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Intrapleural Tranexamic Acid In Haemothorax: A Case Report And Review Of Literature

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1. Abstract

Haemothorax is a collection of blood in the pleural cavity, commonly seen after traumatic injury to the chest. Malignancies and, rarely, medical procedures can also result in haemothorax. Haemothorax requires prompt intervention with tube thoracostomy initially and in severe cases thoracotomy is needed. The source of bleeding also needs to be addressed apart from initial resuscitation. We bring forward a case of iatrogenic haemothorax resulting from central venous catheterization in a renal transplant recipient. The patient was a poor surgical candidate for thoracotomy and was, therefore, managed with intrapleural tranexamic acid. We have also presented a review of literature encompassing cases of haemothorax managed with this drug.

2. Keywords: Iatrogenic haemothorax, tranexamic acid, thoracotomy

3. Key Messages:

1. Haemothorax requires prompt intervention in the form of initial resuscitation, source control and tube thoracostomy for drainage.
2. Thoracotomy remains a procedure of last resort in severe cases but is associated with significant risks.
3. Intrapleural tranexamic acid can be a suitable option in cases not responding to initial treatment and also for cases not fit to undergo thoracotomy.

4. Introduction

Haemothorax is diagnosed based on aspiration of fluid from pleural space having haematocrit level 50% higher than blood haematocrit. Thoracic trauma, iatrogenic injury and neoplasms are the most common causes of haemothorax.[1] Central venous catheterization and placement of thoracostomy tubes are

commonly attributed iatrogenic causes for haemothorax.[2] Initial management involves resuscitation with intravenous fluids and/or blood products plus tube thoracostomy. In cases of persistent haemothorax thoracotomy remains an intervention of last resort. However, thoracotomy is associated with significant morbidity and mortality. Intrapleural tranexamic acid can provide a suitable alternative in cases where thoracotomy is not feasible. Herein, we present a case of iatrogenic massive haemothorax managed with intrapleural tranexamic acid and a brief review of similar cases published in a peer-reviewed journals.

5. Case History

A 30-year-old lady with chronic kidney disease secondary to immunoglobulin A (IgA) nephropathy was admitted under nephrology services for live donor transplantation in may 2024. Patients post-transplant course was complicated by acute transplant rejection. Patient had minimal response despite administration of pulse methylprednisolone given to salvage transplanted kidney. Due to serially increasing serum creatinine levels accompanied by uremic symptoms, decision to go ahead with haemodialysis (HD) was undertaken, patient had HD catheter placed in right internal jugular vein for the same. Patient developed breathlessness with hypoxemia three hours post placement of HD catheter. Chest radiograph and bedside lung ultrasound done for evaluation of the same revealed large right pleural effusion (figure 1). Strong suspicion of haemothorax was kept as no backflow of blood was noted from the HD Catheter with possible injury to right internal jugular vein and adjoining pleura. In view of worsening hemodynamic parameters patient was transfused blood products and started on inotropes. Patient underwent right intercostal drainage (ICD) tube placement of 24 Fr size. Frank blood was noted post placement of ICD tube. Total 2.5 litre of fluid was drained initially, around 1 litre of hemorrhagic fluid was noted in drainage bag over next 1 2 hours. During this period her hemoglobin dropped from 8 g/dl to 4 g/dl requiring transfusion of blood products. She required endotracheal intubation and mechanical ventilation due to cardio-respiratory failure during this period. Contrast enhanced computed tomography (CECT) of chest did not reveal any gross extravasation of contrast into right pleural cavity (figure 2). In view of persistent haemothorax decision to proceed with thoracotomy was suggested. Due to history of recent major surgery and frail condition of patient, thoracic surgeons felt thoracotomy would not be tolerated. Intrapleural tranexamic acid total 5gm solution was instilled into chest tube diluted in 250ml isotonic saline with clamping of chest tube for 30 minutes. Over the course of next 24 hours pleural fluid turned serous with fall in pleural fluid output also. Patient had improvement in hemodynamic parameters with extubation done on third day. Also, pleural fluid drainage decreased to less than 100 ml with good lung expansion on chest radiograph (figure 3). Intercostal drainage tube was removed on fifth day and patient shifted out of intensive care. Patient is currently on maintenance HD and low dose prednisolone five months post this event.

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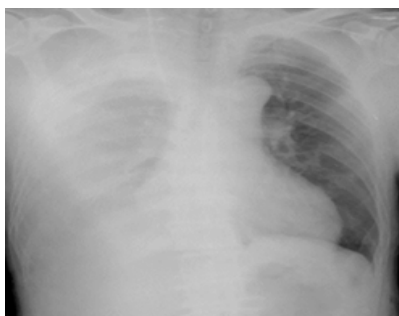


Figure 1: Chest radiograph showing right pleural effusion with central venous catheter (CVC) in right internal jugular vein (IJV) (white arrow)



Figure 2: Contrast enhanced computed tomography of chest (CECT) showing CVC in IJV (white arrow) and right pleural effusion without any contrast extravasation into pleural cavity.



Figure 3: Chest radiograph showing significantly reduced right pleural effusion with intercostal drainage tube insitu (white arrow) and CVC in left IJV (black arrow).

6. Discussion

Haemothorax is a rare but life-threatening complication with mortality rates reaching 90% if not timely diagnosed. Iatrogenic haemothorax can occur during placement of HD catheter in internal jugular vein. Although done under ultrasound guidance, steps of guidewire insertion plus dilatation are done blindly and may result in injury to vein. [3] Iatrogenic haemothorax in such cases requires first of all prompt identification plus brisk management. Extrathoracic vessel injuries are easier to identify as they lead to swelling in neck and also fairly simple to manage with just extrinsic compression. On other hand intrathoracic vessel injury are concealed and present when significant amount of bleeding has resulted in hemodynamic and respiratory deterioration (as in our index case). Sudden onset hypotension, hypoxia and failure to aspirate blood through the ports of central catheter can be signs of potential complication. Management of iatrogenic haemothorax

requires identification and addressing the site of bleeding plus draining the blood collected in thorax to relieve compression of lung.

Intercoastal drain is placed to drain haemothorax and surgical procedure in form of thoracotomy or intervention radiology guided procedures like embolization are used in severe cases of haemothorax. Sometimes general condition of patient may not permit execution of above procedures. Tranexamic acid is a well-known anti-fibrinolytic agent used to manage bleeding from varied causes. This drug is universally used to manage iatrogenic bleed occurring during bronchoscopy and pleural procedures. [4] Previously intrapleural tranexamic acid has been used post lung decortication and also in malignant haemorrhagic pleural effusion to reduce haemorrhagic drain. [5-8] In the above studies 3 to 5 grams of intrapleural tranexamic acid had been used with significant reduction in pleural drain and transfusion requirements. We searched PubMed and Embase database using search string haemothorax and/or tranexamic acid and/or intrapleural tranexamic acid as part of review of literature. Our search yielded three studies with four patients, details of whom are enlisted in table 1.

Table 1

Author(Year)	Age (in years)/Sex of patient	Cause of haemothorax	Dose of intrapleural tranexamic acid	Outcome
Boer et al., (1991)6	56/M	Mesothelioma	5 grams/ day given for 2 days	Resolution of haemothorax within 24 hours
Boer et al., (1991)6	66/F	Mesothelioma	5 grams/day given for 2 days	Resolution of haemothorax within 72 hours
Öztürk Ö et al., (2020)7	53/F	Metastatic ovarian carcinoma	5 grams/ day single dose	Resolution of haemothorax within 72 hours
Kabir et al., (2024)8	42/M	Angiosarcoma	Dose not available however, given for 2 days	Resolution of haemothorax

All four cases were secondary to malignant aetiology and 5 grams of tranexamic acid given over two days resulted in complete resolution of haemothorax. We did not include studies in which tranexamic acid was given post lung and/or pleural surgery.

In conclusion, topical tranexamic acid has been found beneficial in cases of haemothorax arising from malignant causes. Applying similar analogy our case report demonstrates benefit of the same in iatrogenic haemothorax. Our case is first one to demonstrate benefit of intrapleural tranexamic acid in iatrogenic haemothorax. Hence, intrapleural tranexamic acid can be tried as an alternative in cases of haemothorax where thoracotomy is not immediately feasible or is associated with significant risks.

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