ORIGINAL ARTICLE

The Trans-Septal Approach to the Mitral Valve

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Summary

To assess the efficacy of the trans-septal approach to the mitral valve, 40 patients who underwent mitral valve surgery via this approach were compared to 37 patients who underwent surgery via the standard left atriotomy. Concomitant procedures included tricuspid annuloplasty, aortic valve replacement, closure of atrial septal defect, coronary artery bypass grafting and aortic valve repair. There was one (1.2%) operative mortality. No patients required pacemaker implantation. Follow-up of up to 18 months showed that all patients were in NYHA classes I and II. One third of the patients who had trans-septal approach to the mitral valve achieved conversion from atrial fibrillation to sinus rhythm while none of the patients who underwent conventional left atriotomy had conversion ($p<0.02$). The trans-septal approach to the mitral valve is a useful approach in selective patients requiring mitral valve surgery.

Key Words: Trans-septal approach, Mital valve surgery

Introduction

Conventionally, the mitral valve is approached via a left atriotomy. Usually, the mitral valve pathology has resulted in an enlarged left atrium. The exposure through this approach is generally good. In some cases, for instance in patients who had previous mitral valve surgery and in minimally invasive procedures, the exposure via this approach may not be ideal. Other approaches have been suggested, including the superior approach[1] and the extended vertical trans-septal approach of Guiraudon[2]. The extended atriotomy however may result in conduction blocks requiring pacing[3]. The author has been using a more limited trans-septal incision to approach the mitral valve.

Materials and Methods

Between June, 1997 and June, 1999, 40 patients underwent mitral valve surgery via trans-septal approach (trans-septal group). The indications for this approach included concomitant atrial septal defect, tricuspid pathology, redo procedures and minimally invasive mitral valve surgery. The demographics of the patients are shown in Table I. Three patients had previous mitral valve surgery. As a comparison, 37 patients who underwent mitral valve surgery during the same period via the conventional left atriotomy approach were studied (LA group). The data was collected prospectively.

As can be seen in Table I, 77.5% of patients in the trans-septal group were in NYHA functional classes III and IV, compared to 72% in the LA group. Sixteen patients in each group were in sinus rhythm while the remaining patients were in chronic atrial fibrillation. The majority of patients had rheumatic heart disease.

Surgical Technique

All patients underwent surgery with transoesophageal echocardiography. All patients except two in the trans-septal group were operated through full median sternotomy. The

Table I
Demographics of Patients

	GROUP		
	Trans-septal	Left atriotomy	p value
Number	40	37	
Mean Age	36.2 (13.62)	46.3 (14 - 70)	0.002
Male:Female	15:25	18:19	>0.2
NHYA III/IV	31	27	>0.2
Chronic Atrial Fibrillation	24	21	>0.2
Rheumatic Heart Disease	34	27	>0.1

remaining two had lower partial sternotomy. Following aortic and bicaval cannulations, the heart was arrested using antegrade warm blood cardioplegia. An oblique right atriotomy was then performed with the cavae snared. The retrograde catheter was then inserted into the coronary sinus under direct vision. Retrograde blood cardioplegia was then infused and repeated every fifteen minutes. The patients' body temperature was maintained at 32°C and the perfusion pressure between 60 to 70 mmHg. A longitudinal incision was made into the fossa ovalis and extended superiorly and inferiorly within the atrial septum so that a mitral retractor could be inserted. The mitral surgery was then performed. Following this, other procedures were performed, as appropriate. Patients in the LA group had routine aortic and bicaval cannulations. Following antegrade and retrograde cardioplegia, the left atrium was opened parallel to the interatrial groove. The mitral valve procedure was performed together with concomitant procedures as appropriate.

Statistical analyses were performed using Student T tests and Chi square tests where appropriate.

Results

Patients in the trans-septal group were younger by about ten years (p=0.002). There were no significant differences in the sex distribution, NYHA class, incidence of atrial fibrillation and rheumatic heart disease.

Table II
Procedures Performed

	Trans-septal	Left Atriotomy
MVR	37	35
Mitral valve repair	3	2
Tricuspid annuloplasty	36	5
AVR	17	16
ASD closure	4	-
Aortic valve repair	1	-
CABG	-	5

Table III
Complications

	Trans-septal	Left atriotomy
Temporary pacing	2	2
Upper gastrointestinal bleeding	1	0
Bleeding	0	2
CVA	0	1
Early death (<30 days)	1	0
Late death (>30 days)	0	2

In the trans-septal group, MVR with a mechanical prosthesis was performed in 37 patients and mitral valve repair in 3 patients. In the LA group, 35 patients had MVR with mechanical prostheses while 2 had mitral valve repair. The details of the concomitant procedures performed are shown in Table II.

There was one death (within 30 days) giving an overall mortality rate of 1.2%. The complications are listed on Table III.

Follow-up was complete in all patients with a mean of 8 months (range 4 to 18 months). One patient in each group developed late pericardial effusion requiring drainage. One patient in the trans-septal group died following a motor vehicle

accident at two months following surgery. There were 2 late deaths in the LA group, one of congestive cardiac failure at five months and another of sudden death at eight months following surgery.

All surviving patients were improved functionally. Thirty-five patients in the trans-septal group were in NYHA class I and 3 in class II. In the LA group, 28 were in class I and 6 in class II ($p>0.2$).

All patients who were in sinus rhythm preoperatively remained in sinus rhythm following surgery and on follow up. Of the 24 patients who were in chronic atrial fibrillation in the trans-septal group, 8 achieved conversion to sinus rhythm following surgery, with one patient at ten months following surgery. None of the patients in the LA group achieved conversion to sinus rhythm ($p<0.02$).

Discussion

The trans-septal approach to the mitral valve, as described here, has served well in providing good exposure. In patients requiring mitral and tricuspid procedures, avoiding conventional left atriotomy reduced the chance of bleeding from an additional exposed suture line. The exposure was good for both repair or replacement of the mitral valve as appropriate. In cases where the left atrium is not particulary enlarged, this approach has some merits in terms of exposure and secure closure. However, it is in redo cases that this approach is particularly useful. The adhesions and old suture line of the left atrium mean that to approach it in the conventional way, extensive manipulation and dissection are necessary. In the trans-septal approach as described here, only the right atrium needs to be freed for cannulation and exposure of the atrial septum and thus the mitral valve. The extended trans-septal approach has been found useful in the minimally invasive approach to the mitral valve[4]. The extension of the incision in this and that described by Guiraudon[2] can lead to conduction disturbances. The trans-septal approach as described here does not involve further extension beyond the interatrial septum. Thus there is less risk of conduction abnormalities as demonstrated here. The trans-septal approach was used in two patients in this series for minimally invasive mitral valve surgery and was found to be very satisfactory.

In contradistinction to conduction abnormalities, the trans-septal approach as described here appeared to have beneficial effect in achieving conversion of rhythm from atrial fibrillation to sinus rhythm. The two incisions made here form part of the Maze III procedure for atrial fibrillation[5]. Perhaps in some patients with mitral valve disease and atrial fibrillation, limited incisions like those made in the trans-septal approach are sufficient to cure their atrial fibrillation instead of the more extensive variety in classical Maze III procedure. In this series, patients in the trans-septal group were younger than those in the left atriotomy. Whether the difference observed in the incidence of conversion of atrial fibrillation to sinus rhythm is a reflection of younger age in the former group remains to be seen.

The trans-septal approach to the mitral valve as described here is a useful technique in selective patients particularly those who require concomitant tricuspid valve surgery and in patients undergoing repeat operations. Its ease of use, expeditious closure and lack of complications including conduction abnormalities are particularly attractive.

References

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