Vena Cava

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WITH the widespread use of wire guides and catheters inserted into the heart and blood vessels during cardiac catheterization and other diagnostic procedures, loss of a part of such instruments should be considered as a possible complication. The purpose of this paper is to report the loss and subsequent retrieval without surgery of a portion of stainless steel guide in the right atrium and inferior vena cava during a routine cardiac catheterization.

Case Report

A 48-year-old Negro woman was admitted to the hospital because of increasing dyspnea, resulting from rheumatic heart disease. Examination revealed marked cardiomegaly, a loud blowing holosystolic and a slight early diastolic murmur at the apex. There were rales in both lung fields and moderate hepatomegaly. She responded well to treatment with digitalis and diuretics. An anatomic diagnosis of mitral insufficiency was made and cardiac catheterization was planned.

During preparation for a transseptal entrance into the left atrium, a 110-cm. stainless-steel spring guide was passed by conventional cut-down and exposure, through the saphenous vein into the right atrium under cinetofluoroscopic observation. The guide (Fig. 1) was 0.045 inch in diameter with an 0.014-inch, internal steel core that was not movable and fixed 3 cm. short of the distal tip. A Brockenbrough transseptal left heart Teflon catheter was passed over the guide into the right atrium without difficulty. After approximately 50 cm. of the guide was withdrawn through the catheter, slight resistance to further withdrawal was experienced. Thus, the catheter and the guide were removed together. The distal 9.5 cm. of the guide (Fig. 1) was broken off, leaving a portion of the internal core visible. The broken segment could be seen by cinetofluoroscopy (Fig. 2) to lie in the right atrium and extend into the inferior vena cava. Manipulation of the wire with a catheter caused it to move farther down into the vena cava but substantial effort could not effect its removal. An attempt to snare the segment with a fashioned hooked-end thin guide passed through a wide-bore Teflon catheter was unsuccessful. Surgical removal through an abdominal approach to the guide in the inferior vena cava was contemplated. After much consideration a bronchoscope forceps (Fig. 1), 52 cm. in length and 1/16 inch in diameter was passed, without protective catheter covering, through the saphenous vein to the level of the wire in the inferior vena cava. This caused the patient only minimal discomfort. After several attempts, the lost segment was grasped with the forceps and successfully removed. A small blood clot was already attached to the guide.

Discussion

Cope\(^1\) in 1962, reported two instances of

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Figure 1

Forceps used to remove the lost segment of the wire, the broken guide wire, and the retrieved broken segment.

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Seldinger wire breakage occurring in his laboratory and mentioned four others in the literature. One was the breakage of a wire in the inferior vena cava while the guide was passed for a transseptal catheterization. It was removed from the inferior vena cava by laparotomy. The other occurred during selective catheterization of a renal vein. The breakage was not discovered until 3 months later when a repeat film of the abdomen was taken. Since the patient was asymptomatic, surgical intervention was not recommended. The other instances consisted of breakage of a wire tip in an artery near the level of a thrombotic occlusion (recovered during subsequent thromboendarterectomy); breakage of the tip of a guide in the soft tissue in two patients and within the sheath of the femoral artery in another, which required surgical removal.

Complications of intravascular and intracardiac foreign bodies consist of infection around the foreign body with subsequent bacteremia and thrombosis or thromboembolic phenomena. Taylor and Rutherford collected from the literature reports of eight incidents of loss of a plastic tube in the venous system and added two of their own and one by personal communication. Four of the patients are alive and well; two of these had removal of the tube by operation. The remaining seven are dead, death being attributed in five directly to the infected tube in the vascular bed.

To our knowledge, this is the first reported instance of removal of a broken intravascular or intracardiac guide wire without surgical intervention. Removal of the wire in the case herein reported was considered to be mandatory because the reported complications constituted a threat to the patient’s life. The patient was not prepared for surgery, nor had any been anticipated. Therefore, removal of the wire by a nonoperative method was preferable. The danger of general anesthesia and surgery in this patient with severe heart disease would also be avoided. The instrument was not ideal for such a procedure, since it was not flexible and the possibility of perforation of the vein was very great. Despite many anxieties, there were no complications following the procedure. The need for a flexible instrument for retrieval of such foreign bodies is obvious. It is further conceivable that such an instrument could be designed for biopsy of the heart. Observation of the guide prior to the procedure revealed no obvious defect. It was new and had not previously been used. In all instances reported the guides broke without undue manipulation. Such instruments must have been defective. A re-evaluation of the design and manufacture of these guides seems indicated.

Summary

The recovery of a broken segment of a steel spring guide from the right atrium and inferior vena cava without surgical intervention has been reported. The ready accessibility of an adequate instrument for retrieval of such intravascular bodies is recommended. It is possible that such an instrument may be also designed for myocardial biopsy. The relative ease of breakage probably points to a defect in the guides and a re-evaluation of the design and manufacture seems to be indicated.

References

Reports of Medical Cases, with Reference to Morbid Anatomy
Preface by Richard Bright—1827

During some part of the progress of these cases of anasarca, I have in almost all instances found a great tendency to throw off the red particles of the blood by the kidneys, betrayed by various degrees of haematuria from the simple dingy colour of the urine, which is easily recognized; or the slight brown deposit;—to the completely bloody urine, when the whole appears to be little but blood, and when not unfrequently a thick ropy deposit is found at the bottom of the vessel.

Besides these cases of sudden anasarca swelling being generally accompanied by coagulable urine, I have found another and apparently a very opposite state of the system prone to a secretion of the same character; namely, in persons who have been long the subjects of anasarca recurring again and again, worn out and cachectic in their whole frame and appearance, and usually persons addicted to an irregular life and to the use of spirituous liquors. In these cases the albuminous matter has coagulated, in the more ordinary way, in flakes and little curdled clots; but instead of rendering the whole milky, the flocculi often incline to a brown colour, looking like the finest particles of bran more or less thickly disseminated throughout the heated urine. Occasionally in these cases the urine has been much loaded with saline ingredients becoming turbid by standing, but rendered quite clear by the application of a much lower degree of heat, than is necessary to coagulate the albumen.
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