EDITORIAL

Mitral valve reconstruction in the presence of infection

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Reconstruction of the mitral valve offers an alternative to replacement in the treatment of active infective endocarditis, with long term benefits for the patient

The application of techniques of mitral valve reconstruction to the surgical treatment of patients with active endocarditis is appealing. The first principle of the surgery of any infective process is to excise or drain the infected area; the second is to avoid the use of prosthetic materials. Both of these surgical principles have to be compromised on occasions in the surgery of endocarditis—but valve reconstruction is closer to the ideal, and as several reports have shown, such an approach can produce good outcomes for patients.

Infective endocarditis is not a common disease; the incidence in the general population was estimated at 31 per million in a recent study of the disease in France by Hoen and colleagues.¹ Although traditionally the acute phase of endocarditis is treated medically, surgical treatment is now likely to play a much greater role in the treatment of these patients.² The mitral valve is affected in 35–50% of cases of endocarditis.^{3–4}

The approach to treatment is changing for two main reasons. Firstly, endocarditis is altering its profile as a disease—the acuity of presentation is changing with an increase in the proportion of patients who have not previously been known to have valvar heart disease. The pathogen is now more likely to be a *Staphylococcus aureus* or a group D streptococcus than in the last decade, though oral streptococci are still the most common infecting organisms.⁵

Secondly, surgical results are improving—whether this is down to better techniques or better antibiotics is unclear. To this end, Hoen also noted a pronounced increase in the rate of early surgery when compared to their previous study in 1991 (31.2% v 49.7%; $p < 0.001$).¹ There are clearly several reasons for this. In the UK, there is certainly an increased awareness of disease in primary and secondary care and greater involvement of cardiologists in the treatment. The willingness of surgeons to take on cases earlier in the time course of the disease is also undoubtedly a factor.

WHAT IS ACTIVE ENDOCARDITIS?

In this issue, the Leicester group describe their experience with mitral valve reconstruction in active endocarditis.⁶ So, what is active endocarditis? Opinions vary, but before assessing treatment

for endocarditis it is important to have an accurate assessment of the stage of the disease process—it is clearly not helpful to include patients with mitral regurgitation due to burnt out endocarditis in the same analysis as a patient with a swinging fever caused by an annular abscess. In their paper, Doukas and colleagues⁶ have included all patients who had a positive blood culture in the three weeks before surgery (or positive culture of the excised valve) and the presence of macroscopically typical lesions—this definition has also been used by other authors.^{7–8} The group from the Georges Pompidou European Hospital have recently reported their long term results of mitral repair in “active” endocarditis, where the definition used was “endocarditis was considered active when the operation was performed during the first six weeks of antibiotic therapy”.⁹ Such variations in definitions make it difficult to compare studies. However, in their 1998 paper, the Papworth group were more precise and helpfully identified three stages of the disease: an uncontrolled active group; a partially treated group; and a healed group.¹⁰ The surgical approach and the outcomes were very different for each stage—for example, mitral valve repair was possible in only 17% of the uncontrolled group, 59% of the partially treated group, and 63% of the healed group. This grouping would be a good basis for future classification of the stages of the disease as it accurately reflects the dilemmas found in clinical care and authors should be encouraged to use it.

The first description of a series of patients with active endocarditis successfully treated using mitral reconstruction rather than replacement came from Gilles Dreyfus in 1990, who reported the experience of Carpentier’s group in Paris.¹¹ At the time, the authors felt that “although wide use of antibiotics had modified the course of acute bacterial endocarditis, some patients still require early operation”. Of course, it may well have been their belief that improvements in antibiotic treatment would lessen the need for urgent surgery, but since then the proportion of patients with endocarditis requiring surgery in the acute phase of the disease has increased.

INDICATIONS FOR SURGERY

The principle indications for surgery are either persistent signs or symptoms of uncontrolled infection, pulmonary oedema resistant to simple diuretic treatment, or vegetations > 1 cm in size. Annular abscesses are extremely unlikely to be cured by antibiotic treatment and recurrent emboli are an indication for surgery. Preoperative pulmonary oedema is associated with a higher risk of operative mortality and surgery should be

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undertaken before cardiac decompensation occurs. Early operation, before too much tissue destruction occurs, may facilitate valve reconstruction—this is most likely to occur when the infecting organism is *S aureus*. Most patients will be established on appropriate antibiotic treatment before surgical intervention—the mean duration of treatment was 24 days (range 2–64 days) in the Leicester series. As the Papworth group showed the mortality is much higher in patients operated on in the presence of uncontrolled infection and their data would seem to reaffirm the practice of trying to get the patient out of the acute, septic phase before surgical intervention. Some patients, however, will inevitably need surgical intervention while they are still septic.

As a treatment for mitral regurgitation when endocarditis is not an issue, mitral valve repair is associated with a lower operative mortality and improved long term outcome, both in terms of pure longevity and also from a functional point of view. Can these benefits, as well as other possible advantages of repair, such as the potential avoidance of implantation of foreign material, the need for anticoagulation, and the greater durability of repair when compared to bioprostheses, be reasonably offered to the patient with endocarditis? As the Leicester group has shown, the answer is “yes”, as long as certain principles are followed.

REMOVE INFECTED TISSUE FIRST

There is no evidence that the organism involved should influence the surgical techniques used. The first step is to remove all macroscopically infected tissue and only then assess whether repair is possible. In addition to the usual features of degenerative valve disease such as leaflet prolapse, chordal rupture and annular dilatation, vegetations, leaflet perforation, and infected “jet lesions” may also be seen in endocarditis. Fortunately, the infective process rarely extends in to the annulus of the mitral valve (only 5% of cases in the Georges Pompidou series)⁹ and is usually confined to the leaflet tissue and chordae. When the annulus is involved, it is usually associated with either an aortic annular abscess or mitral annular calcification.¹²

Standard repair techniques such as quadrangular resection of the posterior leaflet and chordal transposition can be safely used and perforations of the anterior leaflet are best debrided and then patched with glutaraldehyde treated autologous pericardium.¹³ The use of artificial chordae also appears safe.^{6–9} It is my preference to insert an annuloplasty ring in all cases where there is annular dilatation—which is almost universal in patients with pre-existing mitral valve disease. Annuloplasty rings have been used extensively in published series and recurrent endocarditis is rare.

A few centres have mitral valve homografts available for the treatment of extensive endocarditis—usually as a partial homograft for the treatment of patients with commissural destruction.¹⁴ The long term durability of this approach is still unknown, though the use of partial homografts seems to have a better outcome than replacement with a complete mitral valve homograft.

POSTOPERATIVE ANTIBIOTICS

Postoperative antibiotic regimens do not need to differ whether the technique is replacement or repair. The approach of the Leicester group—a six week course of intravenous antibiotics for patients who had a positive gram stain or culture of the surgical specimen and four weeks for other patients—is sensible. Patients with “healed endocarditis” probably do not need treatment with antibiotics when it is confirmed that the surgical specimen is sterile.

The Papworth group clearly showed that the mortality associated with the surgery of mitral endocarditis varies according to the stage of the disease, with 30 day mortality

rates of 29%, 0%, and 3% in the groups with uncontrolled infection, partially treated, and healed endocarditis, respectively. However, taken overall, operative mortality rates of 3% or less have been reported in several series (Doukas 2.7%, Dreyfus 2.5%, Zegdi 3%),^{6–9–11} which compares well with mitral reconstruction in non-infected cases.

LONG TERM DURABILITY

The Leicester group has shown that mitral valve repair in the setting of endocarditis has good long term durability. The freedom from significant mitral regurgitation of 94% at five years in their series and 91% at 10 years reported by Zegdi⁹ are excellent results. Apart from the surgeon's ability to repair the valve it is also necessary to know that a valve repaired in the setting of active endocarditis is durable and does not have an increased risk of recurrent endocarditis. Recurrent endocarditis occurred in only one patient (3%) in the series reported by Zegdi⁹ and there has been no recurrent infection in the Leicester series. In a retrospective comparison of patients who had undergone surgery for mitral valve endocarditis at the Cleveland Clinic,¹⁵ recurrent endocarditis was less likely in patients who had valve repair (5% v 27%).

There are now several reported series showing that valve reconstruction for mitral endocarditis is a sound approach. The strategy is generally well accepted now—the Euro heart survey found it was used in 28% of patients with mitral valve endocarditis,² though enthusiasts and specialist centres will always be able to achieve higher rates (75–80%).^{9–16} It is at its most reliable when “standard techniques” are used and extensive pericardial patching and the use of partial homografts are not needed. Valve reconstruction, properly performed by an experienced surgeon, is at least as likely to achieve the immediate goal of removal of infected tissue and restoration of haemodynamic stability as mitral valve replacement and the long term benefits for the patient of valve conservation are well recognised and should be offered to patients with endocarditis.

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