Case report

Post-thoracotomy paraplegia due to epidural migration of bone wax

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Abstract

Post-thoracotomy paraplegia after thoracic surgery is a catastrophic complication. We present one such case following resection of a benign posterior mediastinal tumour. Paraplegia was caused by spinal cord compression due to epidural migration of haemostatic agent i.e. bone wax through the spinal canal. Timely intervention leads to the successful outcome.

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1. Introduction

Post-thoracotomy paraplegia is rare (0.08%) but catastrophic [1]. Its causes range from bleeding at the costo-vertebral junction, migration of surgicel (oxidise regenerated cellulose i.e. ORC, Ethicon®-Sarl, Neuchatel, Switzerland) through the spinal canal, thrombosis of the anterior spinal artery, epidural haematoma, epidural catheterisation, metastatic carcinoma and peri- or postoperative hypotension [1-8]. While some of these conditions need a conservative approach, others need urgent surgical intervention, with dramatic improvement if the same is performed in time. Thus differentiating between the various causes at the earliest opportunity is important. Unfortunately, clinical examination is not helpful, hence imaging studies are required early to decide on the appropriate treatment.

We report a case of paraplegia following thoracic surgery for neurogenic tumour of posterior mediastinum in a 55-year-old lady due to epidural migration of bone wax, where timely intervention lead to successful outcome.

2. Case report

A 55-year-old lady underwent left posterolateral thoracotomy for resection on a benign neurogenic tumour in the posterior mediastinum (Fig. 1a and b). A 16 gauge epidural catheter was inserted at the level of Th7—Th8 for postoperative analgesia. Intra-operatively, the tumour was found extending into the left vertebral foramina (Th9—Th12) with no intra-spinal extension or erosion of the vertebral bodies. Complete resection of the tumour was done. Postoperatively, she had no neurological deficit but had to be re-explored after 12 h due to continuing bleed. At re-exploration, the bleeding was seen to be coming from intercostals spaces (Th8—Th10) near the costo-vertebral junction. Initially, packing with sponges and suture ligation was attempted to control the bleed but was unsuccessful. Thereafter, bone wax was carefully applied in small amounts to various bleeding spots in the intercostals space, which controlled the bleed. No electrocautery was used. Epidural morphine was used for postoperative pain management. Patient had an uneventful postoperative recovery for 48 h. On the third postoperative day, she developed acute onset paraplegia. Neurological examination revealed sensory and motor deficit below the level of Th8. MRI spine revealed extra-dural compression of the spinal cord at the Th10 level due to suspected haematoma (Fig. 1c and d). Emergency decompressive laminectomy of Th7—Th11 was done. At surgery, two chunks of bone wax causing extra-dural compression of the spinal cord at Th9—Th10 level were seen and removed (Fig. 2a). Postoperatively, there was immediate return of her sensory function but a gradual recovery of the motor power. Follow-up MRI on 6th day shown no spinal cord compression (Fig. 2b). Patient regained normal motor function and walked out of the hospital 3 weeks after her last surgery. She is doing well at 6-month follow-up.

3. Discussion

Paraplegia is an uncommon yet devastating complication following thoracic surgeries due to various causes mentioned above. The risk of spinal cord injury is relatively increased in...
Fig. 1. Preoperative MRI images showing a large left para-vertebral mass which is hypointense on T1 weighted axial image (a) and heterogeneously hyperintense on T2 weighted image (b) MRI study after paraplegia—T2 weighted MR sagittal section showing an oblong (2.8 cm × 1.1 cm) hypointense lesion in epidural space (arrow) at T10 (c), which is confirmed by MR myelography (d).

Fig. 2. Intraoperative picture (a) showing resected lamina (white arrow), bone wax in the epidural space (grey arrow) and compressed spinal cord (black arrow). Follow-up MRI sagittal section images showing no residual lesion in epidural space and no cord compression (b).

Thoracic surgeries that have postero-lateral incision and dissection near the para-vertebral/costo-vertebral junction [1]. Bleeding at the costo-vertebral junction perioperatively is notorious and difficult to control. The various intra-operative manoeuvres to achieve haemostasis are packing with haemostatic agents like ORC or bone wax, electro-cauterisation and suture ligation [2]. The haemostatic agents may swell up and form a gelatinous mass. They may migrate through the inter-vertebral foramina into the epidural space due to the relative pressure gradient between the inter-vertebral foramina and the spinal canal, subsequently causing spinal cord compression [3,4]. Such a pressure gradient could be produced either by closure of the thoracotomy with rib approximation or by the respiratory movements [3,4]. In the event of misplacement of haemostatic agents through the spinal foramina peripheratively, neurological symptoms would develop in the immediate postoperative period. However, many cases report delayed onset of paraplegia as in our case, which may perhaps be due to the migration of these agents [3,4]. Suture ligation or electro-cauterisation of the intercostals artery has also been reported as the cause of spinal cord ischaemia, which may be outside the spinal canal or within it, if tumour excision requires vertebral resection [5]. Full lateral decubitus positioning of patients for optimal exposure may also compress spinal vessels, causing reduced arterial perfusion, or venous compression with subsequent venous hyper pressure in the cord, reduction in medullary perfusion pressure, and decreased resorption of cerebrospinal fluid. Thoracic epidural analgesia may also cause paraplegia, either due to hypotension with a possible reduction in spinal cord perfusion or sudden increase in CSF pressure after an epidural bolus [8].

MRI is the imaging modality of choice for such cases. It delineates the location of the lesion and the degree of cord compression. Hyperacute haematomas appear hypointense or slightly hyperintense on T1 weighted images and have mixed signal intensity on T2 weighted images. Acute haematomas are also isointense on T1 weighted images, but more hypointense on T2 weighted images, chronic haematomas are hypointense on all sequences. In our case, there was marked hypointensity on T2 weighted images consist with acute haematoma (Fig. 1c and d). Organised haemostatic agents and haematoma may have same signal intensity in T1/T2 weighted images but the focality of the lesion on MRI differentiates it from an epidural haematoma, which is more spread out around the spinal cord [9,10]. Immediate decompressive laminectomy is the treatment of choice and the prognosis depends upon early intervention.

This case describes the potential risk of iatrogenic spinal cord injury due to compression by haemostatic agent used near or in the spinal foramina. At surgery, we found two chunks of organised bone wax compressing the spinal cord although they were never placed there. Obviously, the bone wax placed during the second re-exploration migrated into the spinal canal causing cord compression. Timely intervention leads to successful outcome. Thoracic surgeons need to be aware of this potential risk as bleeding near the costo-vertebral junction is not uncommon and haemostatic agents are often used to control it. Accidental placement or migration of haemostatic agents into the spinal canal can occur. It may be safer to use haemostatic agents other than bone wax in this location. In case of neurological deficit post-thoracotomy, the clinician should be aware of this rare surgical possibility as immediate intervention, as in our case, salvages the spinal cord function.

References


