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### **Original research article**

# The effect of surgical access for mitral valve surgery on incidence of atrial fibrillation and atrioventricular block

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#### ABSTRACT

Atrial fibrillation and conduction disorders are very common and severe postoperative complications in heart surgery.

Retrograde analysis of patients (n = 103) who had undergone mitral valve surgery or concomitant mitral and tricuspid valve surgery was performed (from January 2006 to December 2016). Patients from each group were divided into two groups: a subgroup with surgery access through the right atrium and interatrial septum (transseptal access) and a subgroup with surgery access through the left atrium (left atrial access). The following data were recorded for all patients: age, sex, extracorporeal circulation time, aortic clamping time, blood loss after surgery, count of blood transfusions administered, the need for surgical revision because of higher blood loss and postoperative atrial and atrioventricular conduction defect (atrial fibrillation and atrioventricular block with pacemaker implantation).

A statistically significant difference in extracorporeal circulation time (p < 0.05) and aortic clamping time (p < 0.01) was recorded between transseptal access and left atrial and right atrial access separately, if combined surgery of both atrioventricular valves was performed. No other statistically significant differences were recorded between the groups.

In general, the choice of surgical access for mitral valve on incidence of postoperative atrial and atrioventricular conduction disorders showed no effect. Both access through the right atrium and interatrial septum and access through the left atrium have a similar incidence of postoperative atrial fibrillation and atrioventricular block.

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### Introduction

Postoperative heart conduction disorders are very common and several postoperative complications in heart surgery, and postoperative atrial fibrillation (AF) is the most common postoperative complication after heart surgery [1-4]. Tachyarrhythmia may result in a 15–25% reduction in cardiac output and increase myocardial oxygen consumption, thus resulting in myocardial ischemia [3]. The reported incidence of

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e2

# ARTICLE IN PRESS

COR ET VASA XXX (2017) eI-e8



Fig. 1 - Perioperative pictures: A - transseptal access; B - left atrial access.



Fig. 2 – Schematic picture: A – transseptal access; B – left atrial access (AV – aortic valve; MV – mitral valve; PV – pulmonary valve; TV – tricuspid valve).

postoperative AF after cardiac surgery published in the literature varies, ranging from 5.5 to 65% [4,5]. This variability may be caused by differences in the methods of the presented reports. Most studies did not strictly define AF or AF diagnostic methods, while other reports considered only patients requiring intervention for AF [4]. A meta-analysis of more than twenty trials estimated the incidence of postsurgery AF at 26.7% [4]. In general, higher incidence of AF is presented after valve surgery and combined valve-coronary surgery in comparison with aortocoronary bypass surgery (CABG) [4,6]. During the first 6 days after surgery 94% of AF is presented and 70% by the end of fourth day after surgery [2,4]. The most common day of postsurgery AF is the second postoperative day [2].

Atrioventricular block (AVB) is the next less common, but more dangerous, of the postoperative conduction disturbances, with an incidence ranging from 0.5 to 16% [7]. This is most often a temporary reversible disorder. Only 0.4 to 3.6% of patients after heart surgery require pacemaker implantation [7–9]. The incidence of AVB is dependent on both the patient and the nature of the surgery. In general, higher incidence is assigned to valve surgery and concomitant valve and CABG in comparison with CABG only [7,9–12]. AVB means a two-fold increase of late risk of sudden death for the patients [7,9]. However, Rene et al. reported that 40% of patients who received a pacemaker due to AVB following surgery showed no evidence of high-grade AVB during serial device interrogations at a mean follow-up of 3.6 years, suggesting the pacemaker was not actually required [12]. Despite the development of a minimally invasive method, medial sternotomy is the gold standard of surgical access to the mitral valve and in heart surgery overall [13]. On the other hand, there has been no comparison between surgical access to the mitral valve through the right atrium and interatrial septum (transseptal) on one side and the left atrium on the other (Figs. 1 and 2). This work is focused on a comparison of these two surgical accesses to the mitral valve from the point of view of postoperative conduction disturbances.

#### Material and methods

All patients who underwent mitral valve surgery and/or concomitant mitral and tricuspid surgery between January 2006 and December 2016 in our center were identified by procedure codes, and relevant data were collected from their medical documentation at our institution. Patients who underwent reoperation, minimally invasive surgery or emergency surgery, were excluded. Patients with other concomitant procedures (aortocoronary bypass, MAZE procedure, implantation of epicardial electrode or surgery of the ascending aorta) were excluded. Patients who underwent implantation of prostheses into the mitral valve or tricuspid valve were also excluded, as were those with a history of atrial fibrillation, atrioventricular block or left bundle branch block. After learning of the operation protocols, patients with an additional clamp during extracorporeal circulation (CPB) due to repair

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