CASE REPORT

Learning the hard way: when a CT scan misleads your diagnosis

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SUMMARY

Oesophageal injury due to blunt trauma is extremely rare, and when it presents it carries a very high mortality. Time is of essence and if not promptly recognised these injuries could have devastating consequences. We report a case emphasising the importance of oesophagoscopy in diagnosing oesophageal injuries. A young man presented to our emergency ward as an unwitnessed road traffic accident after receiving first aid from a secondary care facility. At presentation, he was haemodynamically stable with decreased power in lower limbs, and with severe neck and back pain. There was high suspicion of spinal injury, which was later evident on clinical and on radiological findings. A CT scan revealed oesophageal injury, indicated by contrast extravasation, which was convincing enough to proceed without endoscopy. Surprisingly, the apparently convincing injury picked up on CT scan marked by contrast extravasation turned out to be an artefact, which led to a negative surgical exploration.

BACKGROUND

Early diagnosis and appropriate management of oesophageal injury is a dilemma and can present as a clinical challenge to the surgeon. This case proved to be a critical learning experience during our residency training, where we learnt the value of clinical acumen, which needed to be substantiated with investigations before initiation of a surgical procedure and not vice versa. It also highlighted the need to confirm our diagnosis with further investigations rather than basing it on a single modality and going for an invasive procedure. This could prove crucial and cut down the rate of unnecessary laparotomies in patients with trauma.

CASE PRESENTATION

A 20-year-old male patient suffered a high velocity blunt trauma when his motorcycle struck an unknown object. He was not wearing a helmet and was ejected from the seat before he lost consciousness. Initially, he was taken to a nearby healthcare facility prior to transfer to our tertiary care centre. On arrival, the patient was fully conscious and haemodynamically stable. A Philadelphia collar was applied to stabilise his spine and a spine board placed to prevent excessive movement. His primary survey showed a patent airway with normal oxygen saturation. His breathing was normal, however, he was tachycardic with a heart rate of around 110 bpm, with normal blood pressure. While he was in the emergency resuscitation room, his IV

lines were maintained and he was given fluids and painkillers along with standard tetanus prophylaxis. A chest X-ray (CXR) was performed, which revealed evidence of a mild pneumothorax on the right. Ultrasonography (US) focused assessment with sonography for trauma (FAST) was performed, which ruled out any free intraperitoneal fluid. A secondary survey revealed that the patient had a right-sided forehead bruise with presence of a raccoon eye and evidence of right ear bleed. He complained of pain in the right scapular area with a tender bulge on the mid-back raising the possibility of fracture of the vertebral column. His lower limbs showed significantly decreased power with sensory level at T10. CT scans of the head, neck, chest and abdomen were conducted. The residents were smart enough to pick up on the scan images showing pneumomediastinum along with right-sided pneumothorax ([figure 1](#)). There was fracture of the D8 body with forward displacement, which was compressing the spinal cord ([figure 2](#)). CT of the head showed that the petrous temporal bone had fractured and there was slight pneumocranium with no evidence of intracranial bleed. Now the dilemma was to rule out oesophageal injury, since this patient could not have been moved to a fluoroscopy suite for dynamic contrast study without the risk of fracture displacement, which might have resulted in permanent neurological disability. So a static study with contrast swallow was performed to look for any contrast extravasation. Significant contrast leak was demonstrated on the CT images from the distal oesophagus, which was further confirmed by consultant radiologists ([figures 3–5](#)). The gastroenterology team was taken on board for

Figure 1 CT scan of the chest, axial view, showing right-sided pneumothorax.

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Figure 2 Three-dimensional reconstruction images from CT scan showing spondylolisthesis at D8 level.

oesophagoscopy, but they deferred the plan after reviewing the CT images, which showed strong evidence of oesophageal injury. Further, they could not give us any therapeutic advantage due to non-availability of covered stents and endoscopic clipping at that point in time. The patient was haemodynamically stable but his thoracic oesophageal injury posed a significant risk of deterioration over the next few hours, so a major decision had to be made to proceed with surgery. A neurosurgeon was consulted for opinion regarding mobilisation and positioning during surgery, and to ascertain whether the spinal column needed surgical fixation in the same setting. It was suggested that, in the context of a life-threatening injury of the oesophagus, which warranted immediate intervention, and at the same time keeping in mind the high risk of permanent disability if the fractured spine segments got displaced, the procedure be performed in a supine posture. It was decided that the neurosurgical intervention would be performed at a later time, once the patient had stabilised and was out of danger. The patient was taken for surgery where a transhiatal abdominal approach was taken. Laparotomy was performed and oesophagus mobilised around the hiatus. A finger was introduced behind the oesophagus to feel for any breach, but all that could be appreciated were

Figure 3 CT scan of the chest, axial view, showing pneumomediastinum and contrast extravasation around the oesophagus.

Figure 4 CT scan coronal section of the chest and upper abdomen showing contrast extravasation with pneumomediastinum, later found to be an artefact.

fractured fragments of the spine with smooth oesophageal continuity. We further tried to confirm our finding by passing a nasogastric (NG) tube and injecting methylene blue after occluding the oesophageal lumen at the gastro-oesophageal junction,

Figure 5 CT scan sagittal section showing spondylolisthesis at D8 level. Arrow pointing to the area where contrast extravasation was seen from the oesophagus along with pneumomediastinum.

but no leakage could be demonstrated around the hiatus. This was verified by making a gastrostomy through which a cystoscope was introduced to visualise the intraluminal side of the oesophagus. This initiative was taken as our surgeons were not credentialed for performing upper gastrointestinal (GI) endoscopies and we did not have our gastroenterologist's cover. Although the vision in cystoscopy was of poor quality, it was sufficient enough to rule out any mucosal breach. The opening in the stomach was brought out as a gastrostomy to provide decompression and a Witzel feeding jejunostomy was constructed to provide nutritional support access for the patient during the prolonged period of cessation of oral intake that was anticipated after surgery. We did not want to take the risk of missing on any minor injury to the oesophagus in this patient and placed a size 14 silicon flat tube behind the oesophagus in the posterior mediastinum to provide drainage. Two chest tubes were placed on either side of the chest cavities to address the pneumothorax and provide a drainage route. In a nutshell, a false interpretation of contrast-enhanced CT scan led to a negative exploration of this patient, which could have been avoided if an upper GI endoscopy had been performed prior to proceeding for surgery.

INVESTIGATIONS

During his treatment at our facility the patient underwent blood laboratory tests, CXR, US FAST and CT scan of the head, chest and abdomen, with reconstructions of the whole vertebral column.

DIFFERENTIAL DIAGNOSIS

Our patient had a thoracic eighth vertebra compression fracture with spondylolisthesis of thoracic spine causing cord compression. There was fracture of right petrous temporal bone with pneumocranium on CT of the head. A CT scan of the chest showed evidence of pneumomediastinum with contrast extravasation from the oesophagus, which was later interpreted as an artefact raising the possibility of oesophageal injury.

TREATMENT

Laparotomy was performed with blunt mobilisation of the oesophagus around the hiatus with a finger. NG was passed and methylene blue injected to watch for any leakage, but none could be elicited. Gastrostomy was performed, as the site was initially being used to introduce a cystoscope to visualise the intraluminal side of the oesophagus, which did not demonstrate any mucosal breach. A feeding jejunostomy was created for nutritional access during a prolonged phase of cessation of oral intake, since a risk of minor perforation could not be ruled out. The spine was not fixed during the first surgery, to avoid prolonged surgery time and operative stress, allowing the patient to recover before an elective procedure could be performed. Postsurgery, the patient remained stable but was kept on complete bed rest, with no activity, to protect the spine. Later, once the patient had started oral intake during his recovery course, spinal fixation was carried out. After the second operation, rehabilitation was started with limb exercises and ambulation with the help of physiotherapists.

OUTCOME AND FOLLOW-UP

The patient remained at our hospital for a total of 21 days, during which time he underwent D8 spine decompression with D6-7 and D9-10 pedicle screw fixation and fusion. He was gradually rehabilitated and mobilised. He was allowed an oral diet and his chest tubes and silicon flat drain were removed

before discharge. He has rejoined college and has resumed his activities of daily living.

DISCUSSION

Oesophageal perforation, regardless of the cause, can prove to be a life-threatening condition unless diagnosed and addressed in a timely manner. The most common causes of oesophageal injuries are high-speed motor vehicle accidents. Less than 1% of these result from blunt trauma. Beal *et al* examined 96 cases and concluded that the cervical and upper thoracic oesophagus are the most common sites for oesophageal perforation. Hence upper torso injuries should be considered highly suspicious for oesophageal trauma and adequately investigated for the right diagnosis.¹

Depending on the severity, these accidents can result in fatal outcomes such as fulminating mediastinitis. Owing to multiple trauma, the symptoms and signs of oesophageal-related injuries may get overlooked. Pneumomediastinum, if present, should raise the suspicion of oesophageal injuries.²⁻⁴

Oesophageal perforation is an emergency in which time is of the essence. Diagnosis can be tricky due to vague symptoms but a detailed examination with comprehensive investigations is essential for correct diagnosis and further management of oesophageal trauma. A multidisciplinary approach is often recommended, but that again depends on the correct diagnosis. Treatment choice depends on conservative management versus intervention, depending on the patient's condition.

Contrast oesophagography, although not recommended as the first-line investigation, still remains the gold standard for diagnosis, because it provides direct visualisation of the perforated site. It has high sensitivity and specificity but requires expertise for the procedure. It may also give false-negative results if water-soluble contrast is used.

A more feasible alternative investigation could be a helical CT scan, which does not require expertise, is faster and can be performed more conveniently in critically ill patients because it does not require transfer to a fluoroscopy suite. Initial CT findings of mediastinal gas or fluid, and oesophageal thickening or pleural effusion, may raise suspicion of perforation.⁵⁻⁷

Gastroenterologists and surgeons with expertise in thoracic surgery usually deal with such cases, but protocol varies from region to region. Thus it is essential that a general surgeon should be familiar with the basic modalities for efficient and timely management of these patients.⁸ It is essential to determine the need for acute surgery or for alternative interventions in a timely manner. An aggressive diagnostic approach is essential to confirm the diagnosis, but initial resuscitation should be started. Oxygen monitoring, administration of intravenous fluids, antibiotics and appropriate pain management can prove to be crucial steps, and, later, appropriate observation along with availability of intensive care units and surgical facilities can prove to be life-saving in such patients.⁹

The dilemma in today's surgical training is that some institutes incorporate endoscopy as an important component of surgical training, while others consider it to be in the domain of gastroenterology. This case is an important learning lesson, showing that even advanced imaging modalities such as CT scan cannot replace the need for endoscopy. If surgeons are trained for these procedures, they can easily incorporate this into their routine surgery and avoid unnecessary surgeries such as in cases of oesophageal injury due to blunt trauma. Cases with high suspicion of oesophageal injury due to blunt trauma should not simply undergo dynamic contrast study or CT contrast study, but should also additionally undergo endoscopic evaluation

Reminder of important clinical lesson

before proceeding for surgical interventions. Facilities where oesophageal stents are available could provide less morbid treatment options for these patients and result in faster recovery.

Learning points

- ▶ Simple tools of investigation can avoid unnecessary surgery.
- ▶ Oesophageal injuries in blunt high-velocity trauma, although rare, should always be suspected.
- ▶ Choosing from a wide array of investigations is an absolute necessity to streamline your diagnosis.
- ▶ Oesophagoscopy combined with an oesophagogram can increase diagnostic accuracy in oesophageal perforation cases.
- ▶ Surgical residents should be trained in endoscopy.

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Contributors RCG and AB were involved in the case and contributed to collecting information and writing it into a comprehensible format. FM helped in writing the discussion and helped in conceptualisation of the case. HZ was involved in the critical review and reformatting of the manuscript prior to submission.

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