Surgical Removal of a Pacemaker Lead Causing Infective Endocarditis: A Case Report

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Introduction

0.4-1.1% of patients having permanent pacemaker implantation suffer serious infections leading to endocarditis. Generally accepted mode of therapy in these group of patients is removal of the infected pacemaker and lead that has caused endocarditis and accomplishing long term antibiotic therapy and accompanied by implantation of a new pacemaker to another anatomic site. A 71 year old female had implantation of permanent pacemaker 8 years ago owing to total AV block which was tended to be removed 1 year ago. However the lead was left in place because of the dense adherences and another pacemaker was introduced through left subclavian vein. Patient then admitted with signs and complaints of infection. Although the newly implanted pacemaker and lead was removed with suspected infection and ampicr antibiotherapy was initiated, clinical signs continued and ecocardiography revealed vegetation on the previously implanted lead. Surgical extraction of the lead was planned and preoperative angiography showed atherosclerotic lesion in the circumflex artery. Infected lead was extracted by the use of cardiopulmonary bypass through right atriotomy incision with concommitant bypass and implantation of epicardial DDD-R pacemaker. Postoperative period was uneventful and patient was discharged on 15th postoperative day without signs of infection. The pacemaker system must be removed in cases of endocarditis owing to the infected pacemaker lead. Simple transvenous extraction has to be avoided especially when the tip of the lead is infected. This method prevents the risk of pulmonary embolisation associated with vegetation and mechanic injury to the tricuspid valve and right ventricle.

Case

A 71 year old female admitted with the complaints of fever and malaise. She had a history of permanent transvenous DDD-R guidant multiprogrammed pacemaker implantation via right subclavian vein due to total AV block 8 years ago. 1 year ago the pacemaker was tended to be removed due to dysfunction but the lead was left in place because of inability of removal owing to its adherence to overlying tissues. As a result patient had implantation of DDD-R guidant multiprogrammed pacemaker through left subclavian vein. At the 15th. day of implantation naughty smell with purulent discharge was observed at the site of implantation. With the suspicion of pacemaker related infection newly implanted generator and the lead was extracted, but the clinical signs of infection such as high fever and shivering still continued. Laboratory findings including elevated WBC count (17.000) and serum C-reactive protein were consistent with ongoing infection. Transthoracic echocardiography revealed a 19x14mm sized vegetative mass on the lead situated near the tricuspid valve (Figure 1A). Ampicr antibiotherapy with levofoxacin 2gr. iv/day was started immediately after obtaining blood samples for microbiologic
examination. Blood cultures were positive for coagulase negative staphylococcus aureus. Present antibiotherapy was replaced by vancomycine and aminoglycoside combination owing to susceptibility of the microorganism on culture antibiogram. 14 days of therapy resulted in regression of leukocytosis and fever, furthermore the clinical picture was observed to be better. However control echocardiography did not show any improvement in the dimensions of vegetation. As the vegetation was located on the tip of the lead extraction of it through subclavian vein by means of simple traction was thought to carry the risk of peeling and dislodgment of the vegetative mass into the right ventricular cavity. So this method was decided to be potentially hazardous. Therefore an alternative method of removal of the lead surgically through right atrium by the use of cardiopulmonary bypass seemed more reasonable. Prior to procedure to rule out coronary artery disease preoperative coronary angiography was performed. A lesion leading to 80% stenosis in circumflex artery was observed and found to be suitable for concomittant bypass surgery on beating heart. Standart median sternotomy was performed. Following aortobicaval cannulation cardiopulmonary bypass (CPB) was constituted and both caval veins were encircled with tapes and occluder snears were applied. Right atriotomy was made by inflow occlusion. Backflow from coronary sinus was aspirated as to remain a bloodless field. Pacemaker lead that enters from SVC into the right atrium was observed to be adherent to septal leaflet of the tricuspid valve and then to extend through right ventricular apex. Distinct vegetations were seen on both the tip of the lead and septal leaflet of the tricuspid valve (Figure 1B). Proximal tip of the lead was pulled off but the distal part was not been able to be moved due to strict adherence to the septal leaflet and its chordae. The vegetative stuff was cleaned off and adhesive structures were dissected and the lead was retracted (Figure 1C). Superior caval cannule was clamped and removed. Pump flow was decreased and CPB was continued with single venous cannule. Fibrotic, mobile vegetative mass situated just at the orifice and adjacent inner wall of the superior vena cava was dissected and cleaned. After aspiration of the remaining particules superior vena cava was cannulated again. Right atrium was closed. Circumflex artery was bypassed with a saphenous vein graft harvested from right lower extremity with off-pump technique while the cannules were still in place. A permenant epicardial DDD-R guidant multiprogrammed pacemaker was implanted on to the anterior aspect of the right ventricule (Figure 1D). Following decanulation hemostasis was achived, sternotomy was closed and the patient was transferred to intensive care unit (ICU). The patient was extubated on postoperative 8th hour and the length of ICU stay was two days. Antibiotherapy consisting of beta lactamase and aminoglycoside was applied for two weeks then beta lactamase alone was continued for another 6 weeks. The patient was discharged on postoperative 15th day and control examinations on the 4th and 9th weeks revealed no signs of reccurent infection.

Discussion
Although pacemaker related endocarditis is relatively rare carries a high risk of mortality if left untreated. Most frequent causative agents in the presence of vegetation are staphylococcus aureus and staphylococcus epidermidis. Sole medical therapy or treatments aimed at rescue of pacemaker frequently results in reccurence of infection [6,7]. Total removal of the pacemaker system should be preffeered in pacemaker related endocarditis because extraction of the infected parts alone may lead to reccurent infection. Long term antibiotic therapy is appropriate in these cases starting from the preoperative period and continued after lead removal.

There are reports in the literature about removal of infected pacemaker lead both by percutaneous and surgical methods. Percutaneous method have the potential risks such as rupture in the tricuspid valve, right ventricular perforation or peeling of the vegetation located on the tip of the lead. Risk
of pulmonary embolism is higher especially when the size of the vegetation is more than 10mm [8]. So in these group of patients surgical method can be adventegous. Laser assisted sheats may be an alternative tool in removal of the leads that were in chronic use [9]. Surgical extraction of the lead under direct vision via surgical procedure using cardiopulmonary bypass is a more comfortable and safer way. This method eliminates the risk of mechanic injury to the tricuspid valve and right ventricule besides embolisation of the vegetation to the lungs. This method also prevents the arrythmias that can occur during percutaneous transvenous extraction of the lead. The patient in this case was relatively in poor condition with findings of septicemia preoperatively. Meier-Ewart et al. [9] reported formation of lung abcess due to dislodgment of the vegetation located on the tip of the lead as a pulmonary embolus while removal of the infected pacemaker lead transvenously. We initially preffered a conservative approach by applying intravenous antibiotic therapy to gain a regression in dimensions of the vegetation. However we did not observe any change in the size of the dimension and switched to a surgical method under cardiopulmonary bypass.

**Result**

The pacemaker system must be removed in cases of endocarditis caused by infected pacemaker lead. Simple transvenous extraction has to be avioded especially when the tip of the lead carries vegetation. This method prevents the risk of pulmonary embolisation associated with vegetation and mechanic injury to the tricuspid valve and right ventricule. In older age population coronary angiography should be performed preoperatively as to evaluate any coronary leision that can be succesfully bypassed concomitantly during procedure.

**References**