Transvenous Pacemaker Lead Vegetation

To the Editor:

A 72-year-old man with multiple vegetations attached to a permanent pacing electrode, percutaneous removal of the pacemaker generator along with endocardial leads was described in the Journal.1 This patient finally succumbed to irreversible multiple-organ failure. Showering of the pulmonary circulation with vegetation fragments during removal of the infected pacemaker leads probably played a central role in the rapid development of perioperative sepsis in the patient. The authors highlighted the usefulness of transesophageal echocardiography (TEE) in consistently identifying lead or tricuspid vegetations.1

We present a case of successful removal of a transvenous pacemaker lead and vegetation on cardiopulmonary bypass in a 54-year-old woman with chronic renal failure who was on hemodialysis. She was admitted to our institution with a 3-day history of fever. She had a left subclavian transvenous single-chamber (VVI) permanent endocardial pacemaker implanted 4 years ago for sick sinus syndrome. On arrival, she was hypotensive. The physical examination revealed an obese, febrile woman with evidence of a skin infection. The pacemaker generator site was intact with no erythema or discharge. She was on regular hemodialysis for chronic kidney disease via an arteriovenous fistula in the left arm. The white blood cell count was elevated with high inflammatory markers. Her chest x-ray showed an area of confluent opacification in the right lower lobe. Two sets of blood culture grew Streptococcus agalactiae. The diagnosis was pneumonia with sepsis, and she was treated with fluids, inotropes, and appropriate antibiotics for 7 days. An electrocardiogram showed a pacemaker rhythm of 70 beats/min. The pacemaker check showed a normally sensing and pacing generator. Because she was persistently febrile, a transthoracic echocardiogram was performed to rule out infective endocarditis. The transthoracic echocardiogram suggested the presence of a mass in the right atrium attached to the pacemaker lead, with normally functioning valves and good left ventricular systolic function. A subsequent TEE showed a well-delineated echogenic mass measuring 3.5 × 1.2 cm attached to the atrial part of the pacemaker lead near the tricuspid valve and prolapsing into the right ventricle, with no tricuspid valve vegetations (Fig 1).

In view of the large size of the vegetation, it was decided to surgically remove the lead. Under standard American Society of Anesthesiologists monitoring and invasive hemodynamic monitoring, general anesthesia was administered.
Mild hypothermic cardiopulmonary bypass was instituted, cardioplegic arrest was achieved, and the lead with the vegetation was extracted through a right atriotomy (Fig 2). The lead with vegetation was sent to the microbiology laboratory for a gram stain and culture. An epicardial bipolar pacemaker was implanted through a subxyphoid incision and programmed to a VVI mode. The patient was separated easily from cardiopulmonary bypass with minimal inotropic support, and after about 6 hours of mechanical ventilation, her trachea was extubated.

The usefulness of TEE in the diagnosis of lead-related endocarditis is well established. However, a mass adherent to the lead that is seen on echocardiography is usually a thrombus or an infected vegetation, and it is difficult to distinguish between the 2 with echocardiography. Masses that are detected in patients without positive blood cultures or other suggestive features for infection are likely to represent thrombus and by themselves do not require lead removal. In this patient, features suggestive of infection and positive blood cultures confirmed the diagnosis that it was a case of lead vegetation.

Our patient had chronic renal failure, which has been described as a major risk factor for cardiac implantable electronic device infections (odds ratio = 4.8). Fever is the most common presenting sign of implanted cardiac device–related endocarditis, occurring in more than 85% of patients, and our patient was febrile at the time of presentation unlike the patient in the article by Gandhi et al. Staphylococcal species cause the bulk of cardiac implantable electronic device infections and account for 60% to 80% of cases. Gandhi et al reported that coagulase-negative staphylococcus was identified in vegetations from removed pacemaker leads in their patient. In our patient, a group B streptococcus was identified in the vegetation from the removed pacemaker lead. In a recent study, nonstaphylococcal cardiac implantable electronic device–related infections were present in 16% of patients, and it was suggested that nonstaphylococcal organisms are capable of secondarily seeding the pacing lead. Hence, a high degree of suspicion for cardiac implantable electronic device–related infections is warranted in patients with bloodstream infections, as seen in our patient. Lead infection generally occurs because of hematogenous seeding of the organism in the absence of pocket infection. A chest x-ray in the present patient showed a small area of confluent opacification in the right lower lobe that suggested the presence of pneumonia, which could have been the primary problem with secondary seeding of the lead causing endocarditis, or this pneumonia could have resulted from embolism of vegetation fragments from the pacemaker lead.

The management of cardiac implantable electronic devices includes generator removal along with complete lead extraction (via either percutaneous extraction or open surgical removal using cardiopulmonary bypass) and pathogen-specific intravenous antimicrobial therapy. In high-volume centers, percutaneous lead removal can be accomplished relatively safely with a high rate of success. Because of the risk of pulmonary embolism with percutaneous lead extraction, a preference for surgical lead removal has been advocated in patients with lead vegetations greater than 2 cm in diameter. However, such decisions should be individualized and based on the patient’s clinical parameters and the clinician’s evaluation.

REFERENCES


To the Editor:

One of the most challenging techniques in pediatric anesthesia is to achieve correct isolation for one-lung selective ventilation and to get a good quality surgical field. A double-lumen tube (DLT) is a specific device used to isolate one side of the respiratory system. It allows selective ventilation of one lung only. However, the smallest tube is the 26F, which is used in children older than 8 to 10 years of age.¹

Recently, we used a DLT in a 6-year-old female child (25-kg weight) with Wilms tumor metastasis when performing bilateral thoracotomy surgery. She had a history of bilateral Wilms tumor, which was diagnosed as bilateral lung metastasis, with an increase in tumor size in the previous 3 months. Therefore, we decided to perform a bilateral thoracotomy to attempt resection of tumor metastasis.

The measurements of the trachea and the left main bronchus diameter were taken by using a computed tomographic (CT) scan. Table 1 summarizes the diameters of the trachea, the left main bronchus, and the DLT. After careful anesthetic evaluation and studying the potential complications (benefit-risk for the patient), the chest CT scans were reviewed again by the radiologist, and intubation was accomplished using a left DLT 26F BroncoPart (Rusch, Duluth, GA) by an anesthesiologist who had at least 10 years’ experience using a DLT.

The tube was turned 90° and was pushed forward carefully until resistance was noticed. Correct intubation was checked with capnography and auscultation after selective clamping. The bronchial cuff was inflated in increments of 0.1 mL, until no air escaped from the underwater seal. No hemodynamic changes or mechanical problems were detected after intubation. Standard monitoring for this kind of surgery was performed, and we used a continuous epidural infusion with bupivacaine 0.25%. The tumor metastasis were removed completely, and the patient was moved to the pediatric intensive care unit where she was fed at 4 hours after arrival without any adverse incidence.

Choosing a DLT that fits correctly requires good knowledge of the airway anatomy of the patient, particularly in children, paying great attention to the size of the trachea and to the size and length of the main bronchus to be selectively intubated. The optimally sized DLT is defined as the widest tube passingatraumatically through the glottis, easily advancing along the trachea, and entering the main bronchus without difficulty.² Several methods have been proposed over the last decade to calculate the correct DLT size. A study performed in Singapore in 1999 showed the possibility of predicting DLT size by means of measuring the diameter of the left bronchus using a CT scan; this is especially useful when choosing smaller DLTs.³ We believe this method is not too sophisticated and expensive for our colleagues in the radiology department, with the advantage that most thoracic surgery patients have already had chest CT.

This was a bilateral thoracotomy; therefore, the lungs had to be selectively ventilated on both sides. In this case, a DLT allowed easy and fast isolation of each lung, simultaneous clearance of secretions in both lungs, quick access to bilateral ventilation if necessary, and the opportunity to use continuous positive pressure to improve oxygenation.⁴ Other alternative techniques for one-lung ventilation would be long and difficult (eg, fiberoptic repositioning of a bronchial blocker or mainstem intubation of the other bronchus).

In this patient, the CT scan measurements allowed us to make the decision to use a DLT that, based on standard criteria, would not have been anticipated to be appropriate; thus, we achieved optimal ventilation and early extubation. These CT scan studies generally are not used as an aid in the routine management of airways; but in our opinion, this method should be considered in agreement with radiologists and could be included in clinical protocols of preoperative radiologic evaluation. It would be extremely useful in selective cases, but clinicians must not forget the enormous individual variability in similar patients.

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