Outcome of Surgical Repair of Ruptured Sinus of Valsalva Aneurysm

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Aneurysm of sinus of valsalva is a rare anomaly. Here, we analyze retrospectively patients operated at PIC during 93 and 98.Sixteen cases of ruptured aneurysm of sinus of valsalva were operated upon at PIC. The majority arose from the right coronary sinus. The right ventricle was the most common chamber of rupture (62.5%). Ventricle septal defect was associated in 7 patients, of which 5 were supracristal type. The VSD was most common in aneurysm arising from the right coronary sinus 5 cases. Aortic regurgitation was found in 7 patients. In only 2 cases it was severe enough to have aortic valve replacement. The defects were closed through aortic root alone in two patients, while in rest of the cases combine approach was used (aortic root & chamber of rupture were opened). In only two cases aortic valve repair was done.. There was no immediate mortality, only one patient died in late follow up. Repair of RSVA through an aortotomy with or without cardiotomy permits inspection of the aortic root complex and facilitate aortic valve repair. Surgery for aneurysm of sinus of valsalva yields gratifying result and it should be as soon as the condition is diagnosed.

Key words. Rupture, sinus of valsalva, surgical treatment

Congenital sinuses of valsalva aneurysms are thin walled tubular outpouching, nearly always in the right sinus or adjacent half of the noncoronary sinus. They have an entirely intracardiac position and may rupture into the right (or rarely left) heart chambers to form an aortocameral fistula. The first repair of ruptured sinus of valsalva aneurysm was made in 1956[1,2]. The surgical treatment of this anomaly has evolved since this early experience. Long term survival after surgical treatment of ruptured sinus of valsalva aneurysm is excellent. The risk of recurrent fistula or VSD is minimal in the current era. Repair of ruptured sinus of valsalva aneurysm through an aorototomy with or without cardiotomy permits inspection of aortic root complex and facilitates aortic valve repair.

Patients and Methods

From Jan 1993 to April 1998,16 patients underwent operation of ruptured sinus of valsalva aneurysm .The incidence among our cardiac surgical population was 0.56%. The ages of the 12 male 4 female patients ranged from 12 years to 42 years (median 23 years).

Fifteen patients were symptomatic, in 12 patients, the onset of symptoms was insidious. While in 4 patients the onset of symptoms was sudden. Shortness of breath, tachycardia and a feeling of retrosteranal tightness were the main complaints. All the patients were having clinical finding of machinery type murmur. The peripheral pulses often had a bounding collapsing quality. Normal sinus rhythm was present in 15 patients & one patient had atrial fibrillation.

Two-dimensional echocardiography was the main line of investigation, only in one patient cardiac cathetrisation was carried out. Six patients were having VSD but in one patient echo was unable to diagnose VSD.Only two patients were having severe aortic regurgitation while it was moderate in two & mild in three. Surgical repair was carried out using cardiopulmonary bypass with moderate hypothermia (30-32 c). Antegrade cold crystalloid cardioplegia was used for myocardial preservation. In the early part of the series, two right atrial fistula were closed through a right atriotomy after excision of aneurysmal sac & the resulting defects were closed directly. Later on a combined approach through a cardiotomy& aortotomy was used. Seven patients were having associated VSD, 5 were of supracristal type. VSD defects &ruptured sinus of valsalva aneurysm were closed with the help of a single dacron patch in 4 patients while in rest of the 3 patients, two separate patches were used.

Results

The origin & exit of the ruptured sinus of valsalva aneurysm were variable. 12 patients had a connection between the right sinus of valsalva & the right ventricle, in two, the fistula joined the non coronary sinus of valsalva to the right atrium &in 2,the fistula was between the right sinus of valsalva and the right atrium. The rupture holes were invariably at the distal end of the aneurysm, either single or multiple.

In the majority of patients with a subarterial VSD, the ruptured sinus of valsalva aneurysm protrude through the right upper part of the VSD without any muscular boundary with the later, in a minority, the ruptured sinus of valsalva aneurysm was separated from the VSD by a narrow bundle of muscle. The VSD was crescent shaped when it was adjacent to the ruptured sinus of valsalva aneurysm & was round when it was separated from it.

The 12 ruptured sinus of valsalva aneurysm , to the right ventricle were approached through a right ventriculotomy.The windsock was excised from the aorototomy after excising the sac & the defect was closed with the help of a dacron patch.

Discussion

In 1840 , Thurnam[3] published the first important article on ruptured sinus of valsalva aneurysm , in which he outlined the clinical features of abnormal communication between the aorta and the pulmonary circulation . Although in 1919 Abbottt[4] suggested that ruptured sinus of valsalva

aneurysm is of congenital origin, many reports in the following decades considered this condition to be syphilitic or bacterial in origin[5]. It is now generally accepted that the essential lesion in the vast majority of sinus aneurysm is a separation of the aortic media of the sinus from the media adjacent to the hinge line of the aortic valve cusp[6]. The congenital weakness in this region , which result from absence of normal aortic tissues and media or a genetic defect of these tissues , gradually gives way under aortic pressure to form an aneurysm .Rupture rarely occurs in infancy , and in our and other series , the majority of patients have surgery between 20-40 year. of age[9].

The infrequency of severe symptoms at the time of rupture in the majority of patients may be because most ruptures initially are small. It has been suggested that acute symptoms at the time of rupture may be less frequent when a subarterial VSD is also present[10] and more frequent when there is associated aortic incompetence[11].

Echocardiography has reduced the need for confirmatory angiography[12]. Most patients are easily imaged with pericardial or transesophageal echocardiography. Important observations include (1) which sinus of valsalva is involved; (2) which cardiac chamber the fistula enters(3) magnitude of associated aortic valve regurgitation (4) associated anomalies including presence and type of VSD, right outflow tract obstruction , and bicuspid aortic valve (5) Doppler measurement of right heart pressures ; and (6) associated complications such as endocarditis vegetation .

Other sinus anomalies can mimic sinus of valsalva aneurysm . In the presence of a VSD , especially when subarterial in location , the sinus of valsalva can prolapse through the defect without a significant associated sinus aneurysms . However , the combined lesion of a VSD, even though hemodynamically small and an unsupported aortic cusp with variable aortic valve regurgitation should be recognized as an unstable condition that commonly leads to progressive aortic insufficiency and deserves consideration of early surgical repair[11]. In our early experience , the aneurysms was approached through the cardiac chamber into which it ruptured . More recently, we used a combined approach in which both the involved chambers and the aortic root are opened . This combined approach allows meticulous closure of the fistula (and if present, VSD) through the chamber of entry and also permits inspection of the aortic root complex to ensure that true anatomic correction of the ruptured sinus of valsalva aneurysm is achieved and distortion of aortic valve cusp is avoided . Ruptured sinus of valsalva aneurysm fistulas, when present, associated aortic insufficiency may not permit effective myocardial protection through standard aortic route administration of cold cardioplegic solution .And additional advantage of the aortotomy is that it allows selective perfusion of the coronary ostia in larger patients . The Ruptured sinus of valsalva aneurysm can also be approached through the aortic route[13].

Aortic valve abnormalities and incompetence are common in patients with Ruptured sinus of valsalva aneurysm ; our series have an incidence of aortic valve insufficiency in 7 out of 16 patients . In other major series , which includes unruptured aneurysms , the incidence of aortic insufficiency ranges up to 75% . The present study confirms that predisposing factors for aortic insufficiency is an associated subarterial VSD which was present in 5 of 7 of our patients with aortic insufficiency[14]. In addition to prolapse of an unsuppported aortic cusp, is second mechanism that produces aortic insufficiency in Ruptured sinus of valsalva aneurysm is the Bernoulli effect during systole , which tends to pull the related aortic cusp into the VSD .

In summary, the risk for recurrent fistula or VSD is minimal in the current era . Rate aortic insufficiency is still a risk. Repair of ruptured sinus of valsalva aneurysm through an aorototomy with or with out cardiotomy permits inspection of the aortic root complex & facilitates aortic valve repair; this approach may reduce the incidence of late aortic insufficiency .

References

1. Meyer J, Wukasch DC, Hallman GL, Cooley DA. Aneurysm and fistula of the sinus of Valsalva: clinical considerations and surgical treatment in 45 patients. Ann Thorac Surg. 1975;19:170-179.
2. Lillehei CW, Stanley P, Varco RL. Surgical treatment of ruptured aneurysms of the sinus of Valsalva. Ann Surg. 1957;146:459-472.
3. Thurnam J. On aneurisms, and especially spontaneous varicose aneurisms of the ascending aorta, and sinuses of Valsalva: with cases. Med Chir Tr. 1840;23:323-384
4. Abbott ME. Clinical and developmental study of a case of ruptured aneurysm of the right anterior aortic sinus of Valsalva: leading to communication between the aorta and base of the right ventricle, diagnosed during life. Opening in anterior interventricular septum (probably bulbar septal defect). Malignant endocarditis. In: Contributions to Medical and Biological Research. Vol. 2. New York, NY: Hoeber PB; 1919:899-914
5. Scott RW. Aortic aneurysm rupturing into the pulmonary artery: report of two cases. JAMA. 1924;82:1417-1420.
6. Venning GR. Aneurysms of the sinuses of Valsalva. Am Heart J. 1951;42:57-69.
7. Edwards JE, Burchell HB. Specimen exhibiting the essential lesion in aneurysm of the aortic sinus. Proc Staff Meet Mayo Clin. 1956; 31:407-412.
8. Ainger LE, Pate JW. Rupture of a sinus of Valsalva aneurysm in an infant: surgical correction. Am J Cardiol. 1963;11:547-551.
9. Taguchi K, Sasaki N, Matsuura Y, Uemura R. Surgical correction of aneurysm of the sinus of Valsalva: a report of forty-five consecutive patients including eight with total replacement of the aortic valve. Am J Cardiol. 1969;23:180-191.
10. Sakakibara S, Konno S. Congenital aneurysm of the sinus of Valsalva associated with ventricular septal defect: anatomical aspects. Am Heart J. 1968;75:595-603.
11. Kirklin JW, Barratt Boyes BG: Congenital aneurysm of the sinus of valsalva. In Kirklin JW, Barratt Boyes BG eds. Cardiac Surgery. New York NY, Churchill Livingstone, 1993; 825-839.

12. Kiefaber RW, Tabakin BS, Coffin LH, Gibson TC. Unruptured sinus of Valsalva aneurysm with right ventricular outflow obstruction diagnosed by two-dimensional and Doppler echocardiography. J Am Coll Cardiol. 1986;7:438-442.
13. Chiang CW, Lin FC, Fang BR, Kuo CT, Lee YS, Chang CH. Doppler and two-dimensional echocardiographic features of sinus of Valsalva aneurysm. Am Heart J. 1988;116:1283-1288.
14. Mayer E, Ruffmann K, Saggau W, Butzmann B, Bernhardt-Mayer K, Schatton N, Schmitz W. Ruptured aneurysms of the sinus of Valsalva. Ann Thorac Surg. 1986;42:81-85.