SCIENTIFIC LETTER

ASCENDING AORTIC ANEURYSM, EXPERIENCE IN A PUBLIC HOSPITAL IN THE PROVINCE OF BUENOS AIRES

ABSTRACT

An ascending aortic aneurysm is a permanent dilatation in that artery region. Their natural history depends on their size and the weakness of the arterial wall. The surgical indication is defined based on the risk of rupture.

A retrospective analysis of the surgically treated cases in our department considers the surgical technique and postoperative complications.

Keywords: *ascending aortic aneurysm, surgical technique, Bentall surgery, hybrid or debranching method, Wheat surgery, David surgery, Yacoub surgery, Cabrol surgery.*

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INTRODUCTION

An ascending aortic aneurysm is a permanent dilatation in that region of the artery involving all three wall layers that equals or exceeds 50% of the diameter considered normal for a person of comparable age, sex, and height[1].

The natural history of aortic aneurysms depends on their size and the weakness of the arterial wall. The incidence of rupture of aortic aneurysms less than 5 cm in diameter is 1% to 2% per person per year, with a rate of progression of 0.2 cm/year; when the aneurysm is larger than 5 cm, the incidence of rupture is approximately 20%, with a rate of disease progression of 0.3 to 0.8 cm/year[2].

Ascending aortic aneurysms that cause symptoms have a higher incidence of rupture (27% survival at five years compared to 58% for asymptomatic ones). Patients are usually asymptomatic, although subcostal burning chest pain may occur because of its progression and/or expansion. Rarely, dyspnea or cough due to erosion of the bronchial tree; superior vena cava compression has also been reported with a mediastinal syndrome.

In aortic dissection, separation of the wall of the aortic layers occurs, with the formation of a false lumen that runs parallel to the normal lumen. The natural history of untreated type A dissections (according to the Stanford classification) has a very high mortality rate. In the first 24 to 48 hours, it approaches 1% to 2% per hour[2].

The Stanford classification considers the involvement of the ascending aorta independently of the site of the initial lesion (type A, involved ascending aorta; type B, not involved) (*Figure 1*).

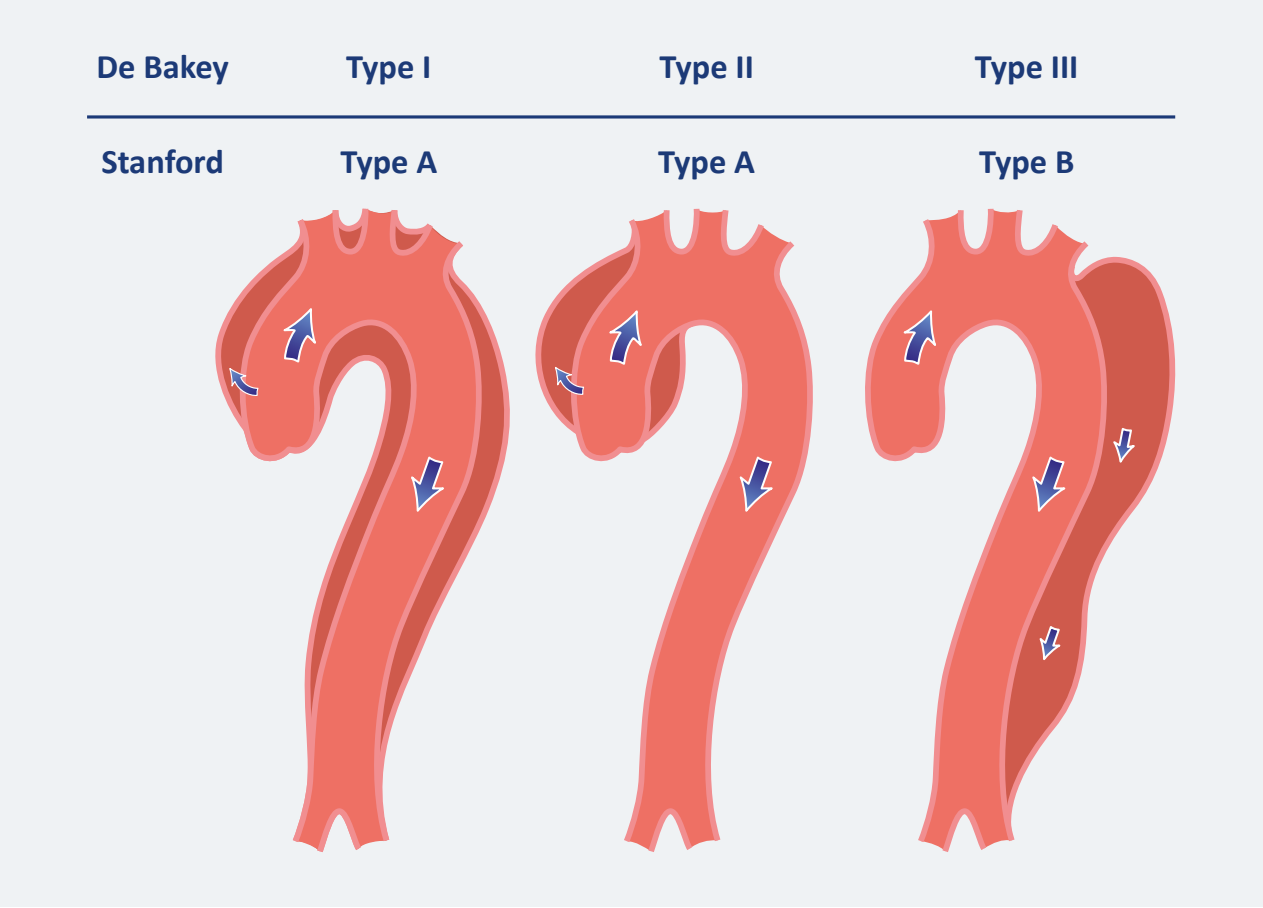

FIGURE 1. Stanford classification of aortic dissections.
From: [3]Erbel R y cols., 2014:2899

Due to the high mortality per se, these cases are not included in this analysis.

According to the Argentine Society of Cardiology, surgery is indicated for ascending aortic aneurysms with a diameter greater than 5 cm and symptomatic; if the diameter is larger, surgery is performed whether the patient has symptoms or not[2]. If the patient is asymptomatic and the aneurysm has a diameter of less than 5 cm, echocardiographic control is indicated every 3 to 6 months.

For European guidelines, the cut-off point is 55 mm in ascending aorta dilatation and 50 mm if the valve is bicuspid[1].

In aneurysms of the ascending aorta accompanying Marfan syndrome, the surgical indication is a diameter greater than 45 mm.

The basic surgical technique for treating ascending aortic aneurysms is replacing the dilated aorta with a tubular prosthetic Dacron™ graft.

Different criteria can be used to classify the possible surgical techniques used in this pathology: the extent of the aneurysm, the type of aortic substitute used, or the anastomotic technique:

1. Extent of the area affected by the aneurysm: The extent of surgery may vary depending on the involvement of regions adjacent to the tubular portion of the ascending aorta. In case of proximal involvement and dilatation of the aortic root, with or without involvement of the aortic valve, the aorta should be replaced in its sinus portion, with or without valve surgery for the replacement or preservation-repair of the aortic valve. It can extend to the distal aorta, involving the supra-aortic vessels.
2. Type of aortic substitute: Depending on the proximal extent of aortic pathology, a synthetic valved Dacron™ graft may or may not be used.
3. The main specific procedures on the ascending aorta and aortic root depend mainly on the extent of the aneurysm and the condition of the aortic root and valve, but also on other factors such as the underlying pathology, the patient's life expectancy, the possibility of anticoagulation and the surgeon's preferences.

SURGICAL TECHNIQUE

In ascending aortic aneurysms with sinuses of Valsalva and normal valvular annulus, only the ascending aorta from the sinotubular junction to the beginning of the aortic arch must be replaced. If the valve is pathological, it can be replaced separately (Wheat technique).

In valve, root, and ascending aorta replacement with aortovalvular grafting (Bentall-type operation), the coronary arteries are reimplanted as coronary "buttons" on the Dacron™ graft. In some cases, coronary reimplantation requires prolongation by Dacron™ tubes (Cabrol technique).

Valve-sparing aortic root replacement procedures can be classified into two major groups: the remodeling or Yacoub technique and the reimplantation technique or the David technique. In both procedures, the aortic valve cusps must be normal, and valve insufficiency is secondary to aortic root dilatation.

A hybrid approach, known as debranching[3], can address the aortic arch by surgical bypass of the neck vessels and subsequent exclusion of the aneurysm with an endoprosthesis.

The surgeon chooses the technique. In our service, we do not have a stock of supplies, but we depend on the provision by the State or social security. Endoprostheses are often unavailable for emergency use, so they are performed in a second stage. However, patients in our center would have required endoprosthesis in a second stage (hybrid method or debranching), but they did not reach that stage due to poor clinical evolution.

METHOD

This study evaluates the cases of ascending aortic aneurysms treated in our department in the last four years. We consider the preoperative status, the decision to perform emergency surgery or not, and, depending on the surgical technique chosen, complications and length of hospital stay will be evaluated. The aim is to correlate surgical technique with postoperative morbimortality; immediate complications and hospitalization time are variables.

RESULTS

Table 1 shows the results of this study. Concerning the previous conditions of the patients, it can be appreciated that those with ages below 50 years and arterial hypertension as the only comorbidity presented a lower incidence of complications and less hospitalization time.

In terms of mortality, the highest incidence was seen in cases admitted as emergencies, especially with pathology involving the aortic arch.

In one case (a patient with a history of chronic obstructive pulmonary disease), a longer postoperative intubation time was recorded. Even so, the sample is too small to establish an association.

CONCLUSIONS

There is no relationship between surgical technique and morbimortality, nor is there any relationship between days of hospitalization directly related to postoperative complications.

The involvement of the arch was associated with higher mortality, which reached almost 70%.

The analysis shows that risk factors and factors inherent to the patient would be the determining factors of postoperative evolution, which would not be directly related to the technique chosen.

Declarations

The authors declare no conflict of interest.

Year	N.° of surgeries	Surgical technique (n)	Complications (n)	Days of hospitalization (average)	Age (years)	Comorbidities	Aortic disease
2022	5	Ascending aorta replacement (3)	None (3)	10	50	AHT (80%)	Aneurysm
		Bentall surgery (2)	Prolonged intubation (1)		38	Marfan syndrome	Aneurysm
2021	8	Bentall surgery (2)	Mediastinitis (1)	44	41	Marfan syndrome	Dissection
			Prolonged OTI (1)		65	AHT and COPD	Aneurysm
		Ascending aorta replacement (4)	Trombophlebitis (1)	33	51	Marfan syndrome	Dissection
			None (2)		25	Marfan syndrome	Aneurysm
					66	AHT	Aneurysm
			AV block (1)		56	None	Aneurysm
		Hybrid technique (*debranching*) (1)	Postoperative death	7	65	Emergency	Dissection
		Wheat surgery (1)	None	32	44	AHT	Aneurysm
2020	4	Aorta replacement (1)	Death due to lower limb ischemia	Intraoperative death	54	Obesity	Aneurysm
		Hybrid technique (*debranching*) (2)	Prolonged OIT and mediastinitis (1)	18	32	None	Aneurysm
			Death (1)	Intraoperative death	44	Acute coronary syndrome	Dissection
		Bentall surgery (1)	None	8	77	AHT	Aneurysm
2019	10	Bentall surgery (7)	None (4)	7	50	AHT (80%) and MRS (1)	Aneurysm
			Death (3)	Intraoperative death	58	AHT and CRF	Aneurysm
				Intraoperative death	34	AHT	Dissection
				Intraoperative death	32	None	Aneurysm
		Hybrid technique (*debranching*) (2)	None (1)	9	52	AHT	Dissection
			Death (1)	Intraoperative death	56	Emergency and IDH	Dissection
		Ascending aorta replacement (1)	Death (1)	Intraoperative death	59	Haematoma of the ascending aorta	Dissection

TABLE 1. Results of the retrospective analysis of aortic aneurysm surgeries in a public hospital in the province of Buenos Aires, Argentina
AHT: arterial hypertension, AV: atrioventricular, COPD: chronic obstructive pulmonary disease, CRF: chronic renal failure, IDH: intramyocardial dissecting haematoma, MRS: myocardical revascularization surgery, OIT: orotracheal intubation.

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