'Spontaneous' rupture of the healthy oesophagus

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Summary

The clinical features of four cases of 'spontaneous' rupture of the oesophagus are described together with the radiological changes.

It is emphasized that the diagnosis often may be made from simple penetrated views of the heart shadow with the patient in the erect position.

Introduction

During the last 20 years the syndrome of acute rupture of the apparently normal oesophagus has been more frequently recognized and several extensive reviews have been made (Barrett, 1946; Moynihan, 1954; Tesler & Eisenberg, 1963). The condition has always been termed 'spontaneous rupture' but the nomenclature has become confused, and it seems preferable to refer to 'true spontaneous rupture' of the organ as rupture occurring at rest, as during sleep (Clark & Tankel, 1964), and whilst watching television (Heroy, 1952). Most cases seem to follow forceful vomiting of a large meal, recently taken, and often liberally mixed with alcohol. These cases have been well termed primary pressure rupture of the oesophagus (Moynihan, 1954). The remainder may be related to miscellaneous conditions such as status asthmaticus (Raffle, 1958), childbirth (Kennard, 1950) and epilepsy (Klein & Grossman, 1943). Under these circumstances there is usually raised intra-abdominal pressure and the rupture may be regarded as a secondary pressure rupture.

The association of severe upper abdominal pain after vomiting, hydropneumothorax and surgical emphysema in the neck may allow a clinical diagnosis to be made, although the condition may simulate such emergencies as myocardial infarction (Armstrong & Shearer, 1965), perforated peptic ulcer (Ross, 1961) and pancreatitis (Hugh, 1965). Four more cases are

described which demonstrate the variability of the presenting symptoms and signs, particular reference being made to the radiological features.

Case 1

Mr H.B., aged 59, was admitted at 17.00 hr. He had been drinking heavily at his daughter's wedding reception at midday when he vomited and then complained of severe abdominal pain and breathlessness. Later his arms and face began to swell.

On admission: When first seen he was shocked, dyspnoeic and cyanosed, with surgical emphysema of the neck and arms. There were the physical signs of a left pneumothorax with tracheal deviation to the right. There was tenderness and guarding in the epigastrium.

X-rays of the chest on admission showed a left sided hydropneumothorax, collapse of the left lung and shift of the heart, trachea and mediastinum to the right side. Mediastinal emphysema was present. Penetrated views of the heart and diaphragm showed a vertical line of mediastinal emphysema behind the heart (Fig. 1) but no gas under the diaphragm. There was also a small right pleural effusion. Widespread surgical emphysema was noted over the chest wall. Aspiration of the left pleural cavity yielded beery fluid.

Operation: Left thoracotomy at 21.30 hr confirmed the presence of a 3½ in. rupture in the left lateral oesophageal wall extending to 1 in. below the hiatus. The laceration was repaired and drains inserted. Post-operatively the patient remained very dyspnoeic with a severe respiratory infection. Ten days later he rapidly deteriorated, developed a left pleural effusion and died shortly afterwards.

Necropsy revealed terminal leakage from the suture line with an acute pericarditis and pleurisy.

Case 2

Mr I.M., aged 79, was admitted after having

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awakened from his sleep 6 hr previously with violent epigastric pain. Subsequently he had vomited twice.

On examination he was very restless and mildly shocked. There was board-like rigidity of the abdomen with few bowel sounds. A diagnosis of perforated peptic ulcer was made but laparotomy was negative. Post-operatively his condition improved but he collapsed next day and was found to have a left pneumothorax and a trace of surgical emphysema in the neck.

Although the straight X-ray of the abdomen on admission failed to show gas under the diaphragm, further examination, in retrospect, revealed a thin V-shaped line of gas behind the heart on the penetrated view (Fig. 2). Later when

FIG. 1. Penetrated view of heart and diaphragm showing a vertical line of mediastinal emphysema.

FIG. 2. Penetrated view of heart to show the thin V-shaped line of air.

Case 3

Mr S.N., aged 54, was admitted after having vomited and developed sudden severe left-sided chest pain following a large meal taken with much alcohol.

On examination he was not shocked, breathless or cyanosed. He had the signs of a moderate left pleural effusion, with tenderness and guarding in the epigastrium and left hypochondrium. Tapping of the effusion yielded beery fluid.

Chest X-ray confirmed the effusion on the left

FIG. 3. Gastrografen swallow showing extravasation into the left mediastinum.

the diagnosis of rupture of the oesophagus became apparent on clinical grounds, further chest films showed more extensive surgical emphysema with a left pneumothorax. A Gastrografen swallow confirmed the site of the rupture to be at the lower end of the oesophagus with extravasation of radio-opaque material into the left mediastinum (Fig. 3).

Operation: Thoracotomy, performed 30 hr after admission, showed the rupture to be 1 in long in the lower third just above the hiatus. The rupture was repaired and drains inserted but the patient's condition remained poor and he died a few hours post-operatively.

side but there was no mediastinal air or pneumothorax.

Operation: Thoracotomy 4 hr after the rupture showed a rent 1 in. long in the lower third of the oesophagus anteriorly. There was beer and food debris in the left pleural cavity. The rupture was sutured and drains inserted. The patient made an uninterrupted recovery and a barium swallow and meal some weeks later were normal.

Case 4

Mr A.R., aged 53, had had a single bout of vomiting and diarrhoea 7 hr before admission. About 1 hr after the episode he developed severe gripping pain over the lower chest and upper abdomen.

On examination he was slightly cyanosed but not shocked. His respiration was shallow but there were no abnormal signs in the lungs. There was guarding and tenderness in the epigastrium. Bowel sounds were present.

Chest X-rays on admission showed diffuse opacities in the left middle and lower zones. There was no mediastinal air.

He was treated with intravenous fluids and antibiotics but became febrile and continued to run a high fever. The patchy opacities at the left base became more pronounced and after 10 days definite evidence of a pleural effusion was apparent both clinically and radiologically. This was tapped to reveal thick pus.

Operation: Thoracotomy, performed 2 weeks after his original admission, revealed a rupture of the oesophagus at the junction of the lower and middle third communicating with a large abscess cavity. The rupture was sutured, the chest drained and a temporary feeding gastrostomy was performed. The patient made a satisfactory recovery.

Discussion

Although many cases of rupture of the oesophagus are related to a rise in pressure in the organ, there is no doubt that sometimes the rupture is truly spontaneous.

The site of the lesion is remarkably constant, being usually along the postero-lateral aspect of the lower third of the organ (*Lancet*, 1963). The absence of striated muscle in the lower third of the oesophagus together with a linear arrangement of the smooth muscle fibres may well play a part in producing the usual longitudinal type of rent. In addition, elongation and tortuosity of the aorta in the elderly frequently causes displacement of the epiphrenic part of the oesophagus forwards and to the left, leaving the left side of the oesophagus stretched and unsupported.

Studies on cadavers, with retrograde injection of contrast media under pressure from the stomach, have confirmed this region to be the weakest part of the oesophageal wall (Bodi, Fanger & Forsythe, 1954). It is of interest to note that spontaneous oesophageal rupture which occurred in five neonates was always into the right pleural cavity (Hohf, Kimball & Bellenger, 1962), this presumably being related to the fact that in babies the distal oesophagus is situated more to the right than in the adult, with the aorta protecting its left side.

Small & Ellis (1958) have drawn attention to the similarities between spontaneous rupture of the oesophagus and the syndrome of post-emetic bleeding from gastric mucosal tears (Mallory & Weiss, 1929). However most authors consider the two conditions to be completely separate entities. In the Mallory-Weiss syndrome the tears are limited to the gastric mucosa around the cardia and rarely extend through the full thickness of the stomach wall (Holmes, 1966). Reviewing the pathogenesis Hodges (1965) has suggested that the primary difference between the two lesions lies in the point of application of stress. In the Mallory-Weiss syndrome the oesophago-gastric junction rises into the chest with vomiting, being allowed to do so by laxity of the diaphragmatic hiatus. In this position the intra-thoracic part of the stomach distends and mucosal rupture occurs. With oesophageal rupture pressure is presumably applied to the oesophageal wall directly with, at first, muscle disruption, and later mucosal tearing.

Anatomically complete rupture of the oesophagus allows the escape of fluid and air initially into the mediastinum. From this situation it tracks extra-pleurally upwards towards the lung hilum or laterally over the dome of the diaphragm (Fig. 4). Spread of air in this way gives rise to the V-shaped shadow which was described by Naclerio (1957) as an almost pathognomonic sign of oesophageal rupture. Probably the earliest and most convincing sign of air in the mediastinum is a thin translucent streak running close to the left border of the aorta and often mistaken for an unusually clear aortic margin. This line runs obliquely upwards and outwards forming the vertical limb of the oblique V-sign. The more horizontal limb, formed by gas tracking along the surface of the dome of the left diaphragm is often missing. Later, air may spread into the upper mediastinum to reach the neck after several hours, although air has been noted in the neck within 1 hr of the actual rupture (Mackler, 1952). Air has never been shown below the diaphragm in spontaneous

rupture of the oesophagus even when, as in Case 1, the perforation extended to 1 in. below the hiatus, or as in the case of Strauch & Lynch (1965) when the rupture was entirely extra-thoracic.

FIG. 4. Diagram showing the production of the V-sign of Naclerio.

Direct rupture into the pleural space gives rise to a pneumo and/or hydrothorax as was seen in Case 1 initially and later in Case 2. This complication is probably found in approximately 85% of all cases at some time, with bilateral changes in a small proportion (Marston & Valk, 1959). Not uncommonly the rent in the oesophagus is of such a type as to give a tension pneumothorax. Untreated the rupture may progress, if the patient survives, to an empyema, as in Case 4, or a mediastinitis.

In spite of the fact that the majority of these cases of spontaneous rupture occur in the lower third of the oesophagus, it is important from the surgical standpoint to establish the exact site of the laceration. Rarely, spontaneous tears may occur in the cervical oesophagus (Russell, 1953), the middle third (Ross, 1961) or even below the oesophageal hiatus (Strauch & Lynch, 1965). In Case 2 this was easily done by giving the patient a small quantity of Gastrografin to swallow which demonstrated extravasation into the lower mediastinum on the left. Kerr (1963) pointed out the difficulty in locating the exact

site of a traumatic perforation after a simple swallow procedure because of the tracking of the contrast medium into the para-oesophageal tissues. He was able to obtain more satisfactory results in five subsequent cases by passing a soft rubber catheter into the stomach and injecting radio-opaque material as the catheter was withdrawn.

In the majority of cases the diagnosis of rupture of the oesophagus may be made on the clinical findings, taken in association with simple radiological techniques. Indeed the parlous state of many of the patients with this disorder precludes anything but the gentlest of investigations. Nevertheless a straight chest X-ray with an over-penetrated view of the heart, taken in association with spot films after a Gastrografin swallow, is likely to be most helpful in the diagnosis, without distressing unduly even the most ill patient.

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