THE SURGICAL REPAIR OF RUPTURED SINUS OF VALSALVA ANEURYSMS

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SUMMARY

Over a period of nine years, from June 1976 through May 1985, 18 cases of ruptured sinus of Valsalva aneurysms were seen at the University Hospital, Kuala Lumpur (UK KL). Seven of these cases were treated surgically. The majority of patients were males, with a mean age of 26.6 years. All cases were symptomatic. The site of aneurysm was the right coronary sinus in five patients and the non-coronary sinus in two patients. All aneurysms ruptured into the right ventricle. The fistula was closed via a transaortic approach. In addition, repair of the right heart chamber was necessary in six patients. There were no deaths. Clinically significant morbidity included aortic regurgitation in one patient and residual fistula requiring reoperation in another. The long term follow-up at two years was excellent.

INTRODUCTION

Operative correction of a ruptured sinus of Valsalva aneurysm was first reported independently in 1957 by Lillehei and coworkers,[1] and by Morrow and associates.[2] Since then, numerous papers[3,4,5,6] have attested to both the rarity of the condition in the West as well as to the effectiveness and safety of surgical repair. However, reports from Japan[7,8] and China[9] have noted a much higher cincidence of this entity. It is our purpose to reaffirm this fact by reporting our experiences at the University Hospital and to contribute our results to the growing body of evidence that operative correction is indeed the treatment of choice.

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MATERIALS AND METHOD

Over a period of 9 years, from June 1976 through May 1985, a total of 18 patients were diagnosed to have ruptured sinus of Valsalva aneurysm (RSVA) in the Cardiothoracic Surgery Unit of the University Hospital, Kuala Lumpur. Their ages ranged from 21 to 44 years with a mean of 29.8 years. Twelve of the patients were males. Eight patients (44%) were of Chinese origin, seven (39%) were Malay and three (17%), Indian. Three patients died before they were operated upon. Six others either refused consent for various reasons or simply did not turn up for admission on the appointed date. Two patients were sent to Australia for operation during the earlier years of the Unit. The rest of the paper is concerned solely with the remaining seven patients who were operated on in the UHKL.

The characteristics of these seven patients were similar to the group's as a whole (Table 1). They were all young, their mean age being 26.6 years. Most of them were males, of either Chinese or Malay descent.

RESULTS

Clinical features

All patients were symptomatic with effort dyspnea. Only two patients had the classical history

TABLE I

PATIENT CHARACTERISTICS

Age	: range	=	21 – 36 years
	mean	=	26.6 years
Sex	: male	=	5 (71%)
	female	=	2 (29%)
Race	: Chinese	=	3 (43%)
	Malay	=	3 (43%)
	Indian	=	1 (14%)

TABLE 2

CARDIAC CATHETERISATION DATA

Pulmonary hypertension :	none	=	3
	mild	=	3
	moderate	=	1
Qp : Qs ratio :	< 2 : 1	=	1
	2 : 1 – 3 : 1	=	2
	> 3 : 1	=	3
	not calculated	=	1

of an acute onset of sudden chest pain, one of them with hemoptysis as well. Their functional status deteriorated soon afterwards. The onset of breathlessness with exertion in the other five patients was less dramatic, being subacute (over a few weeks), in one and insidious (over a period ranging from 1–14 years) in five patients were in the New York Heart Association (NYHA) Functional Class 11b while two were in Class III.[10] A continuous murmur with a palpable thrill over the left sternal edge was detected in all patients. An appreciably widened pulse pressure of 60 mmHg and above was found in only four patients, two of whom had pulse pressures over 100 mmHg.

Investigations

The electrocardiogram was normal in two patients while showing evidence of left ventricular hypertrophy in five patients. Chest X-ray revealed increased cardiothoracic ratio and pulmonary plethora in 6 patients but was normal in 1. All patients had preoperative cardiac catheterisation and angiocardiography, the results of which are shown in Table 2.

Pathology

The site of aneurysm was the right coronary sinus in five patients and the noncoronary sinus in two others All ruptured into the right ventricle. There was an associated ventricular defect (VSD) in four patients whose aneurysms all originated from the right coronary sinus. Other associated defects, alone or in combination with the VSD, include aortic regurgitation in two patients, tricuspid regurgitation in two others, and infundibular pulmonary stenosis in one patient. The latter patient was symtomatic for 14 years. The stenosis was hence probably secondary to right ventricular hypertrophy in response to chronic pressured and volume overload.

Surgical Repair

All operations were performed under cardiopulmonary bypass and systemic hypothermia of 25-28°C. Myocardial preservation was performed using cold potassium crystalloid cardioplegia and topical hypothermia in all but one patient in whom the technique of intermittent crossclamping and ventricular fibrillation was used. The single aortic approach was used in only one patient in whom the neck of the aneurysm was closed directly with interrupted pledgetted mattress sutures. In the remaining six patients, the double approach (through the aorta and a cardiac chamber) was utilised. Four patients had direct closure of the neck of the aneurysm performed through an aortotomy. In these patients, direct closure of the fistula in one and direct closure of a VSD in another were performed through a right atriotomy while direct closure of the fistula and Dacron patch closure of the VSD were done through a right ventriculotomy in the remaining two patients. One patient had direct closure of the neck of the aneurysm and aortic valve repair per-

formed through the aorta while the VSD was closed with a patch through the main pulmonary artery. In the last remaining patient, patch closure of the neck of the aneurysm, direct closure of the VSD and aortic valve replacement were done through the aorta while his infundibular stenosis was resected through the right atrium. The duration of aortic crossclamping ranged from 33 to 106 minutes, with a mean of 59 minutes. The duration of cardiopulmonary bypass varied between 80 to 136 minutes, with a mean of 105 minutes.

RESULTS

Postoperatively, none of the patients required inotropic support. In five patients, a vasodilator (sodium nitroprusside) was needed for a short period to control postoperative hypertension. There was no hospital mortality. There were only two significant complications. The fistula reopened early postoperatively in one patient although it was closed at both ends through the aorta and the right atrium, This necessitated a reoperation about two years later when the neck of the fistula was closed directly using pledgetted sutures through an aortotomy. In another patient, hemodynamically significant aortic regurgitation developed although his functional class improved from Class III preoperatively to Class II postoperatively. In two patients, a soft early diastolic murmur was detected over the left sternal edge without any other clinical evidence of aortic regurgitation. The hospital stay ranged from 8–15 days after operation (mean = 12 days).

Follow-up

All patients were followed up for a period of six weeks to eight years, with a mean of 24 months. Except for the patient already described to be in NYHA Class II postoperatively, all patients became asymptomatic. All six patients with cardiomegaly on preoperative chest xrays showed reduction in cardiothoracic ratio to normal in their follow-up films. Digoxin could be discontinued in two patients out of the four who were on it preoperatively. Five patients were completely free of any medications. There were no late deaths.

DISCUSSION

The number of patients in our series constituted about 2.2% of all open heart operations performed within the same period. This is about five times the incidence of 0.43% quoted in a paper from the Texas Heart Institute[5] and about 16 times the incidence of 0.14% in a recent European paper[6]. Hence, we reinforce the observation that, although rare in the West, ruptured aneurysm of the aortic sinuses of Valsalva is not uncommon in the oriental population. The basic pathology in congenital aneurysms of the sinus of Valsalva is a thinning of the wall of the aortic sinus just above the annulus at the leaflet hinge due to absence of normal elastic and muscular tissue.[11] This may well prove to be a racial trait.

Diagnosis is not difficult. It is predominantly a disease of young males. Although the history of sudden breathlessness and chest pain, usually associated with an event involving heavy exertion or trauma, is classical of acute rupture, this is present in only 35% of patients[12] (about 29% in this series). The infrequency of acute symptoms at the time of rupture may be related to the fact that the rupture is initially a small one in many patients. Following the onset of the acute symptoms, there is a latent period of weeks, months or years when there is symptomatic improvement which may occur even without antifailure therapy. The latent period is then usually followed by recurrent dyspnea and signs of right heart failure.

Surgical repair is best done using the double approach – through the aorta and the involved cardiac chamber. Opening the aorta is mandatory to infuse cardioplegic solution directly into the coronary ostia, to assess the pathology under direct vision, to repair the aneurysm without distortion of the aortic valve and to deal with any aortic valve pathology. A VSD, the most commonly associated congenital cardiac defect (50-60% of patients), is best dealt with through the right atrium or ventricle. Some have used an approach through the aorta alone, but this is believed to be less satisfactory. It is particularly to be avoided when an associated VSD is present

because its repair through the aortic root risks damage to the conduction bundle. The results of surgical repair of RSVA have been excellent, with no deaths reported in many series including ours. The longterm results are also excellent, as typified in our patients showing remarkable reduction in cardiothoracic ratio and improvement or disappearance of symptoms.

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