Original Article

Surgical Outcome in Patients with Ruptured Sinus of Valsalva: A 5 Year Experience at a Tertiary Care Center of Middle Income Country

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ABSTRACT

Objective: To evaluate the surgical outcomes in patients with ruptured sinus of valsalva who presented at a tertiary care center of middle income country.

Study Design: Retrospective study

Place and Duration of Study: This study was conducted at National Institute of Cardiovascular Diseases Karachi from June 2016 to May 2021 for the period of five years.

Materials and Methods: After approval from the ethical review committee of the institution, hospital records of the patients fulfilling the inclusion criteria were accessed. Inclusion criteria for the study are patients who presented with the diagnosis of ruptured sinus of valsalva on echocardiography and undergone surgical treatment. After quality assessment of the data, IBM SPSS version 21.0 was used for the analysis. The continuous variables were summarized as mean ± SD (standard deviation) and categorical response variables were expressed as percentages.

Results: 30 patients with ruptured sinus of Valsalva were diagnosed on Transthoracic echocardiography and undergone surgical treatment. Out of 30 patients, 18 (60%) were males and 12 (40%) were females. The mean age was 26.6 years (range:16 to 47 years). Typical "wind sock" were present in 24(80%) on echocardiography. The aneurysm had communication with right ventricle outflow tract in 28(93%) patients while in 2 (7%) patients its communication was between the no coronary cusps and the right atrium. Twenty-five patients (83.3%) had associated VSD. Five (16.6%) patients had some element of aortic valve incompetence ranging from mild to moderate. In hospital mortality was 0%. All patients survived and were discharged from hospital without any significant morbidity.

Conclusion: Ruptured Sinus of Valsalva is a surgical emergency. The surgical outcomes in these patients are encouraging with good survival and low complication rate.

Key Words: Ruptured sinus of Valsalva aneurysm(RSOA), RSOVA surgical treatment, cardiac surgical emergency

Citation of article: Awan MAB, Awan R, Tariq A, Minhaj S, Baloch K, Zakai SB. Surgical Outcome in Patients with Ruptured Sinus of Valsalva: A 5 Year Experience at a Tertiary Care Center of Middle Income Country. Med Forum 2021;32(9):53-56.

INTRODUCTION

In 1957 Lillehei reported the first successful surgical repair of congenital ruptured sinus of Valsalva aneurysm (RSVA).[1] Ruptured sinus of Valsalva aneurysm (RSVA) is caused by a defect in aortic connective tissue [(2,3)] which forms an aneurysm and it ruptures most commonly in right sided chambers.[4]

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Received: June, 2021
Accepted: July, 2021
Printed: September, 2021

Most common congenital disorder associated with this (RSVA) is subaortic Ventricular Septal Defect (VSD).[5] Mortality without surgical treatment is very high with mean survival of 1-2 years.[6]

Surgical repair of RSVA has low morbidity and mortality. Surgical treatment includes repair of sinus defect with or without pericardial patch by putting patient on cardiopulmonary bypass(CPB) and after aortic crossclamp. These patients may need additional procedures like VSD cloure, aortic valve repair or replacement.

The incidence of ruptured sinus of Valsalva aneurysm (RSVA) is highest in Asian population.[7] Here at National institute of Cardiovascular Diseases, we receive large number of patients who presents with symptoms of right heart failure ranging from mild symptoms to multi organ failure.[8] Surgical treatments is offered to all patients. It is important to study all the surgical outcome in patients with ruptured sinus of Valsalva aneurysm (RSVA).

MATERIALS AND METHODS

Study Design: Retrospective chart review
Setting: At National Institute of Cardiovascular Diseases Karachi.
Duration of Study: Five years
Patient Records: from June 2016 to May 2021
Inclusion Criteria: All patients who have been diagnosed as ruptured sinus of Valsalva on echocardiography and were surgically treated were included.
Exclusion Criteria: No patient was excluded.
Study Outcome: Post-surgical in-hospital survival status and complications (if any)
Data Collection: After approval from the ethical review committee of the institution, hospital records of the patients fulfilling the inclusion criteria were accessed. Inclusion criteria for the study are patients who presented with the diagnosis of ruptured sinus of Valsalva on echocardiography and undergone surgical treatment during study duration of June 2016 and May 2021. Demographic (age, gender, nationality, etc.) and clinical data (presenting complaint, lab work up, echo findings, and surgical parameters) along with post-surgical in-hospital survival status and complications were extracted from the patient's file.
Data Analysis: After quality assessment of the data, IBM SPSS version 21.0 was used for the analysis. The continuous variables were summarized as mean ± SD (standard deviation) and categorical response variables were expressed as percentages (%). Effect of confounding factors on the post-surgical in-hospital outcomes was assessed by conducting Chi-square test or Fisher's exact test. The criteria for statistical significance was taken as a p-value of ≤ 0.05.

RESULTS

Between June 2016 and May 2021, 30 patients with ruptured sinus of Valsalva were diagnosed on Transthoracic echocardiography and undergone surgical treatment at National Institute of Cardiovascular Diseases(NICVD)Karachi. Out of 30 patients, 18 (60%) were males and 12 (40%) were females. The mean age was 26.6 years (range:16 to 47 years).
At the time of admission, 28 patients (93%) were symptomatic. The majority had the following symptoms: dyspnea (80%), palpitation (34%), fatigue (85%), angina (20%), and syncope (1.5%). Continuous Heart murmur of grade 4/6 was present in 28 (93.3%%) patients. There were two patients (6.6%) in atrial fibrillation and 28 (93.3%) had normal sinus rhythm.
On Transthoracic echocardiography diagnosis of ruptured sinus of Valsalva aneurysms were confirmed in these 30 patients. Typical "wind sock" were present in 24(80%) on echocardiography. In 20(66.6%) patients aneurysm was arising from right coronary sinus while in other 10 (33.3%)patients it was arising from other sinuses. The aneurysm had communication with right ventricle outflow tract in 28(93%) patients while in 2 (7%) patients its communication was between the no coronary cusps and the right atrium. Twenty-five patients (83.3%) had associated VSD. Five (16.6%) patients had some element of aortic valve incompetence ranging from mild to moderate. One (3.33%) of patient had severe mitral valve regurgitation.
All patients were put on pump by aortic and venous cannulation. The Patient were cool down upto 28 degree centigrade by hypothermia machine. Surgical repair was done after aortic cross clamping. Aortotomy was done in 100% of patients. Cold blood Cardioplegia at 4degree C were given for myocardial protection to all patients, antigrade in 24(80%) through osteal cannulea and in 6(20%) both antegrade and retrograde were used.
Surgical repair of ruptured sinus of Valsalva was done with pericardial patch in 29(96.6%) patients while in one (3.3%) patient it was directly closed with proline 5/0 with pledgets.VSD was closed directly in 2(8%) with proline 5/0 using pledget while in 23(82%) of patients VSD was closed using pericardial patch. Aortic valve replacement (AVR) had to be done in one (3.3%) patient. Mitral Valve Replacement (MVR) was done in one patient who had significant mitral regurgitation.
Most patients were off by pass uneventfully on mild to moderate inotropic support. Only four (13.3%) patient required more than two inotropic agents. Milrinone was given to all patients.
Average ICU stay was 4 days ranging from 2 to 10 days. One Patient required reopening due to bleeding from aortic suture site within six hours of surgery.
In hospital mortality was 0%. All patients survived and were discharged from hospital without any significant morbidity.

DISCUSSION

Ruptured sinus of Valsalva aneurysm is a rare anomaly which carries a very high mortality if left untreated[9-12]. Surgical repair of RSVA is proven to prevent complications of right heart failure and its associated morbidity and mortality.
Association of RSVA with other congenital cardiac abnormalities is common. Association with VSD was very high in our study (83.3%). Whereas, study done by Wing-Kuk Au at division of cardiothoracic surgery, University of Hong Kong reported 49.1% of cases having VSD finding at the time of surgical repair, which is significantly less than noted in our study on Transthoracic echocardiography prior to surgery.[13]
In our study AVR and MVR was done in 3.3% each but it did not affect in hospital mortality however Abe and Komatsu suggested that AVR or mitral valve regurgitation could be related to late death[14].
Myocardial protection strategies are very important in patients with congestive heart failure or coexistent lesions. In our study, we achieved myocardial

protection by giving cold blood cardioplegia, antegrade as well as retrograde in some cases. We were able to achieve complete myocardial protection as none of our patients had low cardiac output syndrome postoperatively requiring any assist device. Other surgical techniques for myocardial protection can also be used such as On-pump beating-heart surgery[15,16].

There are three approaches to repair ruptured aneurysms of the sinus of Valsalva: via the terminal chamber, via the aortic root, and via a combined approach. In our patients, we used the Aortic root approach. However, others propose that a combined approach offers more advantages[17].

In hospital mortality after surgical correction is zero percent in our study which includes almost all types of RSVA varients;1. RSVA 2. RSVA plus VSD 3. RSVA plus AR 4. RSVA plus MR. In a retrospective study done by Sabit Sarikanya in 2013, there were 55 patients who underwent surgical treatment of RSVA. The hospital mortality rate was 3.6%. According to this study 10 and 15 years survival was 93.4+-3.7% and 87.1+-5.6%[3,18-19].

CONCLUSION

Ruptured Sinus of Valsalva is a surgical emergency. The surgical outcomes in these patients are encouraging with good survival and low complication rate.

Author's Contribution

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Conflict of Interest: The study has no conflict of interest to declare by any author.

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