



OUTCOMES OF COMPLETE MITRAL VALVE EXCISION AND REPLACEMENT WITH TILTING DISC (TTK CHITRA) VALVE FOR RHEUMATIC MITRAL VALVE STENOSIS

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ABSTRACT

Mitral valve disease is one of the earliest disease of heart and rheumatic mitral valve disease is one of the first discovered in the world dated back to 19 century .Rheumatic heart disease is declining in other countries but still prevalent in rural part of india especially in lower economic group. In our hospital we have operated 50 cases of rheumatic mitral stenosis for whom MVR with tilting disc (TTK chitra valve) was done. Most of the mitral valves cases have MV score >12 and sub valvular apparatus was severely effected. In all the cases we have operated , we have excised complete valve and no posterior leaflet preservation or chordal tethering and repair was done.

OBJECTIVES OF STUDY: 1. To study Mitral valve replacement out comes with Tilting disc TTK chitra valve and to compare pre and post operative valve gradient across tilting disc prosthetic valves and also study LV dimensions pre and post MV replacement and to study EF pre and post valve replacement and complications arising from posterior leaflet excision.

MATERIALS AND METHODS: 50 Patients with CRHD with severe Mitral Stenosis have been taken up for study who were operated in this department from may 2016 to april 2019.

All the patients are evaluated with 2D echo, ECG and CAG (when they are >35 year

RESULTS: Out of 50 patients operated in our hospital 34 are females i.e, 68% of the patients and 16 patients are males i.e, 32%. As per the age 20 patients are between 41-50yrs of age i.e 40% belong to 41-50yrs of age and 39 patients are below 50yrs i.e 78% of patients are below 50years and 4% are below 20 years and 22% are above 50 years. As per the combined age and sex ratio also both males and females most MS presumed below 50 years only. As per the valve area most common valve by preoperative echo is 66% are below and equal to 1 sq. cm by PHTs and planimetry. 60% of patients have preoperative ejection fraction of more than 55% and less than 10% are between 36-40%. Preoperatively 40% of the patients have severe PAH 30% of patients have moderate PAH and 30% of patients had mild PAH. All these patients have been operated for mitral valve where posterior leaflet has been excised and no sub valvular apparatus has been conserved and no chordal repair has done but apparently no postoperative LV dysfunction was found in these patients. All these patient have taken up for mitral valve replacement and TTK CHITRA valve between 27 and 31 were used. In 70% of patients 29 and 31 TTK CHITRA valve was used.

Present study is based on echocardiographic analysis of the pre operative mean gradient across mitral valve and post operative mean gradient across mitral valve which shows a considerable, comparable and acceptable mean gradient post operatively.

CONCLUSION: when ever rheumatic mitral stenosis is present - complete valve can be reasonably excised with out even sparing or preserving sub valvular apparatus and it doesn't effect the ejection fraction and left ventricular function.

Native tilting disc valve ie TTK Chitra valve can be safely used and gives comparable results with the recent generation valves. Better outcomes are encountered with 29 mm size and above size valves. Pulmonary artery hypertension decreases significantly if mitral stenosis is operated regardless the advancement of disease process. there is no significant change in left ventricular parameters and pre and post operatively ejection fraction remained same

KEYWORD

tilting disc (TTK chitra valve) Mitral valve disease

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INTRODUCTION

While the incidence of acute RF in the Western world had substantially declined over the past five decades, this trend is reversing due to immigration from non-industrialized

countries where rheumatic heart disease (RHD) is higher Mitral valve disease is one of the earliest disease of heart and rheumatic mitral valve disease is one of the first discovered in the world dated back to 19 century .

Rheumatic heart disease is declining in other countries but still prevalent in rural part of india especially in lower economic group.

Complexity of rheumatic mitral valve is varied in presentations and various permutations and combinations, and in India still they present in advanced stages with WILKINS scoring > 12.

In our hospital we have operated 50 cases of rheumatic mitral stenosis for whom MVR with tilting disc (TTK chitra valve) was done.

Most of the mitral valves cases have MV score >12 and sub valvular apparatus was severely effected.

In all the cases we have operated , we have excised complete valve and no posterior leaflet preservation or chordal tethering and repair was done.

OBJECTIVES OF STUDY

1. To study Mitral valve replacement out comes with Tilting disc TTK chitra valve.
2. To compare pre and post operative valve gradient across tilting disc prosthetic valves.
3. To know about valve size preference and complications of prosthetic valves.
4. To study LV dimensions pre and post MV replacement and to study EF pre and post valve replacement and complications arising from posterior leaflet excision.

MATERIALS AND METHODS

50 Patients with CRHD with severe Mitral Stenosis have been taken up for study who were operated in this department from may 2016 to April 2019.

Pure mitral regurgitation and IHD with ischemic mitral regurgitation are excluded from the study.

All the patients are evaluated with 2D echo, ECG and CAG (when they are >35 years of age) along with other pre operative investigations.

Operative steps

All these patients were approached through median sternotomy.

Routine aortic and bicaval canulation done and patient was put on cardiopulmonary bypass and cold blood cardioplegia was given and heart was arrested in diastole and mitral valve approached through left atrium .

For all these patients complete excision of mitral valve was done and no attempt was done to preserve posterior leaflet or sub valvular apparatus and MVR was done using TTK CHITRA valve from sizes 25mm to 31 mm using intermittent pledgeted sutures.

Routinely all these patients 2D echo is done at the end of 1st week at the time of discharge and evaluated.

Follow up of these patients done every 3 months till date.

RESULTS

Out of 50 patients operated in our hospital 34 are females i.e, 68% of the patients and 16 patients are males i.e 32%.

As per the age 20 patients are between 41-50yrs of age i.e 40% belong to 41-50yrs of age and 39 patients are below 50yrs i.e 78% of patients are below 50years and 4% are below 20 years and 22% are above 50 years.

As per the combined age and sex ratio also both males and females are presumed below 50 years only.

Table 1: Distribution according to Sex

SEX	NO OF PATIENTS
MALE	16
FEMALE	34

SEX DISTRIBUTION

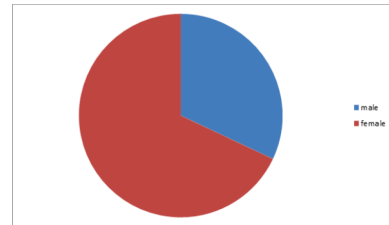
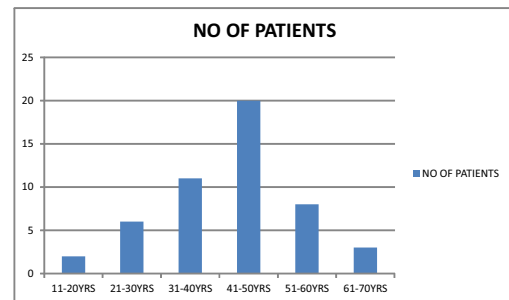


Table 2: Distribution according to Age

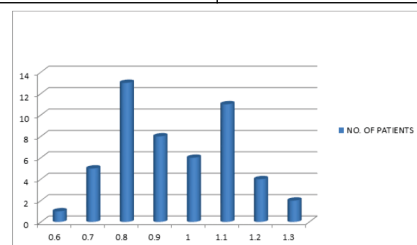
AGE	NO.OF PATIENTS	percent
11-20	2	4
21-30	6	12
31-40	11	22
41-50	20	38
51-60	8	16
61-70	3	6



As per the valve area most common valve by preoperative echo is 66% are below and equal to 1 sq.cm by PHTs and planimetry.

VALVE AREA & SIZE

VALVE AREA	NO OF PATIENTS
0.6	1
0.7	5
0.8	13
0.9	8
1.0	6
1.1	11
1.2	4
1.3	2

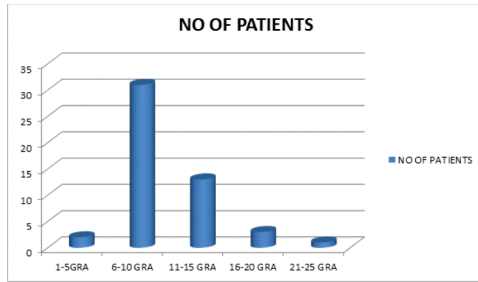


Preoperative maximum and mean valve gradient in 90% of patients was more than 15mmhg and >= 10mmhg respectively.

VALVE GRADIENT & NO. OF PATIENTS

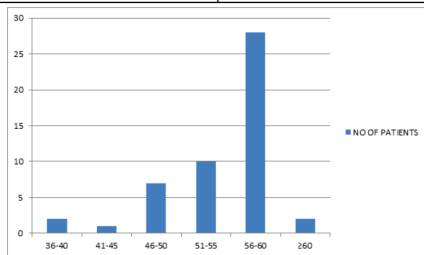
VALVE GRADIENT	NO. OF PATIENTS
1-5	2
6-10	31
11-15	13

16-20	3
21-25	1



80% of patients have preoperative ejection fraction of more than 55% and less than 10% are between 36-40%.

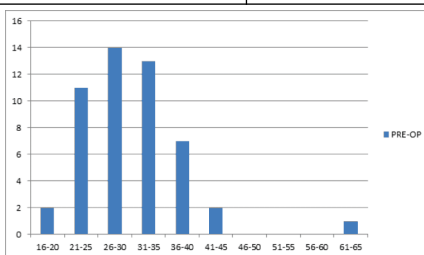
EF (PRE OP)	NO OF PATIENTS
>61%	2
56-60%	28
51-55%	10
46-50%	7
41-45%	1
36-40%	2



60% of patients are with 26-40mm preoperative LVIDs and 60% of them are with more than 45mm preoperative LVIDd.

LVIDs (PRE-OP)

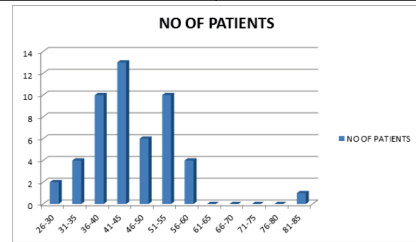
LVIDs	PRE-OP
16-20	2
21-25	11
26-30	14
31-35	13
36-40	7
41-45	2
46-50	0
51-55	0
55-60	0
61-65	1



LVIDd PRE-OP

LVIDd	NO OF PATIENTS
26-30	2
31-35	4
36-40	10
41-45	13
46-50	6
51-55	10
56-60	4
61-65	0
66-70	0

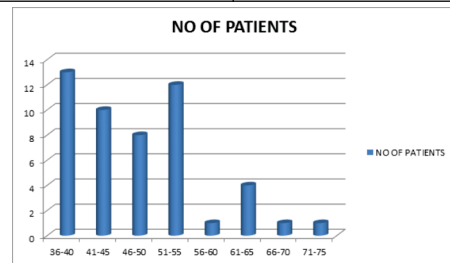
71-75	0
76-80	0
81-85	1



Preoperatively 40% of the patients have severe PAH 30% of patients have moderate PAH and 30% of patients had mild PAH.

RVSP (PRE-OP)

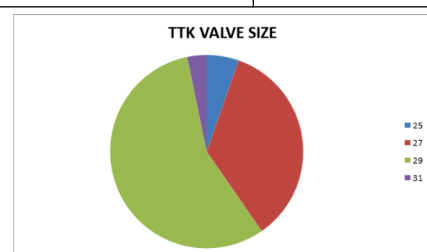
RVSP (PRE-OP) mmhg	NO OF PATIENTS
36-40	13
41-45	10
46-50	8
51-55	12
56-60	1
61-65	4
66-70	1
71-75	1



All these patient have taken up for mitral valve replacement and TTK CHITRA valve between 27 and 31 were used. In 70% of patients 29 and 31 TTK CHITRA valve was used.

TTK VALVE SIZE

TTK VALVE SIZE	NO OF PATIENTS
25	2
27	13
29	23
31	12

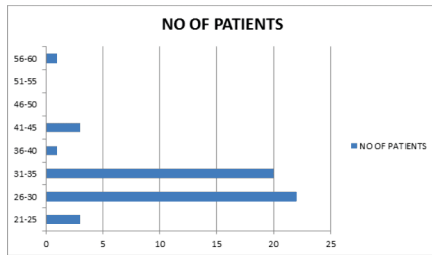


Regarding post operative parameters 80% of postoperative patients are having LVIDs of 26-35mm and 90% of patients had LVIDd less than 55mm.

LVIDs (POST-OP)

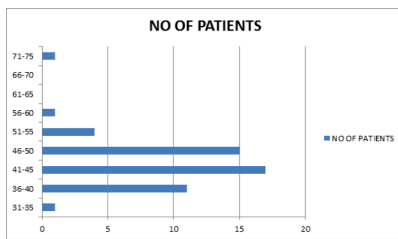
LVIDs (post-op)	NO OF PATIENTS
21-25	3
26-30	22
31-35	20
36-40	1
41-45	3
46-50	0

51-55	0
56-60	1



LVIDd (POST-OP)

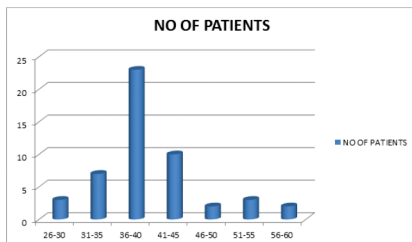
LVIDd(POST-OP)	NO OF PATIENTS
31-35	1
36-40	11
41-45	17
46-50	15
51-55	4
56-60	1
61-65	0
66-70	0
71-75	1



Postoperatively 78% of patients improved themselves to moderate or mild PAH.

RVSP (POST-OP)

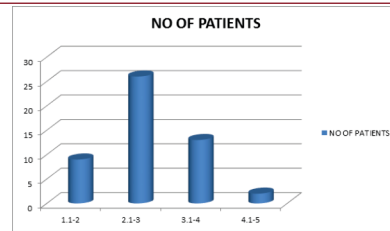
RVSP (POST-OP) mmhg	NO OF PATIENTS
26-30	3
31-35	7
36-40	23
41-45	10
46-50	2
51-55	3
56-60	2
61-65	0
66-70	0
71-75	0



Postoperative mean valve gradient has decreased to 2-4mmhg in 80% patients.

MITRAL VALVE MEAN GRADIENT - POST OP

VALVE GRADIENT	NO OF PATIENTS
1.1-2	9
2.1- 3	26
3.1-4	13
4.1-5	2



All these patients have been operated for mitral valve where posterior leaflet has been excised and no sub valvular apparatus has been conserved and no chordal repair has done but apparently no postoperative LV dysfunction was found in these patients.

This clearly indicates that posterior leaflet preservation and sub valvular apparatus preservation is not protective for LV function as far as rheumatic and stenotic mitral valve is concerned.

DISCUSSION

Mitral valve had been the most commonly affected in the disease process of chronic rheumatic heart disease .

Mitral valve complex which includes valve leaflets, annulus, commissures and subvalvular apparatus which includes chordae tendinae and papillary muscles.

The speciality of rheumatic disease process is it involves all these components in various degrees and process continues to grow slowly.

The popular Wilkins score evaluates these and gives them a score as per the degree of involvement of each component (into 4 grades).

Mitral valve surgery started its origin from 1902 from digital commissurotomy to the present stage of percutaneous mitral valve replacement, which is catering to the changing trends of mitral valve disease from rheumatic to non rheumatic disease in the western world and hence preservation of components of mitral valve complex to preserve the left ventricular geometry and function became the major goal and target of mitral valve replacement.

Contrary to the west, in India still rheumatic mitral valve disease dominates the scenario accounting for more than 70% of the disease population and especially in rural population still patients are presenting with advanced disease involving complete mitral valve complex(Wilkins score more than 12) and preservation of posterior leaflet and sub valvular apparatus will not benefit the patient and ongoing rheumatic process may endanger the prosthetic valve. Study conducted by Djukic PL and team from Institute for Cardiovascular Diseases, Department of Cardiac Surgery, Clinical Centre of Serbia, Belgrade, proved the same Historical evolution of the prosthetic heart valves from the first attempts with the Hufnagel's valve in the treatment of the aortic insufficiency to the Starr-Edwards' ball valve and later the tilting disc valves (Bjork-Shiley etc.,) and finally the bileaflet valves (St. Jude) are discussed. The Indian contribution with Chitra valve is also described. TTK Chitra heart valve prosthesis (CHVP), a tilting disc mechanical heart valve of low cost and proven efficacy, has been in use for the past 15 years

Chitra valve has an integrally machined cobalt based alloy cage, an ultra-high molecular-weight polyethylene disc, and a polyester suture ring. The present valve is fourth generation valve. An important feature of this valve is its soft closing sound, by virtue of a plastic occlude [1].

Present study was focused on two issues basically .

one is the secure use of native tilting disc valves in the current era of bileaflet valves.

second is the effects of excision of posterior valve and subvalvular apparatus and its effects on LV function in rheumatic mitral valve stenosis.

Present study is based on echocardiographic analysis of the pre operative mean gradient across mitral valve and post operative mean gradient across mitral valve which shows a considerable, comparable and acceptable mean gradient post operatively.

Preoperative mean gradient	10.18	3.180
Postoperative mean gradient	2.92	.716

T=15.8 p=0.000(sig)

preoperatively 90% of maximum and mean gradients are more than 15mm of hg and 10mm of hg and post operatively the same parameters have decreased to mean gradient of 2 to 4mmhg in 96% of patients and 70% of these patients have been implanted 29(25) and 31(10) TTK Chitra valve.

In this study most favourable valve is 29mm TTK Chitra valve even in stenotic patients which give acceptable mean gradients post operatively.

31mm TTK Chitra valve produces more acceptable gradients but less frequently implanted in stenotic patients due to fibrosed and contracted annulus in rheumatic disease.

Regarding the other parameters concerning to left ventricle like ejection fraction, LVIDS, LVIDD, there is no improvement or deterioration of left ventricular function and we have not reported any LV dysfunction post operatively.

Table 1

	Mean	N	Std. Deviation
LVIDSpre	31.18	50	7.213
LVIDSpost	31.34	50	5.885

T=0.26 p=0.79(NS)

Table 2

	Mean	N	Std. Deviation
LVIDDpre	45.32	50	9.297
LVIDDpost	45.06	50	6.570

T=0.26 p=0.79(NS)

Table 3

	Mean	Std. Deviation
EFpre	54.94	4.718
EFpost	54.42	4.941

P=0.228(NS)

[Here we use paired t-test and wilcoxon signed ranks test.

Sig =significant NS=not significant]which are shown in the tables.

There is a significant decrease in the pulmonary artery pressures post operatively as 78% of the patients turned down to mild to moderate PAH.

This is represented by RVSP in the table and complete valve excision and using of tilting disc valve did not affect the outcome of the patients and infact the patients improved post operatively

Table 3

	Mean	Std. Deviation
RVSPpre	48.06	8.988
RVSPpost	40.46	6.640

T=6.89 p=0.000(sig)

overall in our study we had not encountered any mortality and morbidity associated with the procedure and there were no para valvular leaks post operatively and all the patient did well in the later period also.

The patient population encountered with us were of rural background and of lower economic group and had severe disease due to poor medical facilities.

Only rheumatic mitral stenosis were taken for study, hence in these situations still age old complete valve excision and even native tilting disc valve TTK Chitra valve give equally good results than the recently invented valves and a large population can be benefited.

Limitations of study

Our patient sample size of study is limited with a limited parameters of study.

This is majorly based echocardiographic study only and other haematological and other investigations are not taken into consideration.

CONCLUSIONS

When ever rheumatic mitral stenosis is present - complete valve can be reasonably excised with out even sparing or preserving sub valvular apparatus and it doesn't effect the ejection fraction and left ventricular function.

Native tilting disc valve i.e TTK Chitra valve can be safely used and gives comparable results with the recent generation valves, better outcomes are encountered with 29 mm size and above size valves.

Pulmonary artery hypertension decreases significantly if mitral stenosis is operated regardless the advancement of disease process.

There is no significant change in left ventricular dimensions systolic and diastolic dimensions and no changes found in ejection fraction postoperatively.

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