

Regional Anaesthesia In A Case Of Traumatic Diaphragmatic Hernia

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Abstract

Traumatic diaphragmatic hernia occurs in ~5% of trauma patients with approximately 75% of ruptures occurring on the left side (1). Chances of gastrointestinal contents herniating into chest and compromising respiratory and circulatory functions are high. Chances of aspiration and bowel strangulation and necrosis leading to sepsis further aggravates the respiratory and circulatory distress.

Here we describe anaesthesia management of a case of traumatic left diaphragmatic hernia with herniation of stomach, hepatic flexure of colon and superior part of spleen with significant collapse of left lung who was managed with sequential spinal epidural anaesthesia.

CASE REPORT

A 28 year old married male patient weighing 59 kg who was a smoker and a chronic alcoholic came to casualty with complaints of pain in abdomen since 3 months which increased in intensity since 4 days before admission. He also complained of left sided chest pain since 3 days before admission. There was no h/o vomiting, constipation, blood in stools, early satiety, dyspnea, or palpitations. On examination he was afebrile, with a pulse of 92 per minute, BP-130/80mm hg. He was tachypneic with breath rate of ~25 /min and breath holding time of 12 sec. Air entry was significantly decreased on left side.

His pre op Hb was 12.3 gm % and TLC 11300 with P89L11. His electrolytes, LFTs and BUN were within normal limits.

His Chest X Ray showed shift of heart to Right side with bowel loops in left mid and lower thorax.(Figure 1)

Figure 1

Figure 1: X Ray Chest lateral view Pre operative showing herniation of transverse colon into the chest



Pre op ABG showed pH7.42, pCO₂ -39, pO₂-69, HCO₃-25.3, BE-0.8, %sO₂-95.2%.

His CT abdomen and chest revealed defect in left hemidiaphragm and herniation of stomach, hepatic flexure of colon and superior part of spleen in left hemithorax with

underlying collapse of left lung. No e/o obstruction to passage of oral contents was noted. Mild left pleural effusion with subsegmental atelectasis was also noted. Mild shifting of trachea and mediastinum to right was noted. Minimally displaced fracture of left 10th rib near its angle was present. There was mild splenomegaly and hepatomegaly. (Figure 2 & 3).

Figure 2

Figure 2: Topogram of the chest showing herniation of large bowel loops into chest through a traumatic diaphragmatic defect with shift of the mediastinum & trachea to the right.



Figure 3

Figure 3: Coronal reformatted CT scan image demonstrate herniation of the spleen into the left hemithorax through the defect in the diaphragm.



His PFTs were s/o moderate obstruction with mild restriction with poor reversibility post bronchodilation. His MVV was only 36.2% of predicted and became 36.8% of predicted post bronchodilation.

Considering the poor PFTs and the need for post operative ventilatory support which increased the risk of secondary infection and prolonged morbidity especially in this case as diaphragm was weak, we decided to administer sequential combined spinal epidural anesthesia in this case.

Patient was premedicated with Inj. Glycopyrrolate 0.2mg i.m. 20 min. before surgery. ECG, NIBP and pulse-oximeter were attached. Two 18 G peripheral venous lines were secured and ringer lactate infusion started. Inj. Ondansetron 4 mg i.v. was given.

Under all aseptic precautions, a 16G epidural catheter was put in T10-T11 intervertebral space and fixed at 9 cm mark. Subarachnoid block was then given in L3-L4 intervertebral space. A sensory level of T-4 was achieved on checking for pin prick sensation. Patient was administered O2 @ 6l/min. by Hudson's mask.

Diaphragmatic repair was done through abdominal approach. Subcostal incision was taken and abdominal contents were brought down from the tear which was about 4*4cm² in size .The tear was primarily sutured .Intra –op. patient maintained vital parameters and was comfortable throughout the procedure. Patient was given Inj. Midazolam 1 mg i.v. and he maintained spO₂ of 99% throughout the procedure. Surgery was complete without requiring any epidural supplementation and on shifting the patient's sensory level for pin prick sensation was T-6 and air entry was decreased on left side. Patient was shifted to Intensive Care Unit and was given Inj. Bupivacaine 0.25% epidurally on shifting and every 4 hours for 3 days for post –op analgesia. He was given O₂ by Hudson's mask with FiO₂ of 0.6 .Chest physiotherapy was started and serial ABGs were done which showed a drop of pO₂ up to 72 mm Hg on second and third day of surgery which gradually improved by fourth and fifth post op day .He also developed fever on second and third post op day which resolved on changing the antibiotics. He was shifted to ward on fifth post op day .Air entry on left side started improving gradually and patient started mobilizing by day seven .

A chest x – ray that was done on second post op day showed gross left sided pleural effusion(Figure 4) .

Figure 4

Figure 4: X-Ray Chest PA view second post operative day showing massive pleural effusion on left side with the trachea & the mediastinal shift resolving.



USG thorax was done on seventh post op day which revealed minimal amount of pleural effusion in left hemithorax. Patient was discharged on eleventh post op day.

CASE DISCUSSION

Traumatic diaphragmatic hernia occurs in around 5% of trauma patients. (E.g. motor vehicle accidents)⁽¹⁾. Although most such injuries are diagnosed at the time of initial trauma approximately 10%become apparent only months or years later.

With the protection afforded to the right side of the diaphragm by liver, majority of the diaphragmatic injuries occur on the left side ⁽²⁾. The increased prevalence of left-sided hernias may also result from weaknesses in points of diaphragmatic embryologic fusion ⁽³⁾.

The pathophysiology of acquired diaphragmatic hernias includes circulatory and respiratory depression secondary to decreased function of the diaphragm, compression of the lungs, shifting of the mediastinum, and cardiac compromise⁽³⁾.

Funatu et al have described three types of diaphragmatic hernia- Acute, Chronic, and Obstructive. In acute type, chances of flail chest, pulmonary injury and multiple organ failure are high. Chronic type is usually associated with gastrointestinal symptoms like ileus and strangulated hernia and involves the risk of aspiration. Obstructive type of diaphragmatic hernia is usually complicated by thoracic abscess and sepsis ⁽⁴⁾.

In traumatic diaphragmatic hernia, imaging findings include: elevation of the hemidiaphragm, abrupt discontinuity, nonvisualization of the diaphragm (absent diaphragmatic sign), pleural effusion, atelectasis, and, at times, shift of the mediastinum away from the injured side. Gas bubbles and air-fluid levels above an irregular diaphragm are strong indications of injury ⁽⁵⁾.

Because diaphragm is in constant motion, chances of spontaneous healing after injury are less and surgical treatment is required to avoid strangulation of herniated contents⁽¹⁾.

Any patient with abdominal viscera occupying a large portion of chest must be considered at risk of regurgitation, aspiration, hypoxemia and hemodynamic compromise ⁽⁶⁾. Tracheal intubation difficulties may be encountered in these patients because of deviation of trachea and mediastinal shift to opposite side ⁽¹⁾. It is also associated with cardiovascular collapse on induction of anesthesia with positive pressure ventilation ⁽²⁾.

Lobb and Butlin have suggested awake intubation using

lignocaine spray and titrated intravenous sedation while maintaining patient on spontaneous ventilation and when chest decompression is imminent nondepolarising muscle relaxant is given and ventilation assisted with low tidal volume and low airway pressure. After the removal of abdominal contents, lungs are reinflated by applying positive pressure ventilation (2).

Central neuraxial blockade was chosen in the above case to minimize the need for post operative ventilatory support associated with general anesthesia. Avoidance of post operative ventilatory support helps in reducing chances of post operative infections for which these patients are highly prone, thus helping in early recovery. Avoiding general anesthesia also helps in reducing the chances of patient getting dependent on ventilator thus helping in reducing the days of ICU stay. Regional anesthesia decreases the risk of aspiration. It helps in improving systemic blood flow, decreases platelet stickiness thus reducing the risk of pulmonary embolism. It also reduces perioperative blood loss and reduces duration of ileus reducing incidence of post operative nausea and vomiting and earlier return of bowel function(7).

Use of post operative epidural analgesia helps in providing good pain relief, reducing pulmonary infection and atelectasis (8). Post operative chest physiotherapy can be started early because of good pain relief thus helping in early lung expansion. In traumatic diaphragmatic hernia cases, ABGs are to be done regularly at least for the initial few days to know whether the patient is getting adequately oxygenated or not .

Still, it is recognized that respiratory compromise can occur with regional anesthesia, especially with high sensory levels because of blockade of the muscles of respiration and reduction of the inspiratory capacity and expiratory reserve volume (9). Use of general anesthesia and positive pressure ventilation may be advantageous in patients with Traumatic Diaphragmatic Hernia to expand the atelectatic lung, increase functional residual capacity and to deliver high concentration of O₂. However, large tidal volume and high

peak airway pressure are not recommended because of risk of barotrauma to non affected lung(1). General anesthesia is also preferred in cases in which postero- lateral thoracotomy is required to reduce abdominal contents like in cases in which adhesions have formed.

We conclude that in hospitals where there is high patient load and limited amount of ventilators available use of regional anesthesia provides a viable option in management of cases of traumatic diaphragmatic hernia and prevents the unnecessary delay of surgery due to non availability of ventilator.

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