

## Prosthetic Valve Endocarditis — AFIC Experience

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### Introduction:

Prosthetic valve endocarditis is one of the most dreadful complications of valvular heart surgery with very high morbidity and mortality. Routine peri-operative antibiotic coverage and better surgical aseptic practices have reduced the incidence of early prosthetic valve endocarditis, though not eliminating it. This, on the other hand, may have contributing to isolation of newer, resistant organisms from these cases. Diagnosis of prosthetic endocarditis is often difficult because of atypical presentation, subtle symptoms & signs and scarcity of specific diagnostic tests. Medical treatment of an established case of prosthetic valve endocarditis with appropriate antibiotics is seldom successful, and surgery has almost always to be resorted to.

Despite improvements in antimicrobial therapy, surgical techniques, the operative mortality for patients of prosthetic valve endocarditis (PVE) remains high and has been reported as 35% to 84% in recent publications. Various risk factors such as early presentation (within 60 days of previous valve replacement), presence of non streptococcal organisms, new or increased regurgitant murmur, myocardial invasion, severe hemodynamic failure and aortic prosthetic replacement have been identified and urgent surgical intervention has been proposed for patients in whom the risk factors are detectable.

In Pakistan, no report is available so far which shows the degree of success which can be achieved by such an approach. We describe here our surgical experience of prosthetic valve explants for bacterial endocarditis in severely ill patients.

### Patients and Methods:

The names of all the patients who were implanted

prothetic valves during years 1991-96 at AFIC by a single operator, were drawn from the record books. The medical record was reviewed and current follow up data obtained from clinic visits, letter and telephone contact with the patients and from questionnaire sent directly to the patients.

The diagnosis of (PVE) required at least two of the criteria to be present: (1) at least two positive blood cultures, (2) clinical features of PVE (fever with leucocytosis in presence of a new cardiac murmur, peripheral embolism or splenomegaly), (3) the presence of vegetation or peri-prosthetic dehiscence with granulation tissue, non-calcific bio-prosthetic leaflet destruction, or annular abscess formation, as observed on TEE, (4) histologic or bacteriologic evidence of infection in excised prosthesis. The operative mortality was defined as death occurring within 30 days of operation. Degree of heart failure was assessed according to the New York Heart Association (NYHA) functional classification. The term "hemodynamic deterioration" refers to deterioration in NYHA Functional Class.

Once identified as a case of PVE, all clinical records were thoroughly scrutinized for identification of various risk factors and clinical course. Data was analyzed using SPSS software package. A p value of 0.05 was considered statistically significant. The aim of study was analysis of the own experience, incidence, morbidity, and mortality.

### Results:

This study included patients operated upon by a single operator (author) from January 1991 to December 1996. The total number of patients in this study were 198. The mitral valve was replaced in 126 cases (63.63 %), aortic valve replacement in 42 (21.21 %) and double



valve replacement in 30 (15.15%) cases. The total explants done because of prosthetic valve endocarditis in this period were 5 out of 198 (2.5%). There were no explants done in MVR Group, the DVR explants were 1 out of 30 (3.3%) cases, that too the aortic valve, 4 out of 42 from aortic valve replacement group (9.5%) required explants. The explanted group of patients were all males. The age range was 18-42 years with a mean of 24.4 years. In this group of 5 patients, 3 (60%) presented early and 2 (40%) presented late. In all three early PVE cases, blood culture grew *Serratia marcescens*, which were resistant to ampicillin, amoxicillin, penicillin, cephradine, but sensitive to quinolones, aminoglycosides, second and third generation cephalosporins. These three cases were clustered temporally suggesting nosocomial outbreak. This was later proved correct as same organisms were isolated from multiple sites in operation theatre. Both late PVE cases were culture negative.

The clinical presentation was: fever with rigors 4/5 (80%), progressive cardiac failure 1(20%), regurgitant murmur 3 (60%), vegetations 3 (60%), para-annular abscess 3 (60%), and positive blood culture in 3 (60%) (Figure 1). All patients in this group had Starr-Edward valve prosthesis for initial-implantation.

The redo procedure was done very cautiously by the standard regimen, 3 patients were again implanted Starr-Edward Valve and 2 with Carbamedics.

The most prominent aspect post-operatively was the excessive bleeding from the operative site, presenting either as bleeding or as tamponade due to friability of

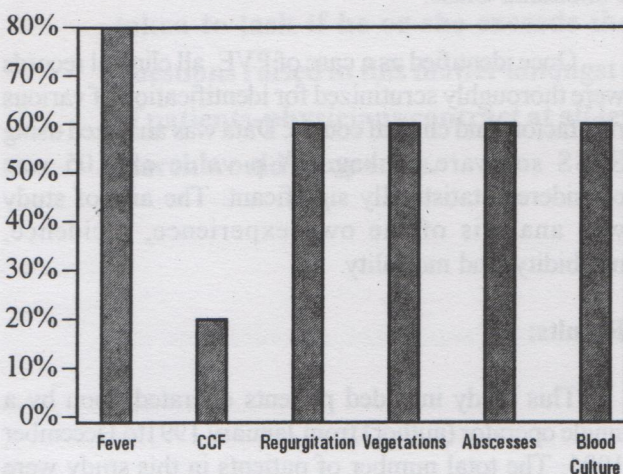


Figure 1.  
Presenting features of Prosthetic Valve Endocarditis.

tissues. None of our 5 cases required re-opening, however.

The outcome of the surgery was: 3 (60%) recovered fully and they are in NYHA I/II until last follow-up, 2 (40%) again developed fever, vegetations and para-annular abscesses. One of them arrested in the ward when consideration for surgery was being undertaken, and could not be revived. The other died due to catastrophic bleeding during the third operation. Out of these two treatment failures, one was from early PVE group and the other from late group.

### Discussion:

Prosthetic Valve Endocarditis (PVE) is one of the most dreaded complications of valvular heart surgery because of its high morbidity and mortality whether treated medically or surgically. Reported incidence varies from 1-4% in various series<sup>1</sup>. Our incidence of 2.5% is in keeping with other reports. However, if three cases of *Serratia* outbreak are excluded, true incidence comes to 1%. This may, in part, be a reflection of routine use of peri-operative antibiotics coupled with good anti-sepsis practices in our institute<sup>2</sup>.

Almost all studies report a greater incidence of aortic valve involvement and ours is no exception showing that 9.5% of aortic valve implants developed PVE in contrast to 0% in mitral valve implants. This contrasts with observations of Slaughter et. al.<sup>3</sup> who maintain that the incidence of involvement of aortic and mitral valves is the same if correction is made for number of valves implanted. The exact reasons for this aortic prevalence are not known; but longer operation / CPB timings and greater hemodynamic stress have been postulated<sup>4</sup>.

The continuing high mortality of PVE in spite of maximal therapy has prompted revision of management strategies. Now-a-days, emphasis has shifted towards earliest possible surgery, rather than medical treatment alone<sup>5</sup>. The only exception, perhaps, being streptococcal endocarditis involving a bio-prosthetic valve, where medical therapy may be given a chance<sup>6</sup>. After the diagnosis of PVE is reasonably established, early surgery is essential. A prior course of antibiotics for a week or so may be beneficial if patients hemodynamic status is relatively stable<sup>7</sup>. In one series, all the five patients were given a fair trial of antibiotics before surgery. During this period, the progression of the disease and hemodynamic status was closely monitored



by serial echocardiography. Surgery was done as soon as hemodynamic deterioration was evident.

The operation for PVE is considerably more difficult as compared to first operation. It requires very cautious and gentle approach by an experienced cardiac surgery team. There is generally considerable paravalvular tissue damage by the ongoing inflammatory process. The non availability of viable tissue for holding valve/sutures is the main problem. This, in combination with those associated with all re-do procedures make surgery challenging. The operative mortality is considerable: so far, it has ranged from 30% to 84% in various series.

Various risk factors such as presentation in first 60 days of previous valve replacement (early PVE), presence of non-streptococcal organisms, new regurgitant murmurs, evidence of myocardial invasion, aortic valve and poor hemodynamic status preoperatively have been identified which indicate poor prognosis<sup>8</sup>. In recent reports the presence of any of the above was associated with a mortality of over 75% and the combination of the two of the above increased the mortality by up to 90%. Urgent surgical intervention seems the only hope for these patients, although even this may carry a mortality of more than 50%.

The clinical presentation of PVE is significantly different from native valve endocarditis. Because of acute and rapidly deteriorating course, many of the classical signs of infective endocarditis are not seen. Because of fulminant course of illness, precious time can not be allowed to pass in waiting for results of blood culture reports. Echocardiography, especially trans-esophageal echocardiography (TEE) has emerged as a diagnostic tool of immense value. It can detect vegetations, valve destruction, dehiscence, paravalvular leaks and abscess in a high proportion of cases. The addition of color Doppler studies further augments its utility<sup>9</sup>. In our cases, TEE was able to detect vegetations or abscesses in almost all cases.

The outcome of surgery has been encouraging. A 60% survival with good functional status over a considerable period of follow up is really gratifying. This can, perhaps, be attributed to prompt diagnosis and early surgery. As mentioned above, we were able to give antibiotics to all our patients for a reasonable period pre-operatively. Another factor may be that the infecting organism in our case was susceptible to commonly employed antibiotics. The fact that there was

no spread of infective process beyond valves in our cases requiring extra-annular procedures might also have been contributory.

### Conclusion:

Management of prosthetic valve endocarditis is a challenging task. It requires a multi-disciplinary approach; cardiac surgeon, cardiologist, echocardiographer and bacteriologist all working in concert. A high index of suspicion on the part of primary care specialist, urgent diagnostic work-up, quick decision making and timely intervention are of essence if disappointing results are to be avoided.

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