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OUTCOMES OF TRANSSEPTAL APPROACH IN MITRAL VALVE SURGERY VS CLASSIC APPROACH

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ABSTRACT

Introduction:
In mitral valve surgery, there are several methods to approach left atrium: the classic approach through vertical interatrial groove, vertical transatrial septal, LA roof, and the classic approach of extending to the LA roof and the temporary vena cava division of the upper cavity. The aim of this study was to determine the effects of mitral valve surgery using transseptal approach in comparison with classic approach.
Materials and Methods:
In this retrospective study, all patients who underwent mitral valve surgery in the Tehran heart center during 2002 to 2012 were divided into two groups (classic and transseptal approaches). Patient's demographic information, electrophysiological findings before and after surgery, and complications of each surgical approaches were recorded.
Findings:
The mean age of subjects in the LA group was 35.5 ± 6.9 with the age range of 11-65 years and in the TS group the mean age of the patients was 32.2 ± 9.3 with the age range of 14-16 years. The LA group included 1078 patients, of which 280 (25.98%) were men and 798 (74.02%) were women. The TS group also included 270 patients, 73 of them (27.03%) were men and 197 (72.97%) were women. The results of this study showed no significant difference between the mean perfusion time (P = 0.354) and cross clamp (P = 0.213). The mean perfusion time in the classic approach was 77.1 ± 15 and in the transseptal approach was 78.5 ± 23 minutes. On the other hand, there was no significant difference between the two approach in terms of the need for pacemaker insertion and postoperative junctional rhythm between the two approaches (P = 0.425). There was a significant difference between the two surgical approaches in terms of the mean stay in the ICU (P = 0.362) and in the hospital (P = 0.779). The mortality rate was similar between the two groups (P = 0.62).
Discussion and conclusion:
The results of our study showed that the Transseptal approach does not produce destructive or lethal effects in comparison with the classic approach.

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Introduction

mitral valve prolapse is one of the common abnormalities in the heart valves, and is seen in 10-5% of people. (3-1) Mitral valve prolapse (MVP) is a common disorder that can be seen at any age (1), but the most prevalent is between the ages of 14 and 30 (2). Although MVP is seen in all ages and in both genders, according to epidemiological studies it is more common in women than in men. (4) There are several approaches to approach the left atrium in mitral valve surgery, among which the Trans Septal Approach (TSA) and the Left Atrial Approach (LAA) are considered as a classic approaches (6-3). LAA is known as the main surgical approach, but due to the better vision of the mitral valve, the wider field of surgery, and closer proximity to the valve, the Trans Septal (TS) approach is preferred for patients with small left atrium, obese patients, Complicated patients and patients with ventricular hypertrophy (4-7).

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In patients with a history of heart surgery, the TS approach is preferred because of the lack of scarring around the atrial fibrillation (8-12). TSA has several types, including TS transversal cutting, Superior TS cutting, Mini Transseptal approach, and ... in our center, the modified transseptal approach is used. (14-11)
The TS approach, despite the better access to the mitral valve, is not the main surgical approach because of its more complicated effects. (15) The complications of TSA include a longer duration and a longer cut that increases the chance of bleeding (12-16). It is said that The probability of arrhythmia and the use of Pacemaker (SA node and AV node) will increase but this possibility has been rejected recently in several studies and the difference in the two groups of patients has been non-significant. (17) The problem with the modified TS approach is that, despite the fact that this technique has been used for many years, there is not enough information to evaluate post-surgical arrhythmias and a comparison of TSA and LAA hasn't been done yet (19-15). In previous studies, the sample size was not high. Perhaps by comparing these two approaches with higher sample size, the results become more meaningful and reliable. (24-20)
In this study researchers intend to compare the different approaches and surgical procedures for this valve and mitral valve surgery by retrospective studying of patients who underwent mitral valve surgery. And with this study, we can identify and use the preferred and less complicated approach with better outcome for patients.

Methods and materials

In this study, the historical cohort of all patients who underwent mitral valve surgery between 2002 and 2012 in Tehran heart center were examined in to groups. The first group was the patients undergoing mitral valve surgery by classic approach (access via LA roof), and the second group was patients undergoing transseptal surgery.
All information on the age, sex, NYHA function class, preoperative patient, patient's BMI, pre-surgical patient's heart rhythm, pre-surgical ejection fraction, existence of permanent pace maker, and also information about surgery type, surgery frequency, surgical cause The type of valve, the size of the left atrium in patients were collected and recorded in a questionnaire form for each patient separately.
In order to compare two types of mitral valve surgery, data on mean perfusion time, mean cross clamp time, need for postoperative pacemaker insertion, postoperative cardiac rhythm, atrial septal shunts, reoperation because of: bleeding, Valve Dysfunction or reesterotomy. For any reason, the need for transfusion, EF after the operation of the patients, the incidence of postoperative complications including: MI, CVA, renal failure, respiratory failure, sternal infection, pneumonia in patients, hospital mortality, mortality cause in two groups of patients were collected and recorded in the questionnaire form.
In patients undergoing classic surgery, in the presence of pulmonary veins, anisosis was given parallel to the atrioventricular groove. After the aortic cross-clamping and injection of cardio-plexus and complete stop, the right atrium was opened longitudinal incision in the middle of the foramen ovalis on the atrial septum (approximately 4 cm in length) and traction was given to the septum edges with pituitary constriction. In this way, the mitral valve was completely exposed and then surgery was performed on it. This approach was used in patients with obesity, in patients with a small left atrium, deep chest, and patients who had indication in re-surgical procedures, and in other patients the classic and conventional LA approach was used. exclusion criteria included: the accompaniment of valve surgery with other surgeries such as CABG, septal myomectomy, and the use of mitral valve surgery approaches other than left atriotomy and transseptal. At the end, the recorded information in the checklists was statistically analyzed by SPSS-22 software.

Findings

In this study, the patients were divided into two groups: the first group included patients who had mitral valve surgery using the classic approach (access through LA roof), and the second group was patients undergoing transseptal (TS) surgery. The mean age of patients in the LA group was 35.5 ± 6.9 with the age range of 11-65 years and in the TS group, the mean age of the patients was 32.2 ± 9.3 with the age range of 14-60 years. The LA group included 1078 patients, of which 280 (25.98%) were men and 798 (74.02%) were women. The TS group also included 270 patients, 73 of them (27.03%) were men and 197 (72.97%) were women. Based on the NYHA classification, all patients in the LA group belonged to Class III, and in the TS group, 56.5% of the patients belonged to Class III and 24.44% belonged to Class IV. There was no significant difference classic and transseptal surgery approaches (p = 0.335). The mean perfusion time in the classic approach was 77.1 ± 15 and in the transseptal approach was 78.5 ± 23 minutes. Table 1

Table 1: mean perfusion time in classic and transseptal approaches

Group study	Perfusion time (min) (mean±SD)	P value
LA gruop	77/1±15	**0.354**
TS group	78/5±23	

There was no significant difference between the two surgical approaches in terms of mean cross-clamping time (P = 0.213). The mean cross-clamp time in classic and transseptal approaches were 82.3 ± 34.1 and 84.1 ± 21.3, respectively. Table 2

Table 2: mean cross-clamp time in classic and transseptal approaches

Group study	Cross-clamp (min) (mean±SD)	P value
LA gruop	82/3±34/1	**0.213**
TS group	84/1±21/3	

14 (5.18%) of the patients undergoing classic surgery and 10 (0.92%) patients undergoing transeptal surgery had respiratory problems during surgery. in both classic and transseptal approaches There was a statistically significant difference between the mean EF before and after surgery. The mean EF in the classic approach group before and after surgery was 58.3 ± 11.1 and 41.2 ± 11.4 respectively (P = 0.001). The mean EF in the transseptal group was 58.2 ± 8.5 and 52.5 ± 13.2 before and after surgery (, P = 0.001). Table 3

Table 3: mean EF in classic and transseptal approaches

Group study	Preoperative EF (mean±SD)(	Postoperative EF (mean±SD)	P value
LA gruop	58/3±11/1	41/2±11/4	**0/001**
TS group	58/2±8/5	52/5±8/5	**<0.001**

There was no significant difference between the two surgical approaches (classic and transseptal) in terms of the need for pacemaker insertion (P = 0.425). The frequency of the need for pacemaker insertion in patients undergoing classic mitral valve surgery was 5.1% and in the patients undergoing transseptal mitral valve surgery, it was 62.9%.

9.92% of the patients undergoing classic surgical procedure had a post-surgical junctional rhythm, and this number was 11.85% in the transseptal group, and there was no significant difference between the two groups in terms of junctional rhythm (P = 0.3235).

Of all the patients in the classic and transseptal groups, only one case (0.37%) in transseptal group had bleeding and reoperation. According to the data presented in the tables, there was no significant difference between the two surgical approaches in terms of the mean hospitalization time in the ICU (P = 0.362) and in the hospital (P = 0.779). the mortality rate was 2.31% in the LA group and 5.18% in TS group and there was no statically significant difference between them (P = 0.62).

Discussion

In this research we studied and compared two classic (LA) and transseptal (TS) approaches to reach left atrium in mitral valve surgery in patients with MVP.

In the present study, women had the highest frequency (74.02% in the LA group and 72.97% in the TS group), which is consistent with other studies, so that in the study of Aykut et al in 2011, it was shown that the incident of this problem is two times more in women than men (20).

MVP is often diagnosed in the second and third decades of life. MVP is often diagnosed in the second and third decades of life. In the present study, the mean age of the subjects in the LA group was 35.5 ± 6.9 years and in the TS group was 32.2 ± 9.3 years. In other studies such as Nguyen et al study in 2009, similar result were obtained (25).

The results of this study indicate that there is no significant difference between the two classic and transseotal surgical approachesin terms of mean perfusion time and cross-clamp time, which is consistent with other studies, forexample no significant difference was observed between classic and trasseptal surgical approaches in terms of mean perfusion time and cross-clamp time in Misawa et al study (24) which is consistent with present study. Also, in the study of Nguyen et al., no cardiovascular block, hemorrhage or mortality was reported using modified superior transseptal approach in mitral valve surgery. The mean aort cross clamp time was 117 ± 9.9 minutes. And heart rhythm resumed immediately after the release of aortic clamp in 93.3% of patients. These researchers mentioned that the main advantages of this approach is the shorter cutting in the atrial muscle and the ease of closure (25).

Also, in both classic and transseptal surgical approaches, there was a significant difference between the mean EF before and after surgery. Also, in the study of Aidin et al., there was no difference between the two approaches of Superior Transseptal and the classic Left Atriotomy approaches in terms of EF before and after surgery that is consistent with the present study (22). Of all the patients in the classic and transseptal groups, only one case (0.37%) in the transseptal group had bleeding and reoperation which was consistent with other studies (18 -23).

On the other hand, there was no significant difference between the two approaches in terms of the need for pacemaker insertion and postoperative junctional rhythm, which is consistent with other studies, so that in the studies of Gaudino, Berreklouw, Guiraudon, and Jeffrey, after mitral valve surgery by using the Superior transseptal approach, the same results were observed (29-26).

In the present study, there was no significant difference between the two surgical approaches in terms of the mean hospital stay in the ICU and in the hospital. Although patients undergoing transseptal surgery were clinically more inferior to those in the classic group (24.44% of patients in the transseptal group were in grade IV, compared with 0% in the classic group), the mortality rate was similar between the two groups, which is consistent with other studies, so that there was no significant difference between the two surgical approaches in terms of the mean length of hospitalization in ICU in Burasi et al study in 2010 (23) which is consistent with the present study.

Aidin et al. Stated that compared to Left Atriotomy approach, the Superior Transseptal approach had no harmful effects on sinus node function or atrial fibrillation (22). Burasi et al also mentioned better access to the mitral valve and lack of technical problems, as advantages of transseptal approach. In Burasi's study, there was no significant difference between transseptal approach and the classic approach in terms of surgical time and mortality rate (23).

Misawa et al. described the superior septal approach as a very suitable method with superior vision and better access to the mitral valve, and mentioned that after superior septal surgery some clinical problems such as arrhythmia disorders may occur but they can be controlled by medication or by using temporary electrical pacemaking in the initial phase after surgery. A classic approach to mitral valve surgery can also be associated with arrhythmias. (24)

In general, according to the results of this study, it can be concluded that the Transseptal approach does not produce destructive or fatal complications in comparison with the classic approach, which, of course, requires further research, such as clinical trials in this field.

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