The Professional Medical Journal
www.theprofesional.com

DOI: 10.29309/TPMJ/2020.27.04.4567

ORIGINAL PROF-0-4567

FREQUENCY OF ATRIAL SEPTAL DEFECT IN PATIENTS OF RHEUMATIC MITRAL STENOSIS UNDERGOING PERCUTANEOUS TRANSSEPTAL MITRAL COMMISUROTOMY.

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Article received on:
12/11/2019
Accepted for publication:
15/03/2020

ABSTRACT: Objectives: To determine the frequency of atrial septal defect in patients of rheumatic mitral stenosis undergoing percutaneous trans septal mitral commissurotomy. **Study Design:** Cross sectional study. **Setting:** Faisalabad Institute of Cardiology, Faisalabad. **Period:** 15-07-2018 to 14-01-2019. **Material & Methods:** Study was approved by hospital ethical committee. A total of 45 patients were included in the study that fulfilled the study inclusion criteria and gave written informed consent. PTMC was performed using Inoue balloon technique through right femoral venous route under local anesthesia. Transthoracic echocardiography was done after 48 hours of PTMC for ASD assessment. **Results:** Out of 45 patients there were 17 (37.8%) males and 28 (62.2%) females. The mean age was (29.06±10.85) years. There were 9 (20%) patients with NYHA functional class II, 28(62.2%) with NYHA functional class III and 8(17.8%) with NYHA functional class IV symptoms. ASD was detected in 15 (33.3%) patients after 48 hours of PTMC. **Conclusion:** In this study frequency of ASD in patients of mitral stenosis undergoing PTMC was 33.3%. Results of this study can help to identify the patients who will be potential candidates for closure of residual ASD.

Key words: Atrial Septal Defect, Mitral Stenosis, Percutaneous Transseptal Mitral Commissurotomy.

Article Citation: Ahmad M, Rauf Q, Akram M, Hameed N, Iqbal S, Shah M. Frequency of atrial septal defect in patients of rheumatic mitral stenosis undergoing percutaneous transseptal mitral commisurotomy. Professional Med J 2020; 27(4):857-862. **DOI:** 10.29309/TPMJ/2020.27.04.4567

INTRODUCTION

Rheumatic fever (RF) is the most common cause of rheumatic heart disease. In rheumatic heart disease permanent valve damage can occur in one or more than one heart valves. Likewise in subjects undergoing mitral valve surgery such rheumatic changes are seen in 99% of stenotic excised mitral valves. In United States of America and Europe, reported prevalence of mitral stenosis is approximately 1/100,000 population, while in Africa number is much larger, that is 35/100,000.[1] According to a study, prevalence of rheumatic fever in Pakistan is 22 /1000[2] population. This very high prevalence has placed Pakistan among top of the list countries regarding rheumatic heart disease (RHD). Mitral stenosis is the most common complication of RHD. In 40% of the cases; in addition to mitral valve other heart valves are also affected. In about 25% of patients mitral valve is affected solely.[1]

Treatment of choice for pliable rheumatic mitral valve stenosis is percutaneous transseptal mitral commissurotomy (PTMC); surgery is now reserved for patients who are not suitable candidates for a percutaneous procedure.[1,3] According to recent updated guidelines by AHA/ACC[3], PTMC for rheumatic mitral stenosis is recommended in symptomatic subjects who are suffering from moderate or severe mitral stenosis with suitable valve anatomy , provided they have no evidence of clot in left atrium or left atrial appendage and in the absence of or with only mild mitral regurgitation. Inoue et al.[4], invented the technique of PTMC in which a single balloon was used after transseptal puncture; it is the most frequently used technique now a day's.[4]

Most common complication after PTMC is atrial septal defect (ASD). Other complications are cerebral emboli, cardiac perforation (in

approximately 1% of cases), and the development of severe mitral regurgitation requiring repair or replacement (in about 2% of cases) while approximately 15% of patients develop lesser degrees of mitral regurgitation.[1] The reported incidence of early ASD (48 hours) after PTMC ranges from 15.2% to 92%.[4] Incidence of ASD early after PTMC reported by Manjunath et al[5] is 66.5%. Such residual defect is seen only in a small number of patients but in majority of cases it either permanently closes or decreases in size with time. In rare instances right heart failure can occur due to significant left to right shunt through some persistent large defects; this complication most often is seen with an unsuccessful mitral valvotomy.[1] Chandraprakasam S[6] reported a case regarding when to close iatrogenic ASD. Weather closure of iatrogenic ASD post PTMC be taken care of in all subjects but at present such hypothesis is not supported by any clinical data.[6]

As for as PTMC is concerned, very few studies have been done and data in Pakistan is not sufficient. The frequency of early ASD after PTMC has not been provided by any local study in Pakistan. Rationale of this study is to find frequency of ASD after PTMC. This may help to identify the patients who will be potential candidates for closure of residual ASD.

The aim of this study was to determine the frequency of atrial septal defect in patients undergoing percutaneous transseptal mitral commissurotomy.

ASD
Atrial Septum Defect
Any discontinuation in atrial septum discovered on echocardiography 48 hours after PTMC.

Symptomatic Mitral Stenosis
Patients of mitral stenosis with valve area <1.5 cm^2 , New York Heart Association Functional Class ≥ II symptoms and Wilkins score <11.

PTMC
Percutaneous Transseptal Mitral Commissurotomy.

MATERIALS AND METHODS

Study Design

It is a Cross sectional study, conducted at Faisalabad Institute of Cardiology, Faisalabad, Pakistan. From 15-07-2018 to 14-01-2019.

Sample size was calculated using WHO calculator with:
P =15.2%[4]
Absolute precision required =10.5%
Confidence level =95%
Sample size =45

Inclusion Criteria
1. Age: >10 and <60 years.
2. Gender: Either
3. Patients of mitral stenosis with valve area <1.5 cm^2, New York Heart Association Class ≥ II symptoms and Wilkins score <11.

Exclusion Criteria
1. Patient with calcified mitral valve.
2. Patients with associated mitral regurgitation ≥2.
3. Clot in LA and/or LAA.
4. Presence of other lesions which need open heart surgery.
5. Wilkin Score > 12.
6. End stage renal or liver disease.
7. Patients with severe COPD.
8. Patients with an active infection (TLC > 11,000 / cu. mm)

Data Collection Procedure

After taking approval from hospital ethical committee, patients presenting to cardiology department who fulfilled the inclusion criteria were enrolled and written informed consent was taken from them. PTMC was performed by senior consultant cardiologist and researcher assisted the procedure. Transthoracic echocardiography was done after 48 hours for ASD assessment. All the information was collected on prespecified Performa.

Data was entered in SPSS version 22.0 and analyzed. Numerical data like age was analyzed using mean and standard deviation (SD).

Frequencies with percentages were given for categorical data like gender, ASD and NYHA class. Post stratification analysis done to study the effect modifiers like age, gender, NYHA class and Wilkins scores using chi-square test and p value <0.05 was considered as significant.

RESULTS

Forty five subjects were included in this study. Their mean age was 29.06±10.85 years, ranging from 13 to 54 years. There were 17(37.8%) males and 28(62.2%) females. There were 15 (33.3%) patients with ASD after 48 hours of PTMC while 30 (66.7%) patients were not found to have ASD after 48 hours of PTMC. ASD after 48 hours of PTMC was found to have significant association with age groups (p=0.049) but no such association was found for ASD after 48 hours of PTMC regarding gender (p=0.828) as shown in (Table-I).

There were 9 (20%) patients in New York Heart Association Functional Class II. There were 28 (62.2%) patients in New York Heart Association Functional Class III and eight (17.8%) patients were found to have New York Heart Association Functional Class IV symptoms (Table-II). There was no statistical significant association (p=0.468) between ASD after 48 hours of PTMC and NYHA Functional Class. (Table-II)

Characteristics		**ASD after 48 hours of PTMC**		**P-Value**
Age	**29.06±10.85**			
Gender		**Yes** (33.3%)	**No** (66.6%)	Chi square test= 0.047
Male	37.8% (n=17)	6(40.0%)	11(36.7%)	P-value = 0.828
Female	62.2% (n=28)	9(60.0%)	19(63.3%)	
		100%(15)	100%(30)	
AGE groups		**Yes** (33.3%)	**No** (66.6%)	
<30	29(64.4%)	7(46.7%)	22(73.3%)	Chi square test= 6.049
31-45	11(24.4%)	4(26.7%)	7(23.3%)	
>45	05(11.2%)	4(26.7%)	1(3.3%)	P-value = 0.049
Total	100%(45)	100%(30)	100%(45)	

Table-I. Basic characteristics and ASD after 48 hours of PTMC in relation to age and gender

	ASD		**Total**	**P-Value**
	Yes	**No**		
II	2(13.3%)	7(23.3%)	9(20%)	Chi square test= 1.518 P-value = 0.468
III	9(60.0%)	19(63.3%)	28(62.2%)	
IV	4(26.7%)	4(13.3%)	8(17.8%)	
Total	15	30	45	

Table-II. ASD after 48 hours of PTMC in relation to NYHA Class

DISCUSSION

In Pakistan and other developing countries mitral stenosis is mostly rheumatic in origin. Due to overcrowding and low socioeconomic background it is more common in young females. Mitral valve surgery is most often performed for mitral regurgitation and PTMC is the best choice for symptoms relief in mitral stenosis[7] since 1982 after the first mitral valvuloplasty by Inoue et al.[4] Prediction of procedural success and immediate results is multi factorial. Independent predictors for procedural success and immediate results are; severity of mitral stenosis, presence of mitral regurgitation before PTMC, annular or commissural calcification , pulmonary artery pressure, severity of tricuspid regurgitation, history of previous commissurotomy, age of the patient, NYHA functional class and morphologic

factors.[8]

PTMC is a standard and quite safe procedure for the treatment of symptomatic mitral stenosis. The fundamental step in performing PTMC is left atrium access via transseptal (TS) puncture. TS puncture results in an iatrogenic ASD. Knowledge about such iatrogenic ASD is of crucial importance.[9] In a number of studies incidence of early ASD (48 hr) post PTMC has been reported between 15.2% to 92%.[10-13] The incidence of post PTMC, ASD reported by Palacios et al[14] was 20%, while it was reported as 8% by Vahanian et al.[7] However in both of these studies less sensitive oximetric method[15] was used for the detection of residual atrial septal defect. Trans-thoracic echocardiography detected early ASD post PTMC in 15.2% (7 out of 46 patients) and 19% (21 out of 110 patients) of cases in the studies by Ishikura et al[10] and Devarakonda et al.[16] While by trans-esophageal echocardiography color Doppler imaging early ASD (48 hr) after PTMC was detected in 87% and 92% of the cases in the studies by Yashida K et al[17] and Arora et al.[12]

In present study ASD was diagnosed in 15 (33.3%) patients. The results of our study showed a significant (p=0.049) association between age groups and early residual ASD. In a study by Manjunath et al 2013 report[5], the incidence of ASD is 66.5% (139 of 209 patients) which is much higher as compared to our study and above reported studies. It may be due to age related changes in atrial septum (increased fibrotic changes) or increased diastolic dysfunction with age that renders ASD patent.

In our study PTMC was successful in 40 (96%) patients which is similar to success rate reported by Ali L et al 2016[2], in which PTMC was found successful in 118 (95.16%) patients. In another study by Babar HAK et al[18] showed procedural success in 97.7% of patients, which also coincides with the results of our study. Our results also coincide with the results of international studies conducted by M S Alkhalife et al[19] and Syed Dawood Md et al[20] in which procedural success was 94.5% and 95% respectively. In 1% to 17% patients PTMC may be unsuccessful and this failure results due to unfavorable anatomy i.e. giant LA, thick septum, during initial portion of learning curve of the operator, subvalvular disease or heavy calcification or special problem like hiatus hernia, kyphoscoliosis and in our study PTMC was unsuccessful or/ and abandoned in 5 (4%) patients and these results coincide with the study by Babar HAK et al[18] who reported failed procedure in 3 (3.3%) patients.

Present day innovative procedures that involve use of large diameter transseptal sheaths and catheters like transseptal mitral valve interventions and electrophysiological procedures especially laser and cryoablations may leave large defects which if persistent, in the long term may predispose to right heart failure, pulmonary hypertension or systemic embolism. Although currently available data is scarce regarding clinical and hemodynamic importance of such persistent defects but there is some evidence that suggests routine echocardiographic follow up of such patients and possible consideration for percutaneous or surgical closure.

CONCLUSION

In this study frequency of ASD in patients of mitral stenosis undergoing PTMC was 33.3%. The main danger related to such continuing defects is the risk of systemic (paradoxical) embolism. If ASD is large enough, it may cause significant left to right shunt, right sided volume overload and progressive pulmonary hypertension and right heart failure.

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It is far more important to know
what **person** the **disease** has
than what **disease** the **person** has.

"Hippocrates"

AUTHORSHIP AND CONTRIBUTION DECLARATION

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