Large right atrial thrombosis

Rare complication during permanent transvenous endocardial pacing

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SUMMARY Right atrial thrombosis is a rare complication of permanent endocardial pacing. We report two cases with large right atrial thrombi which occurred during permanent endocardial electrical stimulation. Both patients were women, aged 83 and 89 years, who died suddenly, respectively, one month and 24 days after pacemaker implantation. At the time of death the two patients were in severe persistent refractory congestive heart failure despite appropriate medical treatment. At necropsy large mobile right atrial thrombi were found in both cases.

Venous thrombosis and embolisation are rare complications of permanent endocardial pacing.¹⁻¹⁴ Right atrial thrombosis has also occasionally been reported.²

London and co-workers¹⁵ described two cases of right atrial thrombosis with subsequent haemodynamic impairment: the first in a 75-year-old man who died 48 hours after the insertion of the pacemaker, the second in a 69-year-old man who died two months after the implantation. In both cases, at necropsy, large right atrial thrombi surrounded the catheter electrode. In the first case the thrombus was approximately 80 per cent of the atrial cavity, in the second the transverse diameter of the thrombus range between 1.5 and 3.0 cm.

We report two cases of large right atrial thrombi found in a series of 53 necropsies performed in patients with permanent endocardial electrodes. Both cases were in congestive heart failure at the time of implantation and showed subsequent deterioration of an already impaired haemodynamic state.

Subjects

CASE 1

An 83-year-old woman with severe diabetes and chronic congestive heart failure underwent endocardial pacemaker implantation under local anaesthesia (lignocaine 2%, 20 ml) for complete heart block with syncopal attacks. An MIP 40 RT Vitatron

unit connected to an MIP 147 electrode advanced via the right external jugular vein was implanted. During the procedure the patient experienced severe hypotension.

The patient subsequently recovered and was treated with insulin, digitalis, and diuretics. One month later she died suddenly, after mild fever during the last three days. At the time of death signs of chronic congestive heart failure were still present in spite of treatment. At necropsy a large spheroidal thrombus was found (4 cm diameter) eccentrically surrounding the catheter electrode in the right atrium. The thrombus was fastened to the atrial wall by two light strings of fibrous tissue (Fig. 1).

CASE 2

An 89-year-old woman underwent implantation of an MIP 40 RT Vitatron pacemaker connected to an MIP 147 electrode advanced via the left cephalic vein, because of atrial fibrillation, bifascicular block, and syncopal attacks. Chronic congestive heart failure was also present. The patient was treated medically and discharged on digitalis and diuretics. She was readmitted to the hospital 20 days later because of severe heart failure. On the fourth day after admission she died suddenly. At necropsy a scar was found consistent with an old anteroseptal myocardial infarction. Septal parietal thrombosis was present. A large thrombus (transverse diameter 3 cm) surrounded the catheter electrode in the right atrium; it was attached to the atrial wall by two large fibrous strands (Fig. 2).

Discussion

Thromboembolic complications of permanent transvenous pacing rarely cause haemodynamic impairment or significant symptoms. London *et al.*¹⁵ reported two cases with significant haemodynamic impairment caused by a large right atrial thrombus. Evidence of haemodynamic impairment, with signs of congestive heart failure, was present in both our cases at the time of implantation. Despite permanent transvenous endocardial pacing and medical treatment congestive heart failure did not improve as expected. In the first case persistence or even worsening of congestive heart failure was probably the result of mechanical obstruction in the right atrium. Sudden death might have been caused by acute obstruction of the tricuspid ring by the mobile thrombus. However, this could not be shown and major arrhythmias remain the other possibility. Thrombus formation might be related to the hypo-

tensive episode during the implantation and possibly to dehydration caused by glycosuria.

In the second case the persistence of congestive heart failure and sudden death might also be related to the right atrial thrombus but major arrhythmias could not be excluded.

In patients undergoing permanent endocardial pacemaker implantation the persistence of refractory congestive heart failure in spite of treatment should call attention to the possibility of right atrial thrombosis. This seems more likely to occur in elderly patients or after episodes of prolonged hypotension. As a diagnostic approach echocardiography or angiocardiology should be considered if signs of severe congestive heart failure persist or become worse despite a normally functioning endocardial pacemaker and proper medical support. In such cases sudden death can be the result, possibly from complete acute obstruction of the tricuspid valve by the mobile thrombus or because of major arrhythmias.

Fig. 1 Thrombus surrounding the catheter electrode inside the right atrium (arrow) in case 1. RA, right atrium; RV, right ventricle.

Fig. 2 Thrombus surrounding the catheter electrode inside the right atrium, cut open (arrow), in case 2. RA, right atrium; RV, right ventricle.

References

- ¹Robboy SJ, Harthorne JW, Leinbach RC, Sanders CA, Austen WG. Autopsy findings with permanent pervenous pacemakers. *Circulation* 1969; **39**: 495-501.
- ²Camerini F, Giarelli L, Crepaldi L, Scardi S, Silvestri F. Anatomic-pathological changes in the endocardial permanent pacemaking and their clinical importance. *G Ital Cardiol* 1971; **1**: 409-21.
- ³Feruglio GA. La stimolazione endocardica permanente in Italia: risultati clinici nei primi 2324 casi trattati. *G Ital di Cardiol* 1972; **2**: 271-82.
- ⁴Adame Moragrega JL, Martinez Rios MA, Vargas Raymond G. Complicaciones de los marcapasos. *Arch Inst Cardiol Mex* 1973; **43**: 766-78.
- ⁵Seremetis MG, deGuzman VC, Lyons VS, Peabody JW Jr. Cardiac pacemakers: clinical experience with 289 patients. *Am Heart J* 1973; **85**: 739-48.
- ⁶Thalen HJ. *Cardiac pacing*. Assen, The Netherlands: Van Gorcum, 1973.
- ⁷Wertheimer M, Hughes RK, and Castle CH. Superior vena cava syndrome. Complication of permanent transvenous endocardial cardiac pacing. *JAMA* 1973; **224**: 1172-3.
- ⁸Chaithiraphan S, Goldberg E, Wolff W, Jootar P, Grossman W. Massive thrombosis of the coronary sinus as an unusual complication of transvenous pacemaker insertion in a patient with persistent left and no right superior vena cava. *J Am Geriatr Soc* 1974; **22**: 79-85.
- ⁹Edelstein JM. Pulmonary emboli associated with transvenous pacemaker. *Am Heart J* 1974; **87**: 808-9.
- ¹⁰Sethi GK, Bhayana JN, Scott SM. Innominate venous thrombosis: a rare complication of transvenous pacemaker electrodes. *Am Heart J* 1974; **87**: 770-2.
- ¹¹Steenkamp WF. Pulmonary embolism complicating permanent cardiac pacing. *S Afr Med J* 1974; **48**: 87-9.
- ¹²Williams DR, Demos NJ. Thrombosis of superior vena cava caused by pacemaker wire and managed with streptokinase. *J Thorac Cardiovasc Surg* 1974; **68**: 134-7.
- ¹³Camerini F, Klugman S, Petz E, Silvestri F. Le complicazioni della stimolazione endocardica permanente. In: Formentini A, Rovelli F, eds. *Attualità in cardiologia*. Rome: L Pozzi, 1977: 247-75.
- ¹⁴Gadaleta G, Magni S, Formentini A, Rovelli F. Stimolazione elettrica endocardica permanente. Osservazioni su 1125 pazienti. *G Ital Cardiol* 1976; **6**: 80-90.
- ¹⁵London AR, Runge PJ, Balsam RF, Bishop MB, Bousvaros G. Large right atrial thrombi surrounding permanent transvenous pacemakers. *Circulation* 1969; **40**: 661-4.

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