

Treatment of Delayed Partial Bronchial Rupture with Expandable Metallic Stent

E K W Sim, B L Liam, K H Lee, L Tan, W X Chan

ABSTRACT

Traumatic bronchial rupture is a rare entity. The severity of the trauma often causes lethal injury to other thoracic organs. The incidence in patients with blunt chest trauma admitted to the hospital ranges from 1.5% to 3%. As a rule, early diagnosis and surgical treatment are important to facilitate successful repair of the disruption. We describe an unusual case of bronchial rupture which was diagnosed 15 days after blunt chest trauma and was treated by bronchial stenting. The success of this case involving the left main bronchial rupture provides a feasible alternative to the repair of partial airway disruption and greatly reduces the morbidity.

Keywords: bronchial stents, chest trauma, bronchial rupture

INTRODUCTION

Traumatic bronchial rupture is a rare form of injury, the incidence ranges from 1.5% to 3%⁽¹⁻²⁾. However, it is frequently lethal because failure to diagnose the condition early leads to delay in treatment. The diagnosis of airway disruption is difficult both clinically and radiologically. Bronchoscopy is the most reliable means of diagnosis⁽³⁻⁴⁾. It should be carried out without delay to confirm diagnosis of airway disruption and to facilitate early treatment. Surgical treatment is the most common form of treatment for tracheobronchial injuries. We describe a patient with late diagnosis of a partial bronchial rupture, in whom stenting was performed successfully. Subsequent endobronchial laser resection of granulation was performed successfully, the necessity for surgery was avoided.

Case Report

A 19-year-old male Chinese was admitted to the Accident and Emergency Department after a road traffic accident. He was thrown off his motorcycle and was found by the road close to his motorcycle. He was cyanotic and dyspnoeic. Chest X-ray (CXR) showed massive subcutaneous emphysema extending from the neck down to the scrotum and bilateral pneumothoraces and pneumomediastinal. Thoracostomy tubes were placed on each side. Flexible bronchoscopy was performed 3 hours after admission.

The right upper lobe bronchus was occluded by plugs and blood clots. Bronchoscopic procedures were performed to remove the clots and clear the right bronchus. The left main bronchus was narrowed and heaped up with mucosa at the postero-medial wall. The bronchi and carina were found to be grossly intact. Surgical emphysema settled over the next few days.

However, 9 days after admission, CXR showed collapse of the left lower lobe. Bronchoscopic suction of the large mucous plug in the left bronchus was performed. The left main bronchus was narrowed 2 cm from the carina with oedema of the left main bronchus. Aggressive physiotherapy and trials of respirators BIPAP; IPAP and EPAP, were employed to allow recruitment and re-expansion of the left lung in the hope that a patent airway would be present after the oedema had subsided. The patient was then intubated and re-expansion of the left lung was then observed. However, the left lung collapsed again on the fifteenth day after admission. Bronchoscopy was performed and a mucosal lesion was found in the left main bronchus 2 cm from the carina with a small piece of exposed cartilage. The diagnosis of a partial tear of the bronchus was made.

Bronchoscopic fluoroscopic placement of a bronchial stent was performed on the seventeenth day after admission. CXR showed the left lung re-expanded post-procedure. On the twelfth day post-procedure, bronchoscopy performed showed the presence of granulation tissue occluding the proximal end of the stent. Laser photoresection of the granulation tissue was performed on the twentieth day post-stenting. Re-inspection confirmed complete patency and segments of the left bronchial tree were all visualised. The patient was then discharged.

Subsequent to the initial laser photoresection procedure, there were two recurrences of occlusion of the left main bronchus by granulation tissue within the two-month period after this patient's discharge. Bronchoscopic balloon dilatation under fluoroscopy was performed on both instances. The patient was diagnosed well with complete re-expansion of the left lung at the follow-up four months after the last recurrence.

DISCUSSION

Traumatic rupture of the major airways occurs in the trachea or bronchi and may present in the form of

Division of
Cardiothoracic Surgery
Cardiac Department
National University Hospital
5 Lower Kent Ridge Road
Singapore 119074

E K W Sim, MBBS,
FRCS (Edin, Glas), FAMS
Head and Consultant

W X Chan
Research Assistant

Department of Medicine
National University Hospital

K H Lee, FAMS
Consultant

B L Liam, MRCP
Visiting Consultant

Department of
Diagnostic Radiology
National University Hospital

L Tan, FRCPE
Head

Correspondence to:
A/Prof E K W Sim

transverse, longitudinal or complex with rupture in more than one site or form. As reported by Symbas and co-workers, transverse rupture is the most common⁽⁵⁾. An increased mechanisation and speed of travel with changing societal trends has greatly increased the frequency and severity of major airway disruption. Ruptured airways is difficult to diagnose. Delayed diagnosis very often results in post-operative complications such as stenosis of the airways by granulation. Thus, the main objective of treatment in tracheobronchial disruptions is early diagnosis and intervention.

Bronchoscopy is the most definitive means of diagnosis⁽³⁻⁴⁾. It should be performed without delay in any instance when the patient shows signs and symptoms related to the rupture of the airways. Besides bronchoscopy, Huson and co-workers have described the use of computerised tomography scans and magnetic resonance imaging in the diagnosis of airway disruption⁽¹⁾.

Due to the complications which may evolve, surgery is advocated as soon as the diagnosis is made. The optimal surgical procedure is debridement of injured tissue and end-to-end anastomosis, which demonstrated satisfactory results in 90% of the cases⁽³⁻⁴⁾. Surgical repair is the favoured choice in patients with delayed presentation of airway disruptions. Baumgartner et al reported 9 cases of single tracheobronchial disruption from four Los Angeles trauma centers over an 8-year period; 4 patients had late presentation of airway disruption, ranging from 3 to 8 days after the injury, while the other patients underwent immediate surgery⁽⁶⁾. All cases were managed surgically. In another paper, Jones et al reported 13 cases of single tracheobronchial injury from the University of Louisville Hospital over a 14-year period; 3 died from multiple major associated injuries and 1 died before therapy could be instituted. Among the 9 survivors, 2 had delayed presentation

with surgical repair performed at 4 and 40 days respectively⁽⁷⁾. All other patients underwent immediate surgery upon diagnosis.

The case reported here is unusual because the diagnosis was delayed for 15 days and stenting under fluoroscopy was performed instead of surgical repair. This is a procedure seldom considered for patients with late presentation of tracheobronchial rupture. Post procedural stenosis of the bronchus at the site of stenting by granulation is a well described event which occurred in our patient. Endobronchial laser resection of the granulation under bronchoscopy was performed. Surgery is the gold standard in the treatment of bronchial rupture and is strongly recommended in patients with complex lesions. This case illustrates that endobronchial stenting may prove to be a suitable alternative in the management of this unusual problem.

REFERENCES

1. Huson H, Sais GJ, Amendola MA. Diagnosis of bronchial rupture with magnetic resonance imaging. *J Magn Reson Imaging* 1993; 3:919-20.
2. Kirndorfer D, Filler D, Muhrer KH. Thoracic trauma. *Zentralbl Chir* 1980; 105:209-19.
3. Kirsh MM, Orringer MB, Behrendt DM Sloan H. Management of tracheobronchial disruption secondary to nonpenetrating trauma. *Ann Thorac Surg* 1976; 22:93-101.
4. Mahour GH, Lynn HB, Sanderson DR. Rupture of the bronchus. *J Pediatr Surg* 1967; 2:263-7.
5. Symbas PN, Justicz AG, Ricketts RR. Rupture of the airways from blunt trauma: treatment of complex injuries. *Ann Thorac Surg* 1992; 54:177-83.
6. Baumgartner F, Sheppard B, de Virgillo C, Esrig B, Harrier D, Nelson RJ et al. Tracheal and main bronchial disruptions after blunt chest trauma: presentation and management. *Ann Thorac Surg* 1990; 50:569-74.
7. Jones WS, Mavroudis C, Richardson JD, Gary LA Jr, Howe WR. Management of tracheobronchial disruption resulting from blunt trauma. *Surgery* 1984; 95:319-23.