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T-tube placement as a method for treating penetrating oesophageal injuries



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ABSTRACT

INTRODUCTION: Penetrating oesophageal injuries are extremely rare. Their timely recognition can be difficult and optimal treatment remains controversial. Early recognition of injury is possible with the help of a high index of suspicion and early radiological and endoscopic examinations. Prompt surgical intervention with primary repair of injury, should be the goal.

PRESENTATION OF CASES: We describe two cases of penetrating oesophageal trauma where T-Tube placement through the oesophageal defect, was successfully employed. Both cases proved to be challenging due to time lapse after injury and anatomical location.

DISCUSSION: Penetrating injuries to the Oesophagus are rare with a reported incidence of 11–17%, most are due to gunshot injuries or stabbings, cervical followed by the thoracic Oesophagus are most at risk. In delayed presentations and sepsis related multi-organ instability, diversion and drainage are considered appropriate. T-tube placement through defects in difficult situations of delayed presentation is well described in setting of iatrogenic perforations. Their use has been described in penetrating injuries but much less frequently.

CONCLUSION: T-tube placement though oesophageal defects can prove to be an effective treatment option to repair both iatrogenic and penetrating injuries of the Oesophagus, whether early or delayed.

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1. Introduction

A T-tube placed in the Oesophagus through the site of injury, to create a controlled oesophago-cutaneous fistula is a well described method for managing oesophageal perforations secondary to iatrogenic or blunt trauma [1]. This technique has been described in clinical situations of delayed presentation or recognition, where primary repair cannot be undertaken due to extensive local inflammation and hemodynamic instability related to sepsis [2]. The method works by reducing local spillage and providing a draining conduit to the exterior for the esophagus, thus allowing other measures to overcome the local infective process. Over time a fibrous tract forms around the tube which eventually obliterates once the tube is removed; providing an effective means to treat this potentially devastating injury [3]. Use of T-tubes in penetrating injuries of the Oesophagus was reported as far back as 1954 as a case report [4]. Though successful its use in this setting has been infrequent over the years. We describe two cases in which primary repair of injuries

were difficult, due to delayed presentation in one and anatomical location of injury in both.

2. First case

A 31 year old male was brought to the ER, having suffered a single gunshot injury from a handgun a short while before presentation. On initial assessment the patient was noted to be alert, oriented and hemodynamically stable. A single puncture wound was noted on the right shoulder with no exit site. There were reduced breath sounds bilaterally on chest auscultation. All peripheral pulses were palpable and of good volume. There was nil of note on abdominal examination. A CT scan of chest and abdomen with oral and IV contrast was performed. Bilateral lung contusions and haemo-pneumothorax was noted (Fig. 1). There was no extravasation of contrast from the Oesophagus and not major vascular or tracheal injury identified. Bilateral tube thoracostomies were done and patient admitted for close observation. Over the next few days his clinical condition slowly worsened, with evidence of sepsis. A repeat CT scan with I/V and oral contrast demonstrated a right plural fluid collection and extravasation of contrast from the upper thoracic Oesophagus. A right anterolateral thoracotomy, through the 6th intercostal space was performed. Lung decortication and wide mediastinal debridement was done, the bullet was removed. A single tangential injury was identified on the postero-

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Fig. 1. CT scan image showing bullet lodged in the right apical lung with bilateral pulmonary contusions. The bullet track is well visualized.

lateral aspect of the upper thoracic Oesophagus. The wound edges were freshened. Due to significant local contamination and delayed diagnosis a primary repair was not attempted. A size 18 T-tube was placed through the defect and wound edges approximated with interrupted vicryl sutures.

The tube was brought out through the 4th intercostal space in the anterior-axillary line. Apical and basal chest tubes were placed and chest closed. A feeding jejunostomy was made to through a small upper midline incision. His post-operative recovery was uneventful, jejunostomy feeding was established and continued for 6 weeks. At 4 weeks some oral liquids were allowed. T-tube was removed in clinic at 6 weeks and an oral contrast study was done a week later to document absence of leak or stricture. Full oral intake was allowed following this.

3. Second case

A 20 year old male was transferred to hospital, having suffered injuries due to a bomb blast. The incident had occurred over 6 h prior to presentation to ER. On initial assessment the patient was noted to be awake and alert and not in any distress, he was complaining of pain on the left side of his neck. On physical examination a single puncture wound was noted at the base of neck on the left side. There was surrounding crepitation. No other injuries were identified. A CT scan of the head neck and chest with oral and I/V contrast was undertaken.

A foreign body was noted along the posterior wall of the lower cervical Oesophagus with spillage of contrast (Fig. 2).

Immediate neck exploration was performed through an incision along the anterior border of the sternocleidomastoid muscle. The foreign body (a ball bearing) was located at the thoracic inlet in close proximity to the Oesophagus and removed. A single perforation along the posterior oesophageal wall was identified. A local hematoma was evacuated and perforation edges were freshened. Primary repair of the defect was considered due to early presentation, but it was felt that to safely close the defect considerable mobilization of the proximal and distal Oesophagus would be needed. The distal mobilization was difficult due to location of injury at the thoracic inlet. Due to recent successful usage of T-tube in another patient with similarly located injury (case no. 1) it was decided to place a T-tube through the defect and manage as a controlled fistula. Interrupted Vicryl sutures were used to close the wound around the tube. A silicone drain was placed in the vicinity; the T-tube and drain were exteriorized through stab incisions on the anterior upper chest wall. A feeding jejunostomy was made through an upper midline incision. Post-operative recovery was uneventful; feeding was maintained through the jejunostomy. At 6 weeks the T-tube was removed in clinic without any immediate



Fig. 2. Non ionic contrast swallow performed on the 12th day, contrast leakage from the upper thoracic Oesophagus is well seen (black arrow).

sequelae and a contrast study was performed a week later to document the absence of stricture or significant spillage. Normal oral intake was allowed thereon.

4. Discussion

Penetrating injuries to the Oesophagus are rare with a reported incidence of 11–17%, most are secondary to gunshot injuries or stabbings. Cervical followed by the thoracic Oesophagus are sites most at risk [5]. Clinical presentation can be subtle and recognition of the injury delayed; the latter being an important factor responsible for high associated mortality rate, up to 40% [6].

An oral contrast study was considered the gold standard for establishing the diagnosis, though an oral and I/V contrast enhanced CT scan is probably as effective and should now be the investigation of choice. An upper gastrointestinal endoscopy may add to the accuracy.

Principles of treatment consist of controlling spillage from the Oesophagus, local debridement of infected tissues and provision of adequate drainage to the area, use of broad spectrum antibiotics and maintenance of adequate nutrition.

Surgery is aimed at re-establishing the oesophageal integrity and controlling spillage thus addressing the mediastinitis and sepsis [7–9]. The specific surgical approach taken varies depending upon the location and extent of injury, time delay before intervention, haemodynamic stability of patient and experience of surgeon [10,11].

Due to the rarity of the condition no definitive treatment guidelines are available. The generally recommended approach for perforations detected within 24 h of injury, is primary repair after freshening of wound edges. Some authors advocate reinforcement with use of plural or local muscle flap. Associated incidence of leakage and mortality is quite low [7]. For injuries identified beyond 24 h the situation is less clear. Most authors suggest an individualised approach based upon extent of delay, extent of local contamination, general clinical state of the patient and just as importantly experience of surgeon. Primary repair with or without buttressing with local flaps can be done, there is however a higher incidence of post-operative leakage and septic complications, including death. Other well described methods include diversion of salivary stream by an end or loop Oesophagostomy

with provision of enteral feeding by gastrostomy or jejunostomy. These require complex reconstructions subsequently [11–16].

A well described though infrequently mentioned technique, used mainly in the setting of delayed interventions for iatrogenic oesophageal perforations is the placement of a 'T-tube' through them rent with exteriorization and local drainage by chest tubes. It has been shown to produce good results with many patients being salvaged by this method. There are reports of this method being applied with success in the setting of delayed presentation of penetrating injuries [17,18].

In both of our cases the location of injury at the thoracic inlet made it difficult to attempt primary repair; in first case delayed presentation was an additional factor. In both we placed a T-tube through the defect which was narrowed around the tube with a few interrupted vicryl sutures. The tubes were exteriorized through the intercostal spaces using the shortest route. The plural space was drained with chest tubes after local debridement in the first case, in the 2nd one a silicone drain was placed in the vicinity of the injury. Removal of T-tubes was done in clinic about 6 weeks later without problems. There were no swallowing problems in subsequent clinic follow up.

5. Conclusion

T-tube placement through a perforation can be considered an effective treatment option, in difficult to repair iatrogenic or penetrating injuries of the Oesophagus.

Conflicts of interest

All the authors have no personal or financial conflicts of interest regards this case report.

Funding

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Ethical approval

This is not a research study involving any interventions. The above two cases are reported on the basis of the authors experience. Not many publications exist on the subject. There are only a few case reports on t tube usage in penetrating oesophageal injury.

Consent

The two cases mentioned in the case report have been completely anonymised with no particulars recorded which could identify or breach their privacy. Only radiological images have been used which have no identifiers hence no consent had been acquired.

Authors' contributions

Dr. Amber Bawa, Dr. Fatima Mannan and Dr. Roger Christopher Gill were involved in the case writing and data collection for the case report. Dr. Inam Pal was involved in the proof reading, critical review and making corrections to the manuscript. Dr. Saulat Fatimi was involved in the proof reading and critical appraisal for the manuscript.

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References

- [1] L. Kaman, J. Iqbal, B. Kundil, R. Kochhar, Management of esophageal perforation in adults, *Gastroenterol. Res.* 3 (6) (2011) 235–244.
- [2] P.A. Linden, R. Bueno, S.J. Mentzer, L. Zellos, A. Lebenthal, Y.L. Colson, et al., Modified T-tube repair of delayed esophageal perforation results in a low mortality rate similar to that seen with acute perforations, *Ann. Thorac. Surg.* 83 (3) (2007) 1129–1133.
- [3] I. Qadir, H. Zafar, M.Z. Khan, H.M. Sharif, T-tube management of late esophageal perforation, *J. Pak. Med. Assoc.* 61 (4) (2011) 418.
- [4] T. Bodi, H. Fanger, T. Forsythe, Spontaneous rupture of esophagus, *Ann. Intern. Med.* 41 (3) (1954) 553–562.
- [5] M.K. Soji Ozawa, *Esophageal Perforation: Mastery of Surgery*, 5th ed., Wolters Kluwer Lippincott Williams and Wilkins, 2007.
- [6] S.B. Vogel, W.R. Rout, T.D. Martin, P.L. Abbott, Esophageal perforation in adults: aggressive, conservative treatment lowers morbidity and mortality, *Ann. Surg.* 241 (6) (2005) 1016.
- [7] A. Altorjay, J. Kiss, E. Szirainyi, The role of esophagectomy in the management of esophageal perforations, *Ann. Thorac. Surg.* 65 (5) (1998) 1433–1436.
- [8] Pankaj Bhatia, Dalilah Fortin, I. Richard Inculet, A. Richard Malthaner, Current concepts in the management of esophageal perforations: a twenty-seven year Canadian experience, *Ann. Thorac. Surg.* 92 (2011) 209–215.
- [9] Esophageal perforation: diagnostic work-up and clinical decision-making in the first 24 h Jon Arne Søreide^{1,3*} and Asgaut Viste 2,3, *Scand. J. Trauma, Resusc. Emergency Med.* 19 (66) (2011).
- [10] M. Tettey, F. Edwin, E. Aniteye, L. Sereboe, M. Tamatey, K. Entsua-Mensah, et al., Management of intrathoracic oesophageal perforation: analysis of 16 cases, *Trop. Doct.* 41 (4) (2011) 201–203.
- [11] V. Bresadola, G. Terrosu, A. Favero, F. Cattin, V. Cherchi, G.L. Adani, et al., Treatment of perforation in the healthy esophagus: analysis of 12 cases, *Langenbeck's Arch. Surg.* 393 (2) (2008) 135–140.
- [12] C.J. Brinster, S. Singhal, L. Lee, M.B. Marshall, L.R. Kaiser, J.C. Kucharczuk, Evolving options in the management of esophageal perforation, *Ann. Thorac. Surg.* 77 (4) (2004) 1475–1483.
- [13] W.G. Jones, R.J. Ginsberg, Esophageal perforation: a continuing challenge, *Ann. Thorac. Surg.* 53 (3) (1992) 534–543.
- [14] P.D. Kiernan, M.J. Sheridan, E. Elster, J. Rhee, L. Collazo, W.D. Byrne, et al., Thoracic esophageal perforations, *South. Med. J.* 96 (2) (2003) 158–163.
- [15] D. Vallböhmer, A.H. Hölscher, M. Hölscher, M. Bludau, C. Gutschow, D. Stippel, E. Bollschweiler, W. Schröder, Options in the management of esophageal perforation: analysis over a 12-year period, *Dis. Esophagus* 23 (2010) 185–190.
- [16] L.B. Reeder, V.J. DeFilippi, M.K. Ferguson, Current results of therapy for esophageal perforation, *Am. J. Surg.* 169 (6) (1995) 615–617.
- [17] T. Nakabayashi, M. Kudo, T. Hirasawa, H. Kuwano, Successful late management of esophageal perforation with T-tube drainage, *Case Rep. Gastroenterol.* 2 (1) (2008) 67–70.
- [18] C. Hatzitheofilou, C. Strahlendorf, S. Kakoyiannis, D. Charalambides, D. Demetriades, Penetrating external injuries of the oesophagus and pharynx, *Br. J. Surg.* 80 (9) (1993) 1147–1149.

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