Journal of Cardiovascular Disease Research
ISSN: 0975-3583, 0976-2833 VOL16, ISSUE 02, 2025

# Anaesthetic Management Of Patient For Simultaneous Repair Of Incidentally Diagnosed Bochdalek Hernia Coming For Aortic Valve Replacement.

**Rajesh Kumar Kodali V[1*], Deepshika Ganga[2], Ranjith B. Karthikeyan[3], Mahesh Vakamudi[4], Kamalakannan GS[5]**

[1*]Professor, Department of Anesthesiology, Sri Ramachandra Institute of Higher Education and research, Porur, Chennai, Tamilnadu 600116
[2]Assistant Professor, Department of Anesthesiology, Sri Ramachandra Institute of Higher Education and research, Porur, Chennai, Tamilnadu 600116
[3]Professor and HOD department of cardiac anesthesiology, Sri Ramachandra Institute of Higher Education and Research (SRIHER),Porur, Chennai, Tamilnadu.600116
[4]Professor, Department of Anesthesiology, Sri Ramachandra Institute of Higher Education and research, Porur, Chennai, Tamilnadu 600116
[5]Associate Professor, Department of Anesthesiology, Sri Ramachandra Institute of Higher Education and research, Porur, Chennai, Tamilnadu 600116

***Corresponding Author:** Rajesh kumar kodali v
*Professor, Department of Anesthesiology, Sri Ramachandra Institute of Higher Education and research ,Porur, Chennai, Tamilnadu 600116

## Abstract

**Background:** Most of diaphragmatic hernias repaired through laparotomy, laparoscopy, thoracotomy or even thoracoscopy. Transsternal approach can be used in patients with diaphragmatic hernia posted for cardiac surgery.

**Case presentation:** We present a case of 70 years old male with history of diabetes and hypertension since the last 15 years presented with complaints of chest pain, dyspnoea, giddiness, epigastric pain. On evaluation, patient was found to have severe Aortic stenosis, posterolateral Bochdalek hernia with bowel loops in the thoracic cavity and collapse of left lung. Under general anaesthesia with lung isolation, hernia was closed following sternotomy prior to Cardiopulmonary bypass. An Anesthesiologist can face difficulties during one lung ventilation in a patient with severe Aortic stenosis in the maintenance of hemodynamics during Bochdalek hernia repair prior to initiation of cardiopulmonary bypass for valve repair.

**Conclusion:** Bochdalek hernia can rarely accompany with coexisting heart disease. Transsternal approach can be used for patients undergoing simultaneous cardiac surgery. Hemodynamic management, oxygenation and ventilation management are major concerns when planned for Transsternal closure of contents before cardiopulmonary bypass.

## Background:

Bochdalek hernias are congenital diaphragmatic defects resulting from the failure of posterolateral diaphragmatic foramina to fuse in utero. Incidence of congenital diaphragmatic hernias ranges from 1 in 2000 to 1 in 4000. They usually present in the neonates and young children. Symptomatic Bochdalek hernias in adults are infrequent. Few case reports of Morgagni hernia repaired through Transsternal approach have been reported[1] [2]. We present our experience with this rare entity in an adult with severe aortic stenosis and giant Bochdalek hernia with collapse of underlying lung planned for simultaneous Aortic valve replacement and Bochadalek hernia repair. To the best of our knowledge this case is among the few cases reported of diaphragmatic hernia and the only one with Bochdalek hernia presenting at later age with coexisting severe aortic valve stenosis.

**Case report:**

A 70-year-old male with history of diabetes and hypertension for the last 15 years came with chief complaints of chest discomfort for 10 days, shortness of breath NYHA II which worsened to NYHA IV in the last 3 months, giddiness for 3 years and epigastric discomfort for 10 days. On examination, the patient was tachypnoeic with respiratory rate of 24 per min, pulse rate of 73 beats per minute, blood pressure of 110/80 mm Hg with room air saturation of 96-97%. On auscultation, ejection systolic murmur was heard over the right upper sternal border, decreased breath sounds in left hemithorax and bowel sounds heard in left hemithorax. ECG (electrocardiogram) showed left ventricular hypertrophy changes. Chest x ray and computed tomogram of thorax (figure 1 ,2) revealed air filled bowel loops, and gastric fundus in left thoracic cavity. 2D echo revealed severe Aortic stenosis with peak gradient 131 and mean gradient of 81mm of Hg, left ventricular outflow tract (LVOT) diameter of 21mm, LVOT VTI 23.2cm, aortic valve AV VTI 142 cm, aortic valve area (AVA) by continuity equation 0.6cm sq, AVA index 0.3cm sq/m sq. Stroke volume(SV) 80ml,SV index 44.4ml/msq, LVOT Vmax 0.98,AV vmax 5.74, dimensionless index of 0.16 with trivial aortic regurgitation, concentric left ventricular hypertrophy, mild Mitral regurgitation, normal LV systolic function with ejection fraction of 64%. Coronary angiogram revealed normal epicardial coronaries. CT thorax (figure 2) findings were left posterolateral diaphragmatic hernia with defect size of 10 cm containing fundus, proximal body of stomach, splenic flexure loops and spleen in thoracic cavity along with bowel loops resulting in passive atelectasis of left lower lobe. All blood investigations are within normal limits. After initial team discussion with cardiologists, cardiac surgeons and anesthesiologists plan was pre-bypass reduction of abdominal contents and mesh repair followed by aortic valve replacement under cardiopulmonary bypass. Complications of combined procedure like hemodynamic instability like hypotension, tachycardia, desaturation were explained to patient and patient relatives. High risk consent for procedure and postoperative prolonged ventilation was obtained from patient and their relatives. Patient consent was obtained for publication of this case report after the surgery before discharge of patient from hospital.

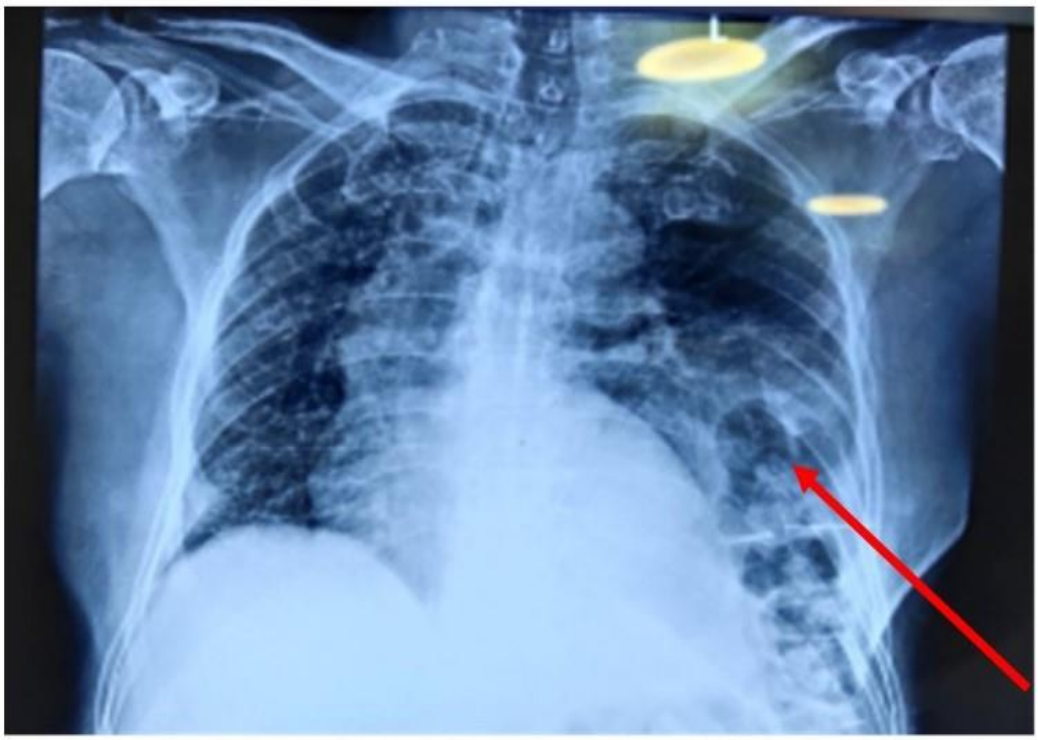

**Figure 1 :Chest x ray showing bowel loops in left lower thoracic region**

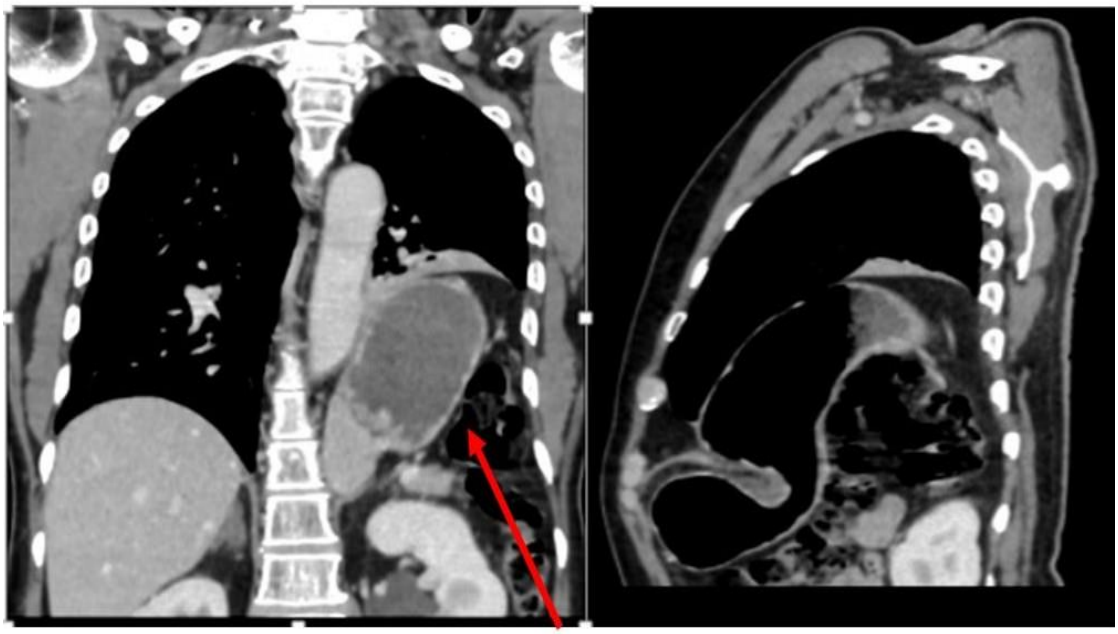

**Figure 2:Computed tomogram of thorax showing bowel loops in left lower thoracic region. Arrow indicates herniated bowel loops**

Under general anaesthesia with lung isolation, hernia was closed after sternotomy before Cardiopulmonary bypass.

**Table 1 Anesthesia concerns in severe aortic stenosis with diaphragmatic hernia**

| Severe aortic stenosis goals | Pre-bypass repair of diaphragmatic hernial defect and one lung ventilation in the setting of severe aortic stenosis | One lung ventilation concern |
|---|---|---|
| **Maintain Heart Rate**<br>**Normal Sinus Rhythm**<br>**Adequate Preload**<br>**Maintain SVR, PVR**<br>**Avoid hypotension**<br>**Maintain contractility** | **1. Tachycardia**<br>**2. Decreases coronary perfusion time**<br>**3. ↑/↓ Systemic vascular resistance**<br>**4. Hypoxic pulmonary vasoconstriction**<br>**↑ Pulmonary vascular resistance decreases venous return**<br>**5. Risk of myocardial ischemia, cerebral ischemia**<br>**6. Difficulty in pre-bypass trans esophageal echo monitoring** | **Hypoxia, Hypoxemia due to shunt**<br>**Hypercarbia**<br>**Hyperoxia (high FiO2) induced vasoconstriction**<br>**Free Radical injury**<br>**Ischemia – Reperfusion post OLV** |

The anaesthetic concerns in this case included left lower lobe atelectasis, aspiration risk during induction and intubation, haemodynamic management during diaphragmatic hernia repair before cardiopulmonary bypass (CPB), post-operative abdominal distension, and ventilatory management in the event of significant bowel manipulation during a complex repair due to adhesions, subsequently

resulting in abdominal distension. Furthermore, there existed a risk of hemoperitoneum after heparinization and challenges in placing the transoesophageal probe, which employed deep transgastric views to evaluate gradients across the aortic valve.

Unlike Morgagni hernia, Bochdalek hernia being posterolateral, manipulation of heart and lung intraoperatively can lead to hypotension, hypoxia and hypercarbia (Table 1).

Patient was kept on nil per oral for 8 hours and shifted to operating room. P reinduction monitors were ECG, pulse oximetry, intra-arterial blood pressure, end tidal CO2 and bispectral index. Post induction monitors were urine output, temperature. 16 G iv cannula was inserted in the left cubital fossa, 20 G jelco used for radial artery cannulation. Patient was induced with Inj. Fentanyl 200 mcg, Inj. Etomidate 16 mg, Inj. rocuronium 80 mg iv ,cricoid pressure was applied after induction and intubated with 39 French (Fr) left sided broncho Cath. Post intubation, a 7 Fr triple lumen catheter was inserted in the right internal jugular vein, left femoral artery cannulated with 16 G vygon single lumen catheter. The right groin area was prepared and covered for an emergency femoral bypass in the event of complications during induction and sternotomy. Hemodynamics, oxygenation and ventilation were maintained during induction and intubation. 16 F Ryles tube was inserted. Anesthesia was maintained with sevoflurane 1 - 2%, oxygen, air, Inj. Fentanyl, Inj. Vecuronium.

Midline sternotomy was done, and plan was to reduce the contents before bypass. Left pleura was opened and adhesions released between the sac and left lower lob (Figure 3). Heart was rotated while identifying neck of diaphragmatic hernia sac and during reduction, hypotension was managed with fluid boluses and Inj. Phenylephrine 20-40 mcg boluses and intermittent reduction of rotation. Intermittently left lung was isolated during reduction of contents. Patient had omental adhesions within the sac, contents were reduced by opening the sac and defect was closed with proline mesh. On CPB, aortic valve replaced with 21 mm bioprosthetic valve, weaned off cardiopulmonary bypass as per departmental protocol and shifted to ICU with stable hemodynamics. Post operatively patient was monitored for abdominal distension and extubated 6 hours after shifting to ICU. Bowel sounds appeared on second post-operative day and Ryles tube was removed. Patient discharged from ICU on the 3rd post-operative day.

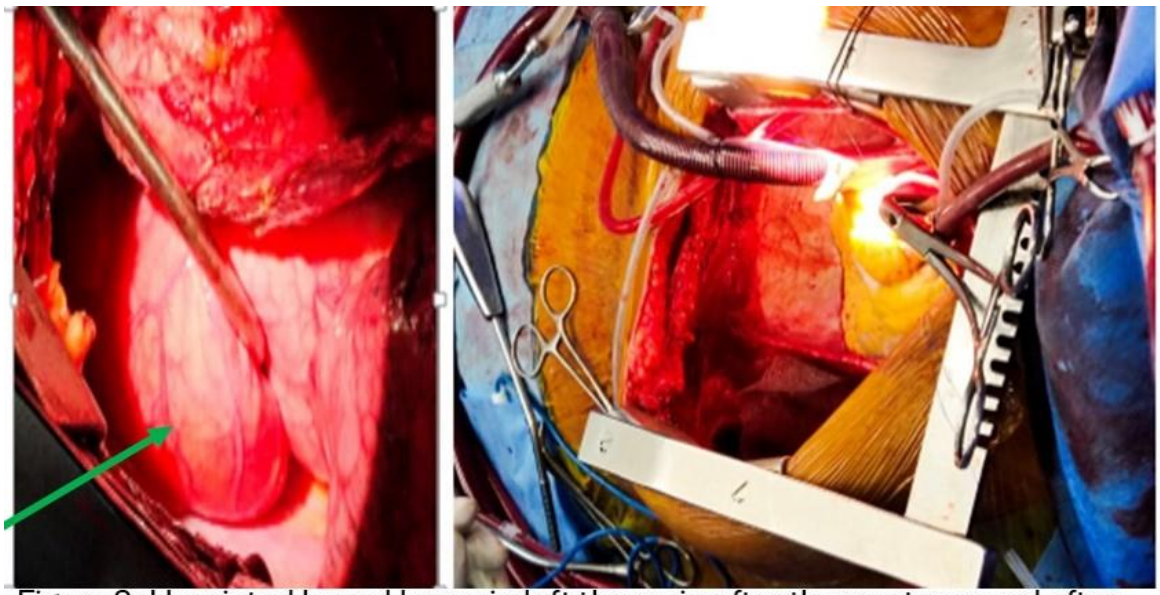

Figure 3 :Herniated bowel loops in left thorax in after thoracotomy and after CPB cannulation. Arrow indicates herniated bowel loop.

**Discussion:** Bochdalek hernia is the commoner congenital diaphragmatic hernia. Incidence in adults is 0.17% [3].Rarity of hernia and abnormal presentation leads to delay in diagnosis in adults. Bochdalek hernia usually congenital due to failed closure of pleuroperitoneal ducts. These hernias can be

acquired in adulthood due to reopening of these ducts following initial extension of intra-abdominal and perirenal fat. Bochdalek hernia can occur on both sides. Patients are usually symptomatic when left sided. In this case, patient had shortness of breath and epigastric discomfort. Up to now there has been no report on anaesthetic management of combined trans sternal repair of Bochdalek hernia and aortic valve replacement. In patients with coexisting severe aortic stenosis and Bochdalek hernia, severe aortic stenosis constitutes priority since it is life threatening and should be carried out immediately. If patients present with strangulated bowel loops, hernia needs urgent intervention [4]. But in this case due to underlying lung collapse, there were increased chances of bowel strangulation and for better post operative ventilator management, surgery was planned for simultaneous repair of hernia and aortic valve replacement. Initiation of cardiopulmonary bypass and reduction of contents were easy. Hernia repair through trans sternal approach before CPB initiation may lead to hemodynamic instability especially in Bochdalek hernia wherein secondary to rotation of heart, there are chances of hypoxemia and hypercarbia. This can be minimised by lung isolation, fluid boluses and Alpha 1 agonists. Hypoxia and hypercarbia during lung isolation were closely monitored with serial arterial blood gases and managed. Patients need postoperative monitoring for abdominal distension (Figure 4).

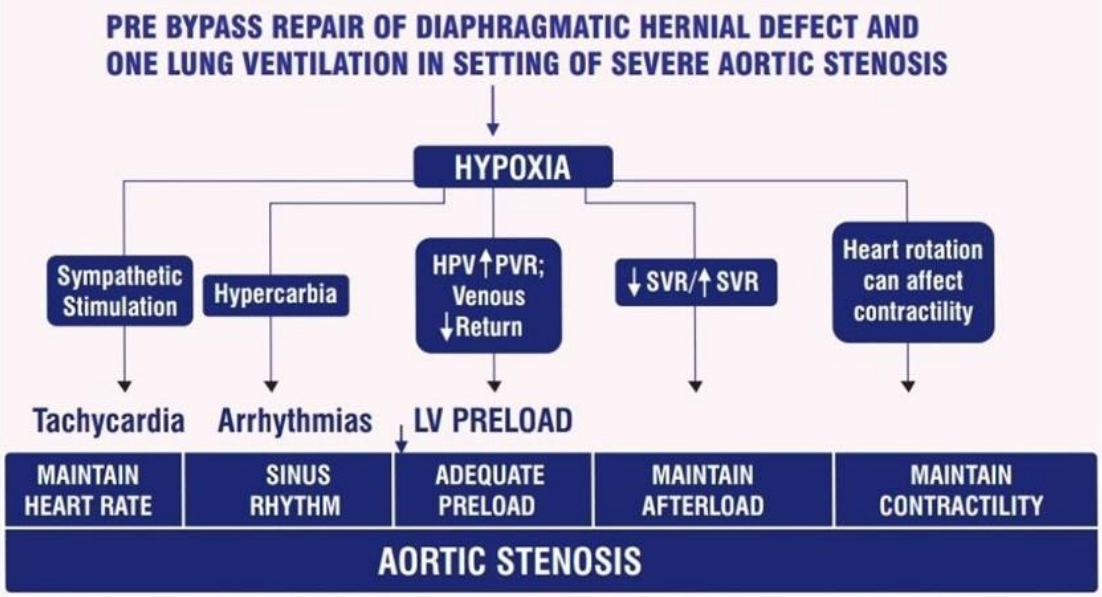


**Figure 4 : Anesthetic concerns and management during One lung ventilation in severe AS with bochdalek hernia repair**

Initiation of cardiopulmonary bypass and reduction of contents may be an easier option but hernia repair after CPB initiation may lead to haemothorax and hemoperitoneum.

Conclusion: All anaesthesiologists should be familiar with hemodynamic changes, oxygenation and ventilator management both intraoperatively and postoperatively.

**References**

1. M. Ahmad, A. Al-Arifi, and H. K. Najm, 'Giant Hernia of Morgagni with Acute Coronary Syndrome: A Rare Case Report and Review of Literature', *Heart Lung Circ.*, vol. 24, no. 9, pp. e144-147, Sep. 2015, doi: 10.1016/j.hlc.2015.04.166.
2. Y. Zhou, H. Du, and G. Che, 'Giant congenital diaphragmatic hernia in an adult', *J. Cardiothorac. Surg.*, vol. 9, no. 1, p. 31, Feb. 2014, doi: 10.1186/1749-8090-9-31.
3. N. O. Machado, 'Laparoscopic repair of bochdalek diaphragmatic hernia in adults', *North Am. J. Med. Sci.*, vol. 8, no. 2, p. 65, Feb. 2016, doi: 10.4103/1947-2714.177292.

4. [4] Akita, M., Yamasaki, N., Miyake, T. *et al.* Bochdalek hernia in an adult: two case reports and a review of perioperative cardiopulmonary complications. *surg case rep* **6**, 72 (2020). https://doi.org/10.1186/s40792-020-00