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Original Article

Evaluation of early direct current cardioversion for maintenance of sinus rhythm in rheumatic atrial fibrillation following successful balloon mitral valvotomy

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ABSTRACT

Background: Patients with rheumatic mitral stenosis (MS) and atrial fibrillation (AF) are at risk for thromboembolism and restoration of sinus rhythm (SR) may be the preferred strategy. Percutaneous balloon mitral valvotomy (PBMV) improves hemodynamics, but may not be enough to restore SR.

Methods: Prospective randomized study aimed at evaluating efficacy of early direct current cardioversion (DCCV) following successful PBMV in patients with long-standing AF. Group 1 ($n = 20$) had patients of rheumatic MS with AF who underwent successful PBMV. Group 2 ($n = 15$) patients were DC cardioverted and administered oral Amiodarone for 6 weeks. Primary endpoint was maintenance of SR after 6 months. Secondary endpoints were functional capacity, number of embolic episodes, adverse drug effects, and all-cause mortality.

Results: In Group 2, all patients underwent successful cardioversion. At a mean follow-up of 7.6 months, 95% in Group 1 were in AF. In Group 2, 87% patients were in SR and 13% had reverted to AF. Difference in rate of SR was 0.82 (95% CI 0.2, 1.01) ($p = 0.001$), with relative risk of 7.1 (1.95, 25.9, 95% CI, $p = 0.001$) for patients to be in AF who underwent only successful PBMV, i.e. Group 1. There was significant improvement in quality of life (SF36) score in Group 2 ($p = 0.001$), with no deaths, stroke, or adverse drug effects in either group.

Conclusion: In patients with rheumatic MS and AF, early DCCV and a short-duration oral Amiodarone, following successful PBMV, may be a reasonable strategy to attain long-term SR.

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1. Background

Rheumatic heart disease (RHD) still retains its dubious distinction amongst the important acquired heart diseases in developing countries, affecting young adults and accounting for about 25% of all patients with heart failure in endemic countries.[1] The estimated prevalence of RHD is 20 per 1000 among young adults (20–35 years), with 62–78 million estimated cases worldwide, with 1.4 million deaths yearly from RHD and its complications.[2]

Increased transmitral gradient causes raised left atrial (LA) pressure leading to LA enlargement, causing pulmonary venous and arterial hypertension and right-sided heart failure.[3] In addition to gradual progression, 50% patients have episodes of acute deterioration due to paroxysmal or chronic atrial fibrillation (AF) with rapid ventricular rate, causing pulmonary edema, acute decompensated heart failure, and cardioembolic phenomenon.[4] Persistent AF frequently complicates mitral stenosis (MS) and conveys unfavorable long-term prognosis.[5–7] Over 80% patients with MS with systemic embolism are in AF, commonest embolic site being the cerebral circulation. High risk of thromboembolism in such a subset of patients renders restoration of sinus rhythm (SR) to be the preferred strategy over rate control.[8]

Persistent AF leads to the deleterious atrial remodeling, which perpetuates sustenance of AF. However, it has been seen that atrial remodeling is not a permanent phenomenon and may be reversed. It has been proposed that relieving MS will reduce LA dilatation, and thus may lead to reverse atrial remodeling by changing the hemodynamics.[9] Previous reports demonstrate significant reverse atrial electrical remodeling in patients with MS after percutaneous balloon mitral valvotomy (PBMV).[10]

PBMV or surgery is effective in relieving MS with correction of hemodynamic alterations, but it often fails to restore SR.[11] In previous series, surgical correction of mitral valve disease in patients with AF resulted in spontaneous conversion to SR in 46%; however, rate of spontaneous conversion was much lower in other reports.[12] Many studies have attempted various strategies of rhythm control in patients with rheumatic AF after PBMV, including oral Amiodarone and direct current cardioversion (DCCV), with varying success. However, these studies also had a time lag between performing percutaneous transvenous mitral commissurotomy (PTMC) and DCCV, probably to see whether Amiodarone alone can lead to successful pharmaco-cardioversion and to allow further improvement in hemodynamics. These studies had indicated that smaller LA size, shorter AF duration, and absence of involvement of other valves were important predictors for conversion of AF and in maintenance of SR over long term.[13–16] The safety profile of Amiodarone, with its interaction with oral anticoagulants (OAC), also is a major factor which prevents its long-term use.

No study till date has prospectively evaluated Indian patients with severe MS of prolonged duration with enlarged LA and long-standing AF with early DC cardioversion as a rhythm control strategy post-PBMV. This randomized prospective study was devised to evaluate efficacy of early DCCV followed by oral Amiodarone in treatment of rheumatic MS and AF post-PBMV during the index hospitalization.

2. Material and methods

This study is a prospective randomized study performed at AIIMS, New Delhi from January 2012 to July 2013. Ethical approval was taken from the institutional ethical committee. The study included patients with rheumatic MS and AF fulfilling the criterion for PBMV according to American College of Cardiology/American Heart Association guidelines.[17] Other inclusion criteria were patients above 18 years, with AF on electrocardiogram (ECG) at least twice with minimum of 2-week interval. Exclusion criteria were patients less than 18 years, contraindications to anticoagulation or Amiodarone use; or requirement for surgery because of complications from PBMV, inability to comply with 6-month follow-up, and patients not giving written consent for participation in the study. Patients were randomized in two groups by computerized method at the time of enrollment. The flow of participants in the study is shown in Fig. 1.

Informed consent was taken from all eligible patients. Baseline historical and clinical parameters were noted at enrolment. Patients' functional status was assessed by New York Heart Association (NYHA) classification and quality of life (QOL) was assessed by modified Medical Outcomes study Short-form Health survey (SF-36) questionnaire (modified for Indian population). Patients on OAC were advised to

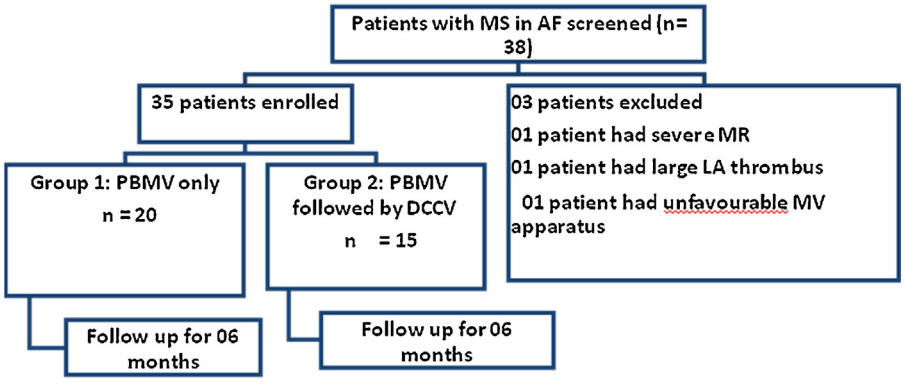

Fig. 1 – Flowchart of the study.