CASE REPORT
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Two-stage surgery of the ascending aorta and aortic arch. An option for managing aortic pathology

Cirugía de aorta ascendente y arco aórtico en dos etapas. Una opción para el manejo en la patología aórtica

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ABSTRACT

Acute Stanford A aortic dissection is a condition with a high mortality rate that requires timely diagnosis and surgical treatment. We present the case of a 58-year-old patient with Stanford A aortic dissection, who initially underwent supracoronary aortic replacement with woven dacron. Nine days later, aortic arch replacement and revascularization of the supra-aortic trunks were completed in a second operation. The clinical outcome was favorable.

Keywords: aortic aneurysm, aortic dissection, ascending aorta, aortic arch, aortic surgery, surgical treatment.

RESUMEN

La disección aórtica aguda Stanford A es una patología con alta mortalidad que requiere un diagnóstico y tratamiento quirúrgico oportuno. Se presenta el caso de un paciente de 58 años con disección aórtica Stanford A, al cual se le realiza inicialmente una sustitución de aorta injerto de dacrón supracoronario. Nueve días después, se completó el reemplazo del arco aórtico y la revascularización de los troncos supraaórticos en una segunda operación. La evolución clínica fue favorable.

Palabras clave: *aneurisma aórtico, disección aórtica, aorta ascendente, arco aórtico, cirugía aórtica, tratamiento quirúrgico.*

Acute DeBakey type I aortic dissection is a critical and lethal pathology requiring urgent diagnosis and surgical treatment.[1,2] Despite continuous progress in surgical techniques, brain protection methods, and perioperative management, perioperative mortality remains high, with some reports indicating rates as high as 20%.[2] Surgical intervention for DeBakey type I aortic dissection is recognized as the gold standard and is often pivotal for patient survival.[3,4] This procedure usually involves the repair of the ascending aorta and, in many cases, the placement of a graft to restore aortic integrity.[4,5] However, the intricate nature of the surgery combined with the severe condition of the patients creates considerable challenges and a high probability of postoperative complications.

Given that the aortic dissection flap typically extends beyond the ascending aorta in the majority of patients, the ultimate fate of the residual dissected aorta holds increasing relevance for these survivors.[3] More than 10% of acute aortic dissection cases that undergo initial repair subsequently require one or more additional surgical interventions due to residual distal dissection.[1,4]

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In select instances, the intricate nature of the disease and the patient's precarious condition necessitate a stepwise, staged surgical approach.[2,3] This methodology facilitates a safer and more effective surgical intervention, meticulously tailored to the unique circumstances of each patient. This strategy is especially valuable for individuals with substantial comorbidities or those presenting with an unstable hemodynamic status, where immediate, single-stage surgery might confer a prohibitive risk of complications.[4,6] Through this deliberate approach, the objective is not only to effectively address the aortic dissection but also to optimize perioperative care and mitigate the potential for postoperative complications.

CASE DESCRIPTION

A 58-year-old male patient presented with a clinical presentation of oppressive chest pain, with sudden onset during aerobic physical activity, radiating to the interscapular region, associated with diaphoresis and dyspnea for 10 days. The patient had an 8-year history of systemic arterial hypertension and dyslipidemia, both under treatment.

The patient was evaluated in three hospital units for the clinical presentation described, with suspected acute coronary syndrome, and was discharged after the latter was ruled out.

Figure 1:

Preoperative computed tomography reconstruction of the aortic dissection in the ascending and descending aorta.

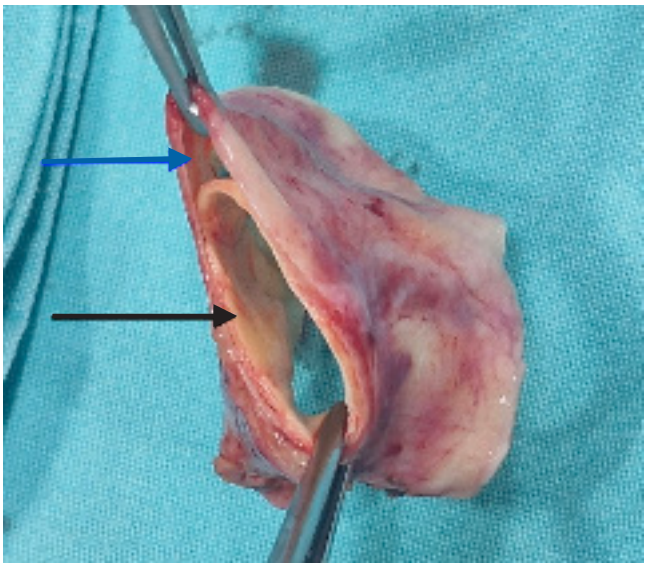

Figure 2: Resected ascending aorta showing true lumen (black arrow) and dissection flap with false lumen (blue arrow).

During a fourth evaluation, a thoracoabdominal CT angiography was performed, diagnosing a Stanford A, De Bakey type I aortic dissection, for which he was referred to our institution. The patient was admitted hemodynamically stable. CT findings showed a diameter of 37 mm at the level of the sinuses of Valsalva and 48 mm in the ascending aorta, with a dissection flap starting in the aortic root and extending to the supra-aortic trunks. Clinically, there was no cerebral malperfusion syndrome, limb or abdominal trunk involvement, and right renal hypoperfusion was a CT finding. Echocardiogram showed an ejection fraction of 65% and a trileaflet aortic valve with mild regurgitation *(Fig. 1)*.

The initial surgical procedure was performed on the patient's second day of admission. Cardiopulmonary bypass was achieved via femoral arterial cannulation and venous cannulation in the right atrium. The patient's temperature was lowered to 30 °C. The procedure involved resection and replacement of the ascending aorta in the supracoronary region and proximal to the brachiocephalic trunk *(Fig. 2)*. The aortic tissue was reinforced at the distal and proximal ends with intraluminal and extraluminal Teflon bands, and a 30-mm Dacron woven tube was used to replace the resected aorta. Direct examination of the aortic valve revealed no structural abnormalities. The aortic cross-clamping time was 133 minutes, and extracorporeal circulation was 168 minutes.

The postoperative course was favorable. During the postoperative period, the presence of systemic arterial hypertension refractory to medical treatment was noted. The postoperative control CT scan identified a dissection flap distal to the cranial end of the graft, which perpetuated

pressurization of the false lumen toward the supra-aortic and abdominal trunks. For this reason, it was decided to perform a second intervention to replace the aortic arch with stabilization of the dissection flap and debranching of the supra-aortic trunks.

The second intervention was performed nine days after the first surgery, in the context of surgery on a patient with clinical stability. Cannulation for cardiopulmonary bypass was performed via a central line due to the impossibility of passing guidewires for femoral cannulation. The arterial line was connected via a Dacron woven chimney anastomosed to the graft in the ascending aorta position, and the venous drainage line was introduced through the right atrium. Body temperature was reduced to deep hypothermia as a measure of cerebral and visceral protection. The aortic arch was resected, reinforcing the distal lumen with Teflon bands. An anastomosis was created with a 28-mm Dacron woven tube. Debranching revascularization was then performed to the left subclavian artery, left carotid artery, and brachiocephalic trunk. The procedure ended with a circulatory arrest time of 115 minutes, aortic cross-clamping of 218 minutes, and extracorporeal circulation of 291 minutes *(Fig. 3)*.

The patient's postoperative course was uneventful, with stabilization of the aortic lumen and no clinical changes suggestive of poor perfusion. To date, he has not required reintervention.

COMMENT

Aortic dissection with ascending aortic involvement requires timely diagnosis and treatment. Despite its characteristic clinical presentation, the spectrum of conditions that can be differentially diagnosed is broad. Therefore, a high level of suspicion and a comprehensive and exhaustive evaluation of the case, leading to appropriate decision-making in an optimal timeframe, have the potential to have a positive impact on the patient's outcome. The best chances of survival in most patients are associated, above all, with the time elapsed from the onset of symptoms to the time of surgical resolution.[3,6,7]

The surgery to be performed in patients with aortic dissection is strictly related to the patient's preoperative condition, prognosis, the structures involved, and the presence or absence of secondary clinical alterations. In the case of this particular patient, the indication for aortic valve preservation is evident, since there were no structural or hemodynamic alterations secondary to valve dysfunction, the main objective in the first intervention was to stabilize the lumen of the diseased aorta by replacing the supracoronary portion.[3-5]

The need for intervention beyond the brachiocephalic trunk in the setting of acute aortic syndromes, such as hemiarch and aortic arch replacement procedures, depends on three circumstances: the presence of primary reentry sites in the aortic arch or proximal descending aorta, the presence of cerebral or peripheral malperfusion syndrome, and the presence of aneurysmal dilatation or rupture of the aortic arch or descending aorta; these indications are presented with a class IIa recommendation and level B evidence in the 2021 American Association of Thoracic Surgery guidelines for the surgical management of acute type A aortic dissection, so the indication for surgical management limited to the ascending aorta in the patient complies with what is recommended according to the guidelines.[8]

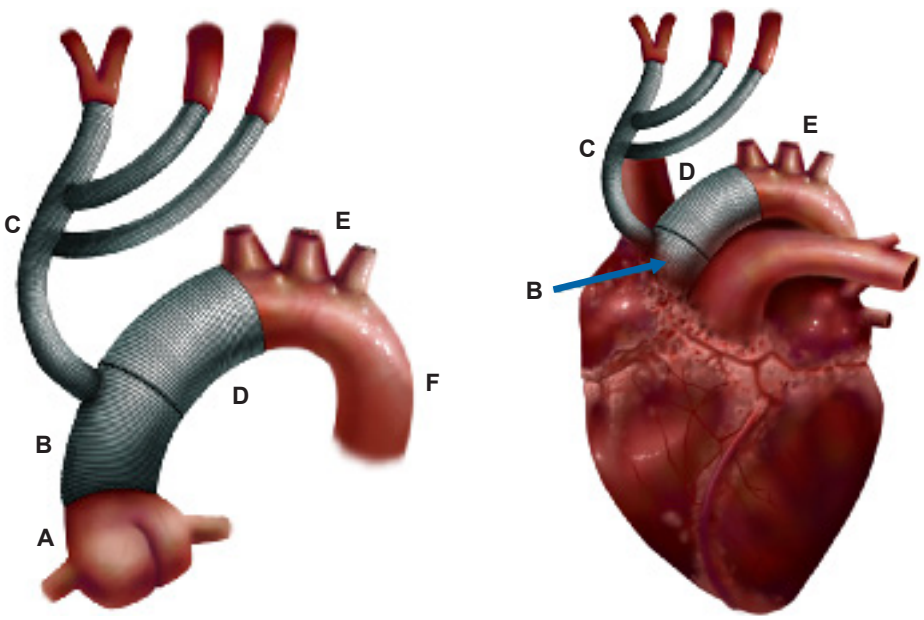

Figure 3:

Representation of the complete procedure performed. **A)** Aortic root. **B)** Dacron woven graft of the supracoronary aorta. **C)** Revascularization (debranching) of supra-aortic trunks from a proximal graft. **D)** Distal Dacron woven graft. **E)** Ligation of supra-aortic trunks. **F)** Descending aorta.

The discovery of a residual dissection flap distal to the site of the initial surgery is the primary indication for a second intervention, intended to restore flow to the true aortic lumen. The need for cerebral and visceral protection during the circulatory arrest required for aortic arch surgery requires meticulous preoperative analysis and planning. Although various strategies exist for such protection, in this case, the exclusive use of deep hypothermia during the circulatory arrest period proved effective.

Undoubtedly, the surgical management of patients with aortic dissection represents a challenge that goes beyond the technical skill required to perform the surgery. A favorable outcome is impossible without adequate analysis and functioning of Team Aorta from the moment of diagnosis to the patient's discharge.

CONCLUSIONS

Two-stage surgery represents a valid and safe strategy in patients with DeBakey type I aortic dissection, especially in cases of high anatomical and clinical complexity, optimizing surgical and clinical outcomes.

REFERENCES

1. Yang B. Does acute type A aortic dissection equal emergency aortic surgery? Ann Thorac Surg. 2023;115(5):1093-1094. doi: 10.1016/j.athoracsur.2022.12.025.
2. Di Marco L, Leone A, Murana G, et al. Acute type A aortic dissection: Rationale and outcomes of extensive repair of the arch and distal aorta. Int J Cardiol. 2018;267:145-149. doi: 10.1016/j.ijcard.2018.05.111.
3. Bhave NM, Nienaber CA, Clough RE, Eagle KA. Multimodality imaging of thoracic aortic diseases in adults. JACC Cardiovasc Imaging. 2018;11(6):902-919. doi: 10.1016/j.jcmg.2018.03.009.
4. Houben IB, Patel HJ. Acute type A aortic dissection: managing more than just the entry-tear. Semin Thorac Cardiovasc Surg. 2019;31(1):122-128. doi: 10.1053/j.semtcvs.2018.08.011.
5. Hagan PG, Nienaber CA, Isselbacher EM, et al. The International Registry of Acute Aortic Dissection (IRAD): new insights into an old disease. JAMA. 2000;283(7):897-903. doi: 10.1001/jama.283.7.897.
6. Pape LA, Awais M, Woznicki EM, et al. Presentation, diagnosis, and outcomes of acute aortic dissection: 17-year trends from the international registry of acute aortic dissection. J Am Coll Cardiol. 2015;66(4):350-358. doi: 10.1016/j.jacc.2015.05.029.
7. Zhu Y, Lingala B, Baiocchi M, et al. Type A aortic dissection-experience over 5 decades: JACC historical breakthroughs in perspective. J Am Coll Cardiol. 2020;76(14):1703-1713. doi: 10.1016/j.jacc.2020.07.061.
8. Malaisrie SC, Szeto WY, Halas M, et al; AATS Clinical Practice Standards Committee: Adult Cardiac Surgery. 2021 The American Association for Thoracic Surgery expert consensus document: Surgical treatment of acute type A aortic dissection. J Thorac Cardiovasc Surg. 2021;162(3):735-758.e2. doi: 10.1016/j.jtcvs.2021.04.053.

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