

Surgery for Right-Sided Infective Endocarditis: Surprise during Surgery

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Abstract: *Infective Endocarditis is a dreadful disease. It most commonly involves the left side of the heart. Right-sided involvement is mainly seen in Intravenous drug users. The other causes are foreign bodies in the cavae or right atrium, congenital abnormalities, extensive burns, or severe infections of the skin. A thorough interrogation can help in considering IE as a provisional diagnosis. The most commonly isolated organism is Staphylococcus. The most important diagnostic tool is Echocardiography. Most of the cases do well with medical management, as tricuspid regurgitation is tolerated well. Surgery is required for right-sided disease in some rare situations. The patient described here had one such rare indication of large-sized, potentially embolic vegetations. Although the pathogenesis was not evident initially, proceeding to surgery revealed the cause.*

Keywords: Infective Endocarditis, Vegetations, Tricuspid Valve Replacement

1. Introduction

Infective endocarditis (IE) is one dreaded disease that all cardiac surgeons face in their lifetime. The left-sided disease is more common than the right-sided disease, probably because the right heart is a low-pressure circuit with low stress over the valves and chambers. Many of the right-sided cases are benign and can be managed medically. Surgery for isolated right-sided IE is rare. We present here a case report of a tricuspid valve endocarditis which required surgery because of the massive vegetation size. The etiopathogenesis could be established only during surgery.

2. Case Report

A 27-year male patient was admitted to the General Medicine department with a history of fever and chills for 15 days. He had started treatment at another hospital. He then developed shortness of breath about 4-5 days before admission and due to lack of improvement, he came to our institute. He had a history of blackish discoloration of stools and jaundice about 4-5 months back. There was a history of small dental procedure about 2 months back. There was no history of Intravenous (IV) drug use. No other significant history was noted.

The presenting features were of that of heart failure viz. tachycardia with a heart rate of 116/min, tachypnea with a respiratory rate of more than 30/min, diaphoresis and pedal edema. His BP was 108/70 mmHg. His temperature was 101.8F. A raised Jugular Venous Pressure (JVP) and a faint systolic murmur along the sternal border were observed during the initial cardiovascular examination. Abdominal examination revealed mild ascites and hepatomegaly.

Primary investigations revealed severe anemia with hemoglobin of 5.4gm/dL and neutrophilic leukocytosis of 26,800 cells/ μ L. The liver profile was also deranged with raised enzymes but bilirubin was normal. Other investigations like Widal's test, Dengue Serology and Leptospirosis were negative. Viral markers were also

negative. Chest X-ray showed bilateral lower zone patchy haziness.

Injections Ceftriaxone and Vancomycin were started after sending Blood and Urine cultures. Blood transfusion was given to increase hemoglobin levels. After preliminary stabilization, he was subjected to Echocardiography, which revealed two large vegetations over the septal and posterior leaflets of the tricuspid valves of size about 20mm and 19 mm respectively (Fig 1). Severe tricuspid regurgitation and pericardial effusion were also noted. Severe Pulmonary Hypertension (PAH) was noticed with right ventricular systolic pressure (RVSP) of 74mmHg. There were no abnormalities seen in other chambers or other valves.



Figure 1: The large vegetations on echocardiography

Further stabilization was done with blood transfusions, diuretics and improvement of nutrition. The etiopathogenesis was not clear since there was no inciting event except for the dental procedure. All the blood and urine culture reports came negative, further confusing the issue.

A repeat Echocardiogram after stabilization showed that the PAH had reduced to a moderate level, but there was no

reduction in the size of the vegetation. There were high chances of embolization of vegetations. Hence the patient was planned for vegetectomy along with Tricuspid Valve Repair or Replacement.

After administering General Anesthesia, a median sternotomy was done. Pericardiotomy revealed moderate pericardial effusion and dilated right atrium and right ventricle. Cardiopulmonary Bypass (CPB) was initiated using 20Fr Aortic cannula and 30Fr and 32Fr venous cannulae and the heart was arrested by delNido cardioplegia. On opening the right atrium, vegetations were found on all three cusps of the tricuspid valve. Valve repair was not possible and we planned for tricuspid valve replacement.

The necrotic portions of the valve cusps were excised and then the etiopathogenesis of the disease became clear. There was a small Ventricular Septal Defect (VSD) underneath the septal leaflet, covered by the septal leaflet and the vegetation over it (Fig 2). The VSD was repaired using a small glutaraldehyde treated autologous pericardial patch and then a 31mm St Jude Medical Epic (Porcine) valve was seated over the annulus with interrupted suturing technique (Fig 3). The rest of the surgery proceeded in an uncomplicated manner and the patient was shifted to the Intensive Care Unit (ICU) in stable condition. The postoperative ICU stay remained uneventful except for intermittent periods of Complete Heart Block like rhythm, which used to revert spontaneously without any pacemaker support. The vegetations were sent for culture, but no organisms could be isolated from them. Biopsy revealed chronic inflammatory cell infiltrate along with necrosis which proved infective endocarditis

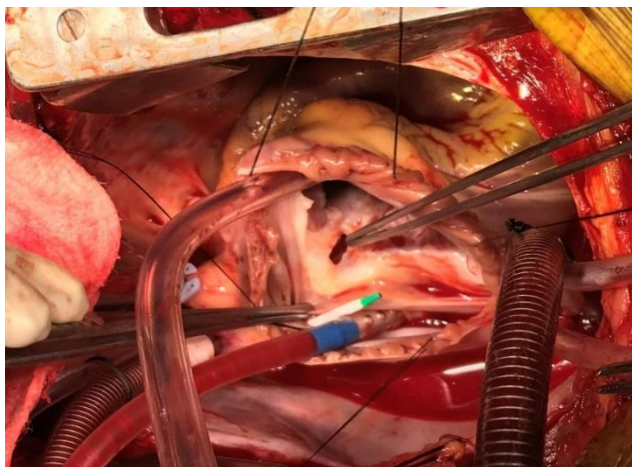


Figure 2: The VSD revealed after vegetectomy

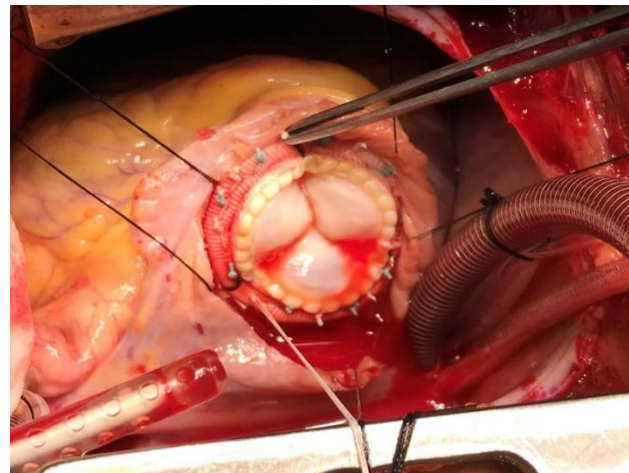


Figure 3: The porcine valve seen after valve replacement

Further interrogation from family elders revealed that the patient was diagnosed with “some heart disease” in childhood. They were told that the disease would heal itself gradually. There was no major problem later on and they did not investigate further.

We kept the patient in the ward for an extended period to ensure that he would not require any permanent pacemaker support. The patient was discharged on the 19th Post-Operative day on diuretics, anticoagulants and pain killers. The patient has been doing well in the 9 months of follow-up.

Discussion

William Osler had given the first description of Infective Endocarditis in 1885 (1). Hugh Hussey (1950) described a series of patients with right-sided Infective Endocarditis from narcotic addiction (2). The incidence of the disease has remained more or less the same since then (3). The majority of the cases of IE are left-sided, mainly because of the presence of high pressures and turbulence on the left side of the heart, the higher oxygen content on the left side of the heart promoting bacterial growth and the epidemiologically higher incidence of congenital and acquired lesions on the left side of the heart. The incidence of right-sided IE is between 5 and 10 % (4) while the incidence of concomitant right and left-sided disease is about 13% (6). Right-sided IE is mainly seen in – IV drug users, patients with right-sided foreign bodies like central venous catheters for patients on hemodialysis, or implantable cardiac devices and patients with cardiac anomalies (6). Epidemiologically about 90% of the patients with right-sided IE are IV Drug users, while only 20% of the patients with left-sided IE are IV Drug users (5). IV drug abuse is not as high in India as the western world but rheumatic heart disease is still prevalent in India when compared to western society. IV drug users who are HIV positive have higher chances of IE than non-HIV positive patients (7). The Tricuspid valve is involved in about 90% of the right-sided IE and the remaining involve the Pulmonic valve (6). Rarely, the Eustachian valve (8) and the free right ventricular wall (9) have been involved.

The congenital lesions with a high risk of developing IE are VSDs, Patent Ductus Arteriosus (PDA) and Fallot's Tetralogy (TOF) among others. Congenital and acquired

valve defects play an important role in the development of IE in adults (10). The vegetations usually develop on the low-pressure side of the defect and are seen downstream. E.g. in PDA, the lesion is seen in the pulmonic end of the ductus and in VSDs the lesion is seen on the right side of the defect and the tricuspid valves. This is due to the continuous injury by the jet of blood.

The most common organism isolated in cases of IE is *Staphylococcus Aureus* (11, 12). Others are *Streptococci* and *Enterococci*. Rarely, fungal, and multiple organisms have been reported (13, 14). Sometimes there may be no organism isolated (6). In our patient, the cultures were negative, probably because he had received antibiotic treatment before presenting at our institute. Even the culture of the vegetation was negative, as he had received antibiotics for a long time at our institute before getting operated.

Fever is the main presenting complaint of patients, seen in 90% of the cases of Infective Endocarditis. Other symptoms are dyspnea, malaise, abdominal pain, etc. Sometimes there may be pulmonary emboli which may require surgeries (15). Potentially catastrophic lesions are also seen which tend to obstruct the right ventricular outflow tract and pulmonary valve (16).

The diagnosis is established by Echocardiography and applying the Duke's Criteria (although they are more helpful for the left-sided endocarditis) (17, 18). Robbins et al. gave criteria specific to right-sided IE (19). Suspicion should start with symptomatology. In our case, the initial history was taken only from the patient and his brother since the elders were not available at admission. After identifying VSD at the surgery and after talking to the elders of the family after the surgery, the pathogenesis became clear. This establishes the importance of thorough history taking.

Another important investigation is Trans Esophageal Echocardiography (TEE) which gives a better picture of the vegetations and also reveals hidden defects like small VSDs and small vegetations. In our case, TEE could not be done due to the patient's orthopnea.

CT scan and MRI are mainly done for diagnosing metastatic infections and other complications of the primary disease. The therapy of right-sided IE mainly involves medical management. Empirical antibiotic therapy must be started especially in sick patients. Tricuspid Regurgitation is generally tolerated well by the patients.

It was observed that vegetations of size more than 10mm were almost 3 times more prone to embolization than vegetations less than 10 mm (20). Extreme high risk was present with a vegetation size of more than 15mm and mobile variety (20). Another article states the significance at 20mm of vegetation size (21).

Other indications of surgical intervention are persistent bacteremia, resistant organisms (like fungal growth), recurrent pulmonary embolisms, annular abscess formation, for removal of foreign bodies like pacemaker leads, etc. Surgery (especially tricuspid replacement) should be

avoided in patients with IV drug users due to the risk of repeated infections (22).

The principles of surgical therapy in right-sided IE are radical debridement, prevention of regurgitation and avoidance of prosthetic material, especially in IV drug users. Along with this, the causative disease (VSD, implanted devices) should also be dealt with accordingly (23)

The surgical methods employed can be classified into;

- a) Those which do not use Prosthetic material like vegetectomy and valve repair, and valvectomy (without replacement) (24) OR
- b) Those which use prosthetic material like valve repair with ring annuloplasty, and valve replacement. A wide variety of valves have been used, like the usual porcine/bovine stented valves, cryopreserved homografts, or reversed stentless aortic valves (23).

In our case, the vegetations involved all the three cusps and after vegetectomy, it was found that the valve was not repairable. Hence valve replacement was done after closing the VSD with a patch of glutaraldehyde treated autologous pericardium. We used a porcine bioprosthetic valve which was sutured using interrupted pledgeted polyester sutures

The postoperative stay of our patient was mostly uneventful, except for some events of transient bradycardia with CHB like rhythm probably due to the tissue edema. They became less frequent after a few days. We kept the patient for an extended period in the ward, as he did not have access to cardiology services near his village. He was discharged in stable condition and has been doing well during follow-up.

3. Conclusion

All right-sided IE patients may not benefit from medical therapy and rarely, surgical intervention may be required. Good interrogation should reveal the pathogenesis of the disease. Echocardiography guides in decision making. VSD was a surprise for us during surgery. The surgeon should be ready to deal with any surprises and should take decisions based on the skills possessed.

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