Emergency Valve Replacement for Primary Infective Endocarditis

R. H. KINSLEY, P. R. COLSEN, A. BAKST

SUMMARY
During the past 3 years at Baragwanath Hospital, 20 patients with primary infective endocarditis were subjected to emergency heart valve replacement. Operative mortality was 10%; significant postoperative periprosthetic regurgitation occurred in 10% and reinfection in 5% of cases. Eighty per cent of patients were alive and well 3-36 months after surgery (1 patient required early reoperation). Our results provide further evidence for the efficacy of early surgical intervention in patients with infective endocarditis complicated by medically uncontrolled congestive heart failure or recurrent emboli, or both.


In the pre-antibiotic era, death in patients with infective endocarditis was almost inevitable, usually as a result of septicaemic complications.\(^{(3,)}\) Despite the improved prognosis obtainable with antibiotic treatment, the mortality of patients with infective endocarditis complicated by persistent cardiac failure, remained between 70%, and 100%.\(^{(3)}\) Now, however, the majority of patients die from uncontrolled cardiac failure.\(^{(1)}\)

Understandably, there has been a reluctance to insert a prosthetic valve in an area considered to be actively infected, because added to the risk of infection of the prostheses are the technical difficulties of a friable annulus.\(^{(3,7)}\) However, in 1965, Wallace and his associates\(^{(5)}\) reported the first case of active bacterial endocarditis and aortic valve perforation in which cure was achieved by aortic valve replacement.

In 1975, Jung et al.\(^{(6)}\) reviewed 293 cases of primary left-sided endocarditis treated surgically. Since then a further 95 cases have been reported in the English literature.\(^{(7,8,10)}\) Indications for surgery included recurrent emboli, fungal or persistent bacterial infection, drug toxicity and haemodynamic deterioration.\(^{(5,7,8,14)}\)

In a 3-year period 20 Black patients with gross evidence of infective endocarditis have been subjected to valve replacement at Baragwanath Hospital. All the operations were emergency procedures before or during a course of antibiotic therapy in patients with severe valvular lesions and intractable or progressive cardiac failure, with or without peripheral emboli.

The purpose of this communication is to report our experience, which has the following distinctive features: (i) the generally short duration (or complete absence) of antibiotic therapy before surgery; (ii) the low mean age of patients; (iii) the high incidence of double valve replacement; and (iv) a surprisingly low yield of organisms from blood and valve cultures despite overt evidence of bacterial endocarditis.

PATIENTS AND METHODS
From January 1974 to December 1976 emergency valve replacement was performed during or before antibiotic treatment in 20 patients with gross features of bacterial endocarditis. Elective operations in patients successfully treated with antibiotics were not included in this series. The ages ranged from 14 to 50 years (mean 29.5 years) and there were 12 male and 8 female patients. Pre-existing valve disease was noted in 16 patients: 13 rheumatic, 1 congenital subaortic stenosis and 2 syphilitic. In the remaining 4 the valve was thought to be normal, although mild pre-existing disease of the valve could not be excluded. Blood cultures were performed in 15 patients, but organisms (Streptococcus faecalis) were cultured in only 1 of these. Five patients did not receive antibiotics. In the remainder, antibiotics were administered pre-operatively for periods ranging from 1 day to 6 weeks, although only 4 patients received treatment for longer than 3 weeks. The mean duration of antibiotic therapy was 11.5 days.

The main indication for operation in all patients was progressive or severe cardiac failure. Several patients had a low cardiac output. In addition, 5 patients had peripheral emboli and 1 had renal failure. The interval between admission and surgery ranged from hours to 6 weeks. Seven patients were operated upon within 1 week of admission.

All patients had macroscopical features of florid endocarditis. In each patient vegetations were present on the valve(s) involved. Four of 17 aortic and 3 of 11 mitral valves replaced were totally destroyed. Cusp or leaflet perforations were common findings and rupture of chordae tendineae was noted in 6 of 11 mitral valves replaced. Valve cultures were performed in 13 patients but organisms were grown in only 3. Valves were examined histologically in 17 patients. Bacterial colonies were seen in 5 and an acute inflammatory reaction was demonstrated in 13.

Valve replacement was performed in all patients by means of cardiopulmonary bypass with moderate hypothermia. A Björk-Shiley prosthesis was inserted in all patients who required aortic valve replacement; an interrupted suture technique was used for this procedure. For the mitral valve, a Björk-Shiley prosthesis was used in 8 patients with a continuous suture interrupted at 5
or 6 points. A Hancock porcine valve was inserted with interrupted sutures in 3 patients. Coronary artery perfusion with a beating heart was preferred for aortic valve replacement, while intermittent aortic cross-clamping, for periods not exceeding 15 minutes, was employed during mitral valve replacement. Three patients were subjected to isolated mitral valve replacement, 9 to aortic valve replacement and 8 to aortic and mitral valve replacement. Two patients had an associated tricuspid valve annuloplasty. One patient had aortic valve replacement combined with resection of subaortic stenosis. In 3 patients the aortic root was too small to accept an adequate-sized prosthesis. For this reason the aortic annulus was widened and the valve inserted obliquely according to the technique previously described by one of the authors. Extreme care was taken to remove all grossly infected tissue; the area was thoroughly curetted and washed with a neomycin solution. The prosthetic valve was also bathed in neomycin.

All patients received a minimum of 6 weeks' antibiotic therapy. Initially, penicillin, cloxacillin and gentamicin were administered, but this regimen was modified according to antibiotic sensitivities. There was a 100% follow-up from 3 to 36 months after operation.

RESULTS

Two patients died in the hospital within 1 month of surgery. One patient died 3 days after surgery as a result of heart block which had been present pre-operatively. The other patient, who was moribund at the time of surgery with jaundice, uraemia, septicaemia and a low cardiac output, died 3 weeks after surgery from multiple organ failure. There were no late deaths. One patient required urgent reoperation 4 weeks after the initial surgery because of aortic valve disruption, but made a complete recovery with no residual paravalvular leak. Sixteen patients are alive and well. Two patients are significantly disabled; one has a mitral valve ring leak following a recurrence of bacterial endocarditis and the other had mild residual aortic regurgitation and chronic renal failure due to active glomerular nephritis which required long-term dialysis.

DISCUSSION

The aim of surgery in patients with active bacterial infective endocarditis is twofold: firstly, correction of the valve lesions and, secondly, eradication of infection and, with it, the source of systemic emboli. There is now compelling evidence that earlier surgery should be recommended to patients with infective endocarditis, in particular those with cardiac failure or recurrent systemic emboli. Without surgery the mortality in these patients is prohibitively high, but encouraging results have been reported following surgery. The concern of surgeons about the holding power of sutures in inflamed and friable tissues and an increased risk of prosthetic valve infection has not always been confirmed. In a collective review of 293 cases, Jung et al. noted that in only 7% of patients was valve replacement complicated by significant periprosthetic insufficiency, while only 5 of 162 patients operated upon in the active stage developed infection on the prosthetic valve. Furthermore, unnecessary delay of operation might promote the emergence of resistant bacteria and, consequently, jeopardize the prospect for successful surgery.

In our series 2 patients died early after operation. Only 2 patients developed significant periprosthetic regurgitation. One of the latter is well following reoperation. One patient has chronic renal failure as a result of glomerulonephritis secondary to infective endocarditis and requires dialysis. Thus, of 20 critically ill patients subjected to emergency surgery for active bacterial endocarditis, 16 are alive and well 3-36 months postoperatively.

Infective endocarditis occurs most commonly on the mitral valve. However, emergency surgery is most frequently performed for aortic valve disease because of the susceptibility of this valve to gross malfunction and because of poor tolerance of the left ventricle for acute regurgitation. Thus, in the collective series of Jung et al., the aortic valve was replaced in 71%, the mitral valve in 19% and both valves in 10% of cases. Several factors may account for the high incidence of double valve replacement in our series (40%). Firstly, rheumatic valvulitis, with its known propensity to involve more than one valve, was a common pre-existing lesion. Secondly, patients presented late for treatment, when cardiac involvement was extensive and, thirdly, the possibility of a more virulent organism, with or without diminished host resistance, must be considered in our population.

The average period of pre-operative antibiotic therapy in our series was short. Indeed, 5 patients were operated on within hours of admission. The rarity of postoperative infection in our series supports the view of others who found no relation between the duration of antibiotic treatment and the incidence of postoperative prosthetic valve infection.

It is difficult to reconcile the typical macroscopical features of florid, infective endocarditis with the low incidence of positive blood and valve cultures in our series. It is possible that the responsible organisms (e.g. Streptococcus viridans) were excessively sensitive to antibiotics. However, methods of collection, inappropriate cultural techniques and the administration of antibiotics have undoubtedly contributed to the low yield. According to Weinstein and Schlesinger the blood may contain factors such as bacterial antibodies which inhibited microbial growth. These factors may have an unusually high prevalence in our population.

Manhas et al. considered 'activity' to be present in patients with bacterial endocarditis when one or more of the following features were noted: (i) a positive blood culture at the time of surgery; (ii) a positive valve culture; (iii) bacterial colonies demonstrated in the valve macroscopically; (iv) microscopical evidence of an acute inflammatory reaction in the valve. Despite the florid macroscopical features of endocarditis in all the cases in our series, only 82% of patients satisfied these criteria for active endocarditis.

Although it is preferable to control infection before
operation, the risks of delaying surgery in patients with infective endocarditis, cardiac decompensation, and possibly emboli, far outweigh those of early surgery. Procrastination while attempting to cure the infection may result in myocardial damage and multiple organ failure, the major causes of postoperative mortality. Indeed, surgical excision may be the only means of eradicating infection. Recently Boyd et al. noted a 90% mortality in patients with uncontrolled infection on whom operation was delayed for 4 - 6 weeks. By contrast, in patients with uncontrolled infection who underwent immediate operation the mortality was 7%. In view of our observations and those of others, it is our policy to do early valve replacement in all patients with deteriorating cardiac function or severe cardiac failure and in those with recurrent emboli, despite potentially active infection and regardless of the duration of antibiotic therapy. Surgery for persistent sepsis alone (without cardiac failure or recurrent emboli) is debatable and, according to the available data, cannot be clearly resolved. We therefore concur with the statement of Manhas et al. that 'next to antibiotics, the introduction of open heart surgery in the management of infective endocarditis has been the single most significant recent advance in changing the prognosis of an entity which was formerly uniformly fatal'.

This study was supported by a grant from the Stella and Paul Loewenstein Cardiac Trust Fund, University of the Witwatersrand.

REFERENCES

The Role of Radiology in Urinary Tract Infection in Children

JOY M. ISDALE

SUMMARY

Of 758 children examined by uroradiography at the Transvaal Memorial Hospital for Children, 232 (30%) had been referred for the diagnosis of urinary tract infection.

The incidence of radiological anomaly or abnormality in these children was an overall 30%; in the first 3 years of life this figure rose to 40%. Radiological investigation of these children should be undertaken routinely. Excretory urography alone is a satisfactory screening procedure in children over the age of 3 years; under this age, formal voiding cysto-urethrography is of immense importance.

The incidence of 70% of underlying radiologically detectable abnormalities associated with Pseudomonas infection was statistically significantly higher than the 30% found in association with all other infecting organisms.


The role of radiology in the assessment of children presenting with urinary tract infections was investigated prospectively at the Transvaal Memorial Hospital for Children. The objects of this study were to assess: (i) the incidence of radiological abnormalities in children presenting with urinary tract infection; and (ii) the relationship of the infecting organism to radiologically demonstrable abnormalities or anomalies.

PATIENTS AND METHODS

During the period 1973 - 1975, excretory urography was performed 939 times and formal voiding cysto-urethrography 356 times on a series of 758 patients. Of these, 232 (30%) had been referred with a diagnosis of urinary tract infection established by clinical and laboratory investigations.\(^1\)

Pyuria without significant bacterial growth had been recorded in 39 children referred for investigation of urinary tract infection after being treated by their private practitioners. These children therefore had no record of urinary tract infection in the hospital documents. In the remainder...