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First Bentall Procedure in Dr. Mohammad Hoesin Hospital: A case report

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ABSTRACT

Introduction: The Bentall procedure is a complex surgical intervention to correct aortic root abnormalities, often associated with ascending aortic and aortic valve dysfunction. Despite advancements in improving patient outcomes, postoperative complications such as atrial fibrillation (POAF) and pleural effusions can still occur. This case report illustrates the successful management of these complications following the Bentall procedure.

Case: A 61-year-old woman with untreated severe aortic regurgitation and an aortic root measuring 5.8 cm underwent a Bentall procedure. The surgery involved aortic and right atrial cannulation, preservation of coronary buttons, aortic valve replacement with a size 21 mechanical valve via the supra-annular technique, ascending aorta replacement with a polytetrafluoroethylene (PTFE) graft, and coronary reimplantation. Postoperatively, she developed atrial fibrillation with rapid ventricular response (AF-RVR) and bilateral pleural effusions. AF-RVR was effectively managed with bisoprolol and digoxin, restoring sinus rhythm. Pleural effusions were successfully drained via chest tube insertion, relieving symptoms. These complications were likely due to surgical trauma and systemic inflammatory response, exacerbated by her age and hypertension. This case underscores the potential for postoperative complications after the Bentall procedure and highlights the importance of effective management strategies.

Conclusion: This case demonstrates successful management of postoperative atrial fibrillation and pleural effusions following a Bentall procedure. The favorable outcome underscores the importance of vigilant postoperative monitoring and a multidisciplinary approach in optimizing care after complex cardiac surgery.

Keywords: Antiarrhythmic drug therapy, Bentall procedure, chest tube insertion, pleural effusions, postoperative atrial fibrillation.

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INTRODUCTION

The Bentall procedure is a highly intricate surgical technique that involves replacing the aortic root aortic valve and reimplantation of the coronary arteries. It is a cornerstone intervention for managing complex aortic pathologies, particularly in patients with severe aortic regurgitation and significant aortic root dilation. Despite its success in improving patient prognosis and survival rates, the procedure remains associated with notable postoperative challenges.¹ Among these complications, postoperative atrial fibrillation (POAF) and pleural effusions stand out due to their potential to impact patient recovery and long-term prognosis. Patients with POAF, characterized by an irregular and often rapid heart rhythm,

can lead to hemodynamic instability, thromboembolic events, and prolonged hospital stays. Pleural effusions, fluid accumulation in the pleural cavity surrounding the lungs, can compromise respiratory function and necessitate additional interventions.^{2,3}

The development of POAF and pleural effusions after the Bentall procedure results from a multifactorial interplay of patient-specific factors, surgical trauma, and the inflammatory response inherent to cardiac surgery. Managing these complications requires a comprehensive, individualized approach to address their complexity and optimize patient outcomes.⁴ The successful management of POAF and pleural effusions also hinges on combining preventive strategies and effective treatment modalities. Prophylactic

measures, such as the judicious use of beta-blockers and other antiarrhythmic medications, can significantly reduce the incidence of POAF. Similarly, meticulous surgical techniques and interventions like posterior pericardiotomy can minimize the risk of pleural effusions.⁵

When POAF or pleural effusions occur, prompt recognition and appropriate treatment are paramount. Rate and rhythm control strategies, tailored to the patient's clinical status, can effectively manage POAF. Thoracentesis or chest tube placement and addressing the underlying cause can alleviate the symptoms and complications associated with pleural effusions.⁶ The present case report illustrates the successful management of POAF and pleural effusions following the Bentall procedure.

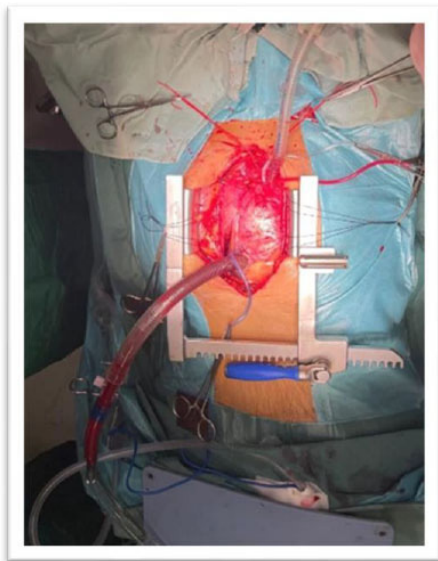


Figure 1. Aortic and Right Atrium Cannulation.

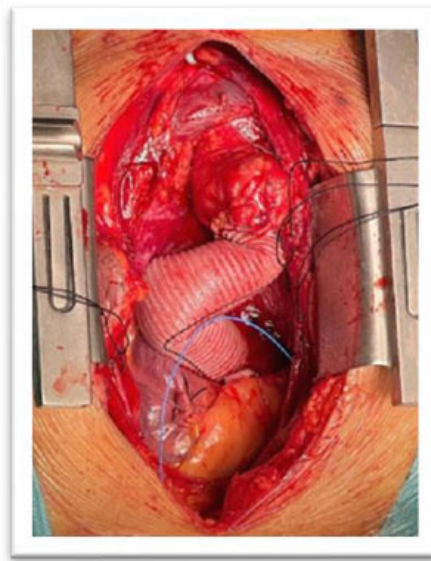


Figure 2. Ascending aorta replacement with polytetrafluoroethylene vascular graft.

CASE PRESENTATION

A 61-year-old female presented with a history of intermittent chest pain and an untreated heart murmur since twelve years ago. She also reported nocturnal shortness of breath. Physical examination identified a heart murmur at the left parasternal border in the third intercostal space. Her medical history was significant for hypertension, which was managed with multiple medications, including candesartan, nitroglycerin (Nitrokaf), spironolactone, lansoprazole, furosemide, and amlodipine.

Preoperative transthoracic echocardiogram showed severe aortic regurgitation with an aortic root diameter of 5.8 cm, but the left ventricular ejection fraction was preserved. Laboratory results showed mild anemia and normal renal function, with coagulation parameters within the normal range. The Bentall procedure was cannulated via the aorta and right atrium (Figure 1). The coronary buttons were preserved, the aortic valve was replaced with a mechanical valve (size 21) using a supra-annular technique with nine pledget sutures, and the ascending aorta was replaced with a polytetrafluoroethylene (PTFE) vascular graft (Figure 2). The procedure was concluded with coronary reimplantation. The patient was transferred to the CVICU in stable condition.

The development of atrial fibrillation

complicated the postoperative period with a rapid ventricular response (AF-RVR) and bilateral pleural effusions. The AF-RVR was managed effectively with medications, including bisoprolol and digoxin, which helped to control the heart rate and restore a normal rhythm. The pleural effusions necessitated chest tube insertion for drainage. The patient responded favorably to the treatment, and the AF-RVR and pleural effusions resolved. The case demonstrates the successful management of complex postoperative complications following cardiac surgery, highlighting the importance of vigilant monitoring and timely intervention to ensure optimal patient outcomes.

DISCUSSION

The Bentall procedure, a complex surgical intervention involving the replacement of the aortic root, aortic valve, and reimplantation of the coronary arteries, is a cornerstone in managing complex aortic pathologies (Figure 3).

Postoperative atrial fibrillation (POAF), a recognized complication of cardiac surgeries involving the aortic root, was exacerbated by the patient's advanced age and history of hypertension. Effective management using bisoprolol and digoxin underscored the importance of prompt recognition and targeted treatment of this arrhythmia. At the same time, pleural

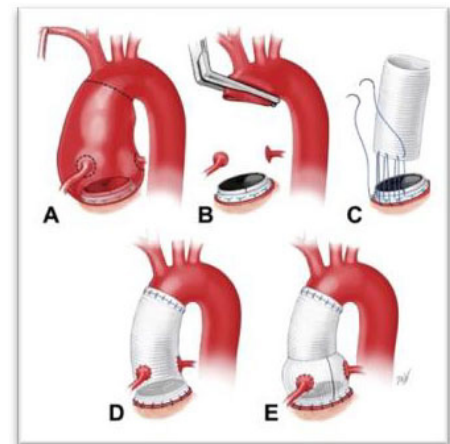


Figure 3. Completion of Bentall procedure.⁷

effusions were successfully addressed through chest tube insertion, relieving symptoms and improving respiratory function. This case highlights the critical role of comprehensive postoperative care and individualized treatment strategies in optimizing outcomes for complex cardiac procedures.^{1,2,8}

The occurrence of bilateral pleural effusions in this patient is consistent with the understanding that these are a frequent complication after cardiac surgery. The successful resolution of the effusions through chest tube insertion emphasizes the importance of timely intervention in managing this condition. The absence of any complications related to the chest tube insertion further highlights the safety and efficacy of this procedure.³ The successful management of these postoperative complications underscores the critical role of a multidisciplinary approach involving cardiologists, cardiac surgeons, and intensivists. The collaborative efforts of these specialists ensured the timely diagnosis, effective treatment, and comprehensive care of the patient, ultimately leading to a favorable outcome.⁴

The patient's history of hypertension and untreated heart murmur likely contributed to the development of POAF, underscoring the intricate interplay between patient-specific factors and surgical stress. The systemic inflammatory response triggered by the Bentall procedure, combined with surgical trauma, likely also contributed to the development of pleural effusions.^{6,9} These complexities highlight the need for a personalized approach to postoperative

care, emphasizing vigilant monitoring and timely intervention. Preventive strategies, such as beta-blockers or meticulous surgical techniques like posterior pericardiotomy, may reduce the incidence of these complications. Prompt recognition and management of POAF and pleural effusions were pivotal in preventing further complications and ensuring the patient's recovery.^{10,11}

Effectively managing AF-RVR with bisoprolol and digoxin highlights the importance of rate and rhythm control strategies in restoring normal sinus rhythm and preventing hemodynamic instability. The medications should be tailored to the patient's clinical status and comorbidities. The successful drainage of pleural effusions through chest tube insertion underscores the efficacy of this intervention in relieving symptoms and improving respiratory function. The absence of complications related to the procedure further supports its safety profile.^{6,12,13}

This case report highlights the successful surgical management of severe aortic regurgitation with a preserved left ventricular ejection fraction using the Bentall procedure, emphasizing the effective use of advanced surgical techniques and vigilant postoperative care to address complications such as atrial fibrillation with rapid ventricular response (AF-RVR) and pleural effusions. A notable strength of this report is its detailed description of surgical and postoperative interventions, providing valuable insights into managing complex cardiac surgery cases. However, the limitations include the lack of long-term follow-up data to assess the durability of the mechanical valve and PTFE graft and the absence of a broader discussion on differential diagnoses or alternative management strategies for similar clinical presentations.

CONCLUSION

This case report showcases the successful management of postoperative atrial fibrillation and pleural effusions after the Bentall procedure through antiarrhythmic drug therapy and chest tube insertion, respectively. The patient's favorable outcome underscores the

importance of vigilant monitoring and a multidisciplinary approach in optimizing patient care following complex cardiac surgery. Further research is warranted to investigate the role of preventive strategies and develop innovative therapeutic approaches for managing postoperative complications in this complex surgical context.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTION

All authors equally contributed to the preparation of this report.

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ETHICAL CONSIDERATION

The patient has provided informed consent and has agreed to this writing.

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