

## AN EFFECTIVE LOW-DOSE SPINAL ANESTHESIA FOR PARTIAL HIP REPLACEMENT SURGERY IN A MITRAL VALVE STENOSIS PATIENT

### Muhammad Saad

Senior Registrar, Department of Anaesthesiology, Surgical ICU & Pain Management, Dr Ruth K M Pfau Civil Hospital Karachi, Dow University of Health Sciences, Pakistan.

[muhammad.saad@duhs.edu.pk](mailto:muhammad.saad@duhs.edu.pk)

### Shaista Ismail

Senior Registrar, Department of Anaesthesiology, Surgical ICU & Pain Management, Dr Ruth K M Pfau Civil Hospital Karachi, Dow University of Health Sciences, Pakistan.

### Maryam Muhammad Bashir

Consultant, Department of Anaesthesiology, SMBB Institute of Trauma Karachi, Pakistan

### Marium Amjad

Dow University of Health Sciences, Pakistan

Author Details
<b>Keywords:</b> Mitral valve stenosis, hip replacement, spinal anesthesia, femur fracture, hip arthroplasty
Received on 16 Feb 2026 Accepted on 26 Mar 2026 Published on 14 Apr 2026
Corresponding E-mails & Authors*: <b>Muhammad Saad</b> <a href="mailto:muhammad.saad@duhs.edu.pk">muhammad.saad@duhs.edu.pk</a>

### Abstract

Determining the appropriate anesthesia for mitral valve stenosis patients continues to be controversial. The choice between spinal and general anesthesia is intricate, as both have benefits and drawbacks. We present the anesthetic management of a 60-year-old female with severe mitral valve stenosis and a closed left intertrochanteric femur fracture. Under spinal anesthesia of 7.5 mg of 0.5% hyperbaric bupivacaine, a satisfactory left partial hip replacement was performed. Anesthesia adequate for the operation was ensured by the loss of sensation up to the

umbilicus. On the eighth day after surgery, the patient was discharged with an uneventful recovery.

## INTRODUCTION

In most of the developing world, rheumatic heart disease (RHD) remains the primary reason for mitral stenosis. In 2015, 33.4 million cases of RHD took place globally. South Asia, Oceania, and central sub-Saharan Africa experience the highest rates of rheumatic heart disease<sup>1</sup>.

Since there is reduced blood supply from the left atrium to the left ventricle, stenosis of the mitral valve decreases left ventricular filling. Chronic blood pooling within the left atrium leads to pulmonary hypertension, atrial fibrillation, and dilatation of the left atrium. When spinal anesthesia is chosen for those with severe mitral stenosis, caution should be exercised, as it can lead to sympathetic blockade and decreased preload, which reduces cardiac output and causes severe hypotension. Also, since excess fluid during operation may lead to pulmonary edema, it should not be allowed in those with severe mitral valve stenosis due to venous pooling in the left atrium. Since an increased heart rate also reduces the flow of blood from the left atrium to the left ventricle during diastole, the heart rate must be maintained between 70 and 80 beats per minute.

Therefore, before, during, and after surgery, patients with severe mitral valve stenosis require close evaluation, with their heart rate, blood pressure, and volume of circulation monitored closely<sup>2</sup>.

## Case Report

A 60-year-old female with a body mass index of 23.18 presented with a history of mitral valve stenosis and atrial fibrillation. Surgery for a left partial hip replacement was planned upon the diagnosis of a left femoral intertrochanteric fracture. The patient was fully conscious on admission and had no edema, fever, chest pain, respiratory distress, or mucous membrane or skin bleeding. An X-ray of the chest showed an enlarged silhouette of a heart. A transthoracic echocardiogram (Figure 1) revealed a high pulmonary artery pressure (40 mmHg), normal ejection fraction (60%), dilatation of the left atrium, severe mitral valve stenosis with a valve

orifice area of 0.8 cm<sup>2</sup>, and no thrombus. The INR test value before surgery was 1.2. On arrival to the operating room, she had a central venous catheter inserted in the right internal jugular vein and invasive blood pressure monitoring via the right radial artery, along with continuous electrocardiogram (ECG), heart rate, and SpO<sub>2</sub> monitoring. Before anesthesia, her blood pressure was 110/70 mmHg, heart rate was 90 beats per minute, SpO<sub>2</sub> was 97%, and central venous pressure was 6 mmHg. The ECG (Figure 2) showed atrial fibrillation, with Lead II showing bifid P waves indicating left atrial enlargement due to severe mitral valve stenosis. The 0.5% hyperbaric bupivacaine 7.5 mg (1.5 ml) was given using a 25-gauge Quincke needle at the L4-5 level to perform spinal anesthesia on the seated patient. She was positioned on the table immediately after the removal of the spinal needle, which was rotated fifteen degrees left. Cold cotton was applied to test the degree of block, and at five minutes following spinal anesthesia, the level was up to T10.

Ten minutes after the surgeon began incising the skin, the patient's blood pressure was 105/60 mmHg and the pulse was 100 beats per minute. The surgery lasted 60 minutes from incision to skin closure with no issues and minimally changed hemodynamics. Intraoperatively, 300 ml of normal saline was used, and the central venous pressure was 8 mmHg after skin closure. There was no requirement for a blood transfusion since the blood loss during the surgery was just around 100 milliliters. The patient had no complaints of pain, discomfort, or any other abnormality during the procedure.

The patient was transferred to the post-anesthesia care unit after surgery. One hour later, she could move her knee (Bromage grade 2) and was then transferred to the orthopedic surgery department for further care and observation. The ECG, chest X-ray, coagulation tests, and total blood count tests done on the first post-surgical day were all within normal values. The patient received subcutaneous injections of low-molecular-weight heparin of 4000 IU every 12 hours, starting on the second postoperative day. On the eighth postoperative day, the patient was discharged without any complications.

## Discussion

In less developed countries, rheumatic heart disease remains the leading etiology of mitral valve stenosis. Further, there are other causes such as congenital heart defects or age-related valve degeneration. The American Society of Echocardiography<sup>3</sup> reports that mitral valve stenosis is graded on echocardiography, and severe stenosis is diagnosed as having an orifice area of less than 1 cm<sup>2</sup>. Maintaining heart rate, blood pressure, and preload and avoiding hypoxia or hypercarbia are significant in anesthesia for patients with severe mitral stenosis.

Our patient had a partial hip replacement procedure planned, which was a major operation with a serious risk of blood loss and left the patient in unbearable pain. In addition, older adults who have hip replacement surgery are at risk of developing a pulmonary embolism. Hemodynamic disturbances, pulmonary edema, venous thromboembolism, and acute right heart failure are some of the possible risk factors that can occur during and after surgery. Hence, the patient should be optimized before the procedure.

Another issue that needs to be considered here is whether or not a hip replacement operation should be done following a mitral valve replacement operation. Although asymptomatic, our patient was diagnosed with severe mitral valve stenosis. Also, the pressure in the pulmonary artery was 40 mmHg, and this was not a very elevated reading. There was no indication for mitral valve replacement surgery in this patient.

Many experts recommend that in severe mitral stenosis patients, neuraxial anesthesia has to be employed with caution and titrated to effect. The major concern is that neuraxial anesthesia can result in profound hypotension and reduced cardiac output due to vasodilation, reduction of preload, and left ventricular filling. However, no such studies have been conducted for the risk of spinal anesthesia in patients with severe mitral valve stenosis to direct clinical practice.

Our patient was not showing any other cardiovascular symptoms, no rales on lung auscultation, no pulmonary edema on chest X-ray, moderate pulmonary hypertension, and normal EF. Therefore, our patients can be safely administered low-dose spinal anesthesia. Several papers

have reported the successful administration of neuraxial anesthesia in patients having severe mitral stenosis. Ghai<sup>4</sup> effectively conducted cesarean sections in pregnant women with severe mitral valve stenosis and advanced pulmonary hypertension with low-dose spinal anesthesia supplemented with epidural anesthesia. Also, with no complication, Manish Kela<sup>5</sup> conducted labor with epidural analgesia in pregnant women with severe aortic and mitral stenosis.

This patient had both severe mitral valve stenosis and concomitant atrial fibrillation. Since atrial contractions that pump blood from the left atrium to the left ventricle are less effective during diastole in atrial fibrillation, anesthesia has to ensure preload so as not to induce hypotension. To avoid minimizing vasodilation and provide preload to ensure reasonably stable hemodynamics during the procedure, we use low-dose spinal anesthesia with 7.5 mg of 0.5% bupivacaine. The level of block was up to T10, which was sufficient for surgery, and hemodynamic alterations were negligible both during and after the procedure. Three hundred milliliters of normal saline were used as the intraoperative fluid infusion. There was no need for a vasopressor bolus or continuous infusion because the central venous pressure at the end of the procedure was 8 mmHg. The patient received intravenous infusions of 1 g of paracetamol every 8 hours. During the postoperative period, the patient's hemodynamics were stable, and she had minimal pain. In conclusion, low-dose spinal anesthesia for operations in patients with severe mitral stenosis is safe and effective even though these patients are generally considered a relative contraindication to spinal anesthesia. More studies should evaluate its efficacy during different types of operative procedures.

#### References:

- 1- Watkins DA, Johnson CO, Colquhoun SM, et al. Global, Regional, and National Burden of Rheumatic Heart Disease, 1990-2015. *N Engl J Med.* 2017
- 2- Carabello, Blase A. "Modern management of mitral stenosis." *Circulation* vol. 112,3 2005

- 3- Baumgartner H, Hung J, Bermejo J, et al. Echocardiographic assessment of valve stenosis: EAE/ASE recommendations for clinical practice. J Am Soc Echocardiogr. 2009
- 4- Ghai, Babita. "Low Dose Combined Spinal and Epidural Anesthesia in a Parturient with Severe Mitral Stenosis and Severe Pulmonary Arterial Hypertension for Cesarean Section." Southern African Journal of Anaesthesia and Analgesia, 2009- Kela M, Buddhi M. Combined mitral and aortic stenosis in parturient: Anesthesia management for labor and delivery. J Anaesthesiol Clin Pharmacol. **2017**

**Figure captions:**

Figure 1: Transthoracic echocardiogram showing severe mitral valve stenosis with left atrial enlargement

Figure 2: ECG Lead II showing bifid P waves. This indicates left atrial enlargement due to severe mitral valve stenosis.

**Abbreviations**

RHD, rheumatic heart disease ECG, electrocardiogram

**Acknowledgements**

Not applicable

**Conflict of interest**

All authors declare no conflicts of interest.

**Patient consent**

Written informed consent was obtained from the patient for publication of the clinical details.

Saad et al - 2026

DOI: <http://doi.org/10.5281/zenodo.19567282>

**Ethical approval**

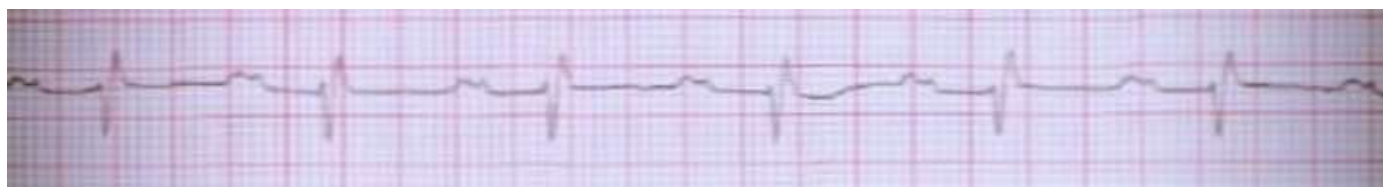
The case report was conducted in accordance with the ethical standards was exempted from IRB approval

**Funding**

No funding was received.



Figure 1



---

Figure 2

**Author Agreement**

All authors have contributed significantly to the preparation of this report and have approved the final version of the manuscript. Declaration of Interest Statement

All authors declare no conflicts of interest to disclose.