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Case Report

Morbid Obesity is Not A Contraindication to Type-A Aortic Dissection Repair: A Case Report

Arjun Malik, Samail Shahjahan, Taimoor Khan, George Krasopoulos*

Department of Cardiothoracic Surgery, John Radcliffe Hospital, Oxford University Hospitals, Headley Way, Headington, Oxford OX3 9DU, United Kingdom

***Corresponding author:** George Krasopoulos, Department of Cardiothoracic Surgery, John Radcliffe Hospital, Oxford University Hospitals, Headley Way, Headington, Oxford OX3 9DU, United Kingdom

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Abstract

Background: Obesity, particularly morbid obesity, is recognised as a significant risk factor for cardiovascular diseases such as Type A Aortic Dissection (TAAD). Despite its well-established association with adverse cardiovascular outcomes, the specific impact of morbid obesity on post-surgical outcomes for TAAD patients remains an area of limited research.

Procedure: We present the case of a 39-year-old morbidly obese male (Body Mass Index 58.41kg/m^2) with a complex medical history who presented with symptoms suggestive of Acute aortic syndrome. Following a thorough evaluation revealing extensive aortic pathology of acute type A aortic dissection, urgent surgical intervention was undertaken. The patient underwent surgical intervention that addressed the aortic dissection with specialised surgical techniques. The surgical procedure, spanning 381 minutes, involved the replacement of the native aortic valve and repairing the aortic root, ascending aorta, and proximal descending aorta. Due to the patient's morbid obesity, securing the sternotomy incision and ensuring stability of the chest wall postoperatively required additional measures. Consequently, the surgical team opted to reinforce the sternotomy closure with plates and screws, facilitating optimal wound healing and minimising the risk of postoperative complications related to chest wall instability.

Postoperative Outcome: The patient experienced a stable postoperative course with successful recovery following surgery. Postoperative assessments, including imaging and cardiac function evaluations, confirmed optimal prosthetic function and satisfactory cardiovascular status. Despite encountering mild postoperative complications such as tricuspid regurgitation and impaired right ventricular function, the patient's recovery was favourable. Successful extubation, chest drain removal, and improvement in renal function following continuous veno-venous hemodialysis were achieved, accompanied by restored mobility and the initiation of appropriate pharmacotherapy.

Conclusion: This case highlights the critical importance of preoperative planning, specialised surgical techniques, and vigilant postoperative care in achieving optimal outcomes for morbidly obese TAAD patients. Further research is needed to understand better the specific implications of obesity on surgical outcomes in this patient population.

Keywords: Aortic surgery; Cardiovascular Disease; Morbid Obesity; Surgical Complications; Surgical Outcome; Type-A Aortic dissection

Introduction

Obesity, defined by a BMI of 30kg/m² or higher, and particularly morbid obesity with a BMI of 40 kg/m² or greater, poses significant challenges, especially for individuals with heart disease, stroke, and various cancers. Recognised as a leading risk factor for various cardiovascular conditions, including TAAD, obesity triggers hemodynamic stress, hypertension, atherosclerosis, metabolic dysregulation, and compromised tissue repair [1-3]. Type A aortic dissection (T(A)AD) stands as a critical cardiovascular emergency stemming from an intimal tear in the aortic wall, often leading to sudden death. [4-6] Current literature indicates that incidence rates of T(A)AD vary globally, ranging from 2.1 to 16.3 per 100,000 persons [7,8]), with acute phase mortality rates at 73% and pre-hospital mortality rates at 49% (9). While immediate surgical intervention enhances survival rates, surgical mortality among T(A)AD patients remains high [10].

Despite extensive research on obesity-related conditions, the specific impact of morbid obesity on post-surgical outcomes for acute Type A aortic dissection patients remains understudied. In this context, our case report sheds light on the challenges. It emphasises the importance of preoperative planning, specialised surgical techniques, and vigilant postoperative care in optimising outcomes for patients with acute Type A aortic dissection and morbid obesity.

Clinical Presentation

A 39-year-old morbidly obese male (BMI-58.41 kg/m²) with a history of type 2 diabetes mellitus, fatty liver, paroxysmal atrial fibrillation, iron deficiency without anaemia, non-ischemic dilated cardiomyopathy, heart failure with reduced ejection fraction, initially presented with symptoms including breathlessness, leg swelling, fluid overload, progressive exercise intolerance, and atrial fibrillation. Following evaluation, he showed symptomatic improvement with treatment initiation for heart failure. However, subsequent imaging via Computed Tomography (CT) aortogram/coronaries revealed significant cardiac and aortic abnormalities, including a dilated aortic root (42mm), dilated ascending aorta (57mm), and a sub-acute/chronic Type-A Aortic Dissection extending from the Sinu-Tubular Junction to the left Subclavian Artery. Trans-thoracic echocardiogram findings indicated a dilated Left Ventricle with normal systolic function, dilated ascending aorta, and mild-moderate aortic regurgitation. The patient exhibited moderate lung abnormality on the Pulmonary Function Test, with a Forced Expiratory Volume-1 at 69% predicted and normal Forced Vital Capacity at 88% predicted. Despite the severity of the aortic dissection, the patient remained asymptomatic and euvolemic.

Urgent surgical intervention was promptly arranged to address the aortic dissection and mitigate the risk of potentially life-threatening complications (Figure 1).

CT Images (pre-operative)

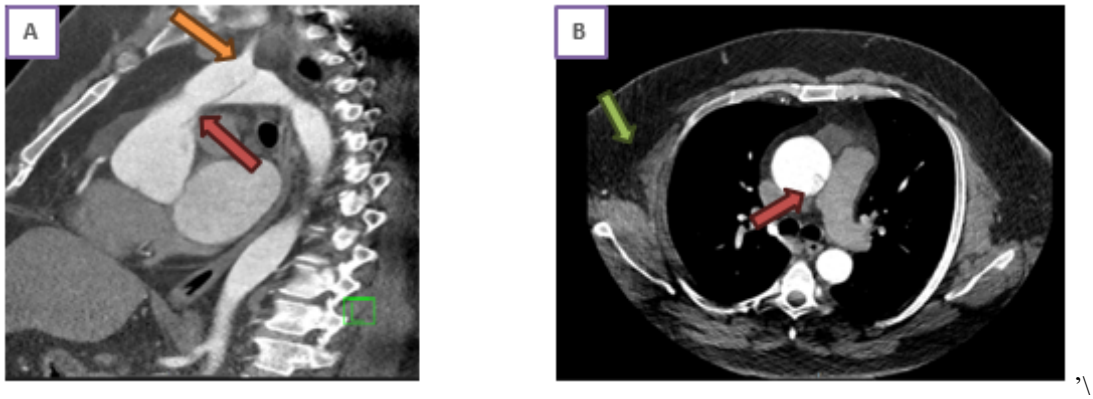

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Figure 1: A: Sagittal CT scan plane (contrast-enhanced) showing Ascending aorta dissection (red arrow) and dissection of innominate artery (Orange arrow). B: Shows chest wall soft tissue (green arrow) and dilated ascending aorta with near transaction segment of proximal ascending aorta (red arrow)

Surgical Procedure

The surgical procedure revealed a substantial tear affecting approximately 90% of the aortic wall below the Sinutubular Junction (STJ). Due to the irreparable damage to the aortic valve, a decision was made to proceed with a total root replacement. Thorough examination of the aortic arch and descending thoracic aorta with endovascular endoscopy, under circulatory arrest with antegrade cerebral perfusion, revealed another tear at the greater curvature of the aortic arch with complete transection tear of all three head and neck vessels at their origins, along with a re-entry tear in the proximal descending aorta. The surgical repair involved complete aortic root replacement in the form of a mechanical Bentall procedure and replacement of the ascending aorta, using a composite graft 25mm mechanical prosthesis and a 26mm Valsalva aortic graft. The aortic arch and proximal descending aorta were replaced with a 30/34/159 thoraflex™ hybrid graft to ensure comprehensive repair that could address both the aortic arch and the proximal descending aortic re-entry tear. An extra-anatomical bypass was required to anastomose the left subclavian artery to the ascending aortic graft via the left second intercostal space. During the operation, precise techniques were employed for cardioplegia administration (antegrade and retrograde), myocardial protection, and deairing to ensure an optimal outcome. A total of 381 minutes of cardiopulmonary bypass time and a cross-clamp time of 240 minutes were needed for the procedure. Deep hypothermic circulatory arrest (DHCA) with antegrade cerebral perfusion lasted 60 minutes.

Due to the patient's morbid obesity, securing the sternotomy incision and ensuring the stability of the chest wall postoperatively required to reinforce the sternotomy closure with plates and screws (SternaLockBlue™, Zimmer BioMed™), facilitating optimal wound healing and minimising the risk of postoperative complications related to chest wall instability.

Postoperative Outcome

Successful extubation followed 42 hours after the patient returned to intensive care. Hemofiltration was used to support the renal function during postoperative acute renal injury, leading to full recovery of the renal function within 59 hours. Postoperative recovery was favourable, with mobility regained within two days, leading to transfer to the cardiothoracic ward and ultimately discharged from the hospital on day 11 post-surgery and scheduled follow-ups at three months and one year. Post-operative CT angiogram confirmed the successful repair with complete obliteration and thrombosis of the false lumen. Follow-up CT angiogram at 4 months (check) confirmed positive remodelling of the dissected descending thoracic aorta, no evidence of dissection and excellent surgical repair. His sternum was stable and well positioned in the CT scan (Figure 2).

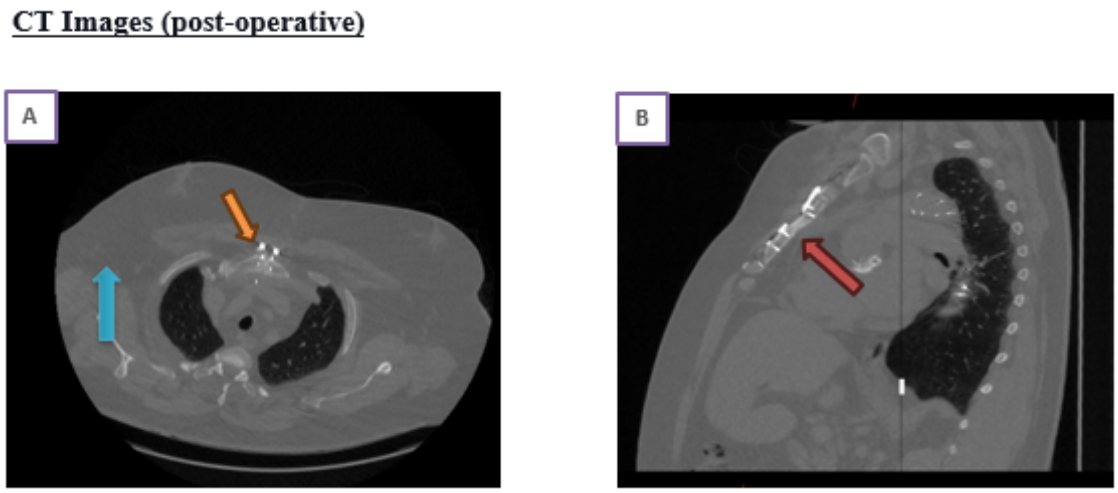

Figure 2: Post-operative follow-up CT scan 4 months post-procedure. A: Showing the sternal plate and screws in a stable position sternum (orange arrow) and chest wall soft tissue thickness showing the extent of obesity (blue arrow). B: Shows the appropriately sized and positioning of sternal screws in the body of the sternum (red arrow).

Discussion

This case report discusses the successful management of Type-A Aortic Dissection (TAAD), emphasising the challenges posed by the combination of morbid obesity and cardiovascular emergencies. It highlights the importance of specialised surgical approaches and meticulous postoperative care. Despite the well-established association between morbid obesity and adverse cardiovascular outcomes, the report asserts that morbid obesity should not be considered a contraindication to TAAD repair. The utilisation of a Bentall procedure and a thoraflex hybrid graft, along with accurate surgical techniques in sternal reconstruction, facilitated rehabilitation and healing. This highlights the significance of customised surgical strategies in addressing the complexities of aortic pathology in morbidly obese individuals. Successful recovery and careful postoperative care underscore the critical role of preoperative planning and specialised interventions in optimising outcomes. This case report provides valuable insights into the limited research on the specific implications of morbid obesity on post-surgical outcomes in TAAD patients, highlighting the fact that modern surgical techniques can overcome older impedances in offering curative surgical repair to these patients and emphasising the need for further exploration in this area.

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