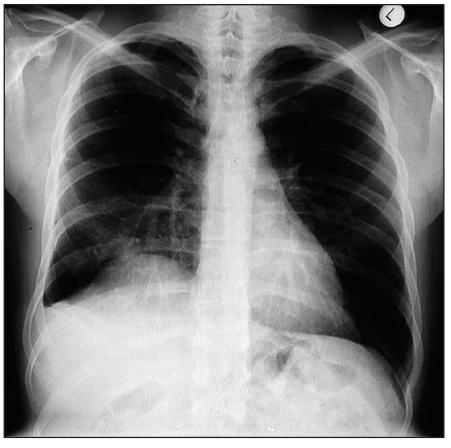
Late presentation of traumatic rupture of the right hemidiaphragm

Introduction

Rupture of the right hemidiaphragm following trauma with herniation of the liver in the chest is less common than left-sided rupture, and can be quite elusive in diagnosis. This article reports the case of a 30-year-old male who presented with right diaphragmatic rupture with liver herniation 21 weeks after a road traffic accident, in whom the diagnosis was established with certainty only at surgery. An overview of this condition's features, diagnosis and treatment is also presented.

Figure 1. Chest radiograph demonstrating what appears to be elevation of the right hemidiaphragm.



Discussion

The incidence of diaphragmatic rupture varies in literature, but in a review by Shah and colleagues of 980 cases treated at various centres between 1981 and 1999, 68.5% were left-sided, 24.2% were right-sided, and 15.0% were bilateral (Shah et al, 1995). Hepatic protection on the right, the higher strength of the right hemidiaphragm, and the fact that right-sided ruptures are less frequently diagnosed, might explain the higher incidence of left-sided ruptures (Mihos et al, 2003).

Right-sided ruptures are difficult to diagnose. Right-sided chest pain and shortness of breath on exertion can be the only symptoms. A chest radiograph will show what appears to be elevation of the diaphragm on the affected side, which might be interpreted as a right haemothorax. Ultrasound establishes the diagnosis by showing the free edge of the diaphragm within the pleural fluid or, in late presentations, the liver herniating into the thorax.

A computed tomography (CT) scan might not be very helpful for establishing right-sided ruptures. A helical CT scan is more sensitive, and may show discontinuity of the diaphragm and herniation of the liver lobe in up to 50% of cases of right diaphragmatic ruptures (Killeen et al, 1999).

Magnetic resonance imaging has been shown to be very useful in establishing the diagnosis, because of its capability of directly acquiring coronal and sagittal images allowing evaluation of the entire diaphragm. The disadvantage is that it cannot be easily carried out in emergency situations, when helical CT remains the modality of choice (Dosios et al, 1993).

Radionuclide liver-spleen imaging with technetium-99m sulphur colloid characteristically shows a distortion of liver configuration with displacement of the right lobe superiorly and posteriorly.

Video-assisted thoracoscopy is particularly useful in late presentations, when the diagnosis is elusive, before performing a full right thoracotomy. If there are no massive intrathoracic adhesions, the defect can even be repaired thoracoscopically (Sato and Kosaka, 2002).

Treatment is undertaken by reducing the contents and closing the defect. Acute diaphragmatic injuries are best approached through the abdomen, as there might be associated intra-abdominal injuries. However, in right-sided ruptures, access to the torn diaphragmatic edges can be difficult, and a thoraco-abdominal approach is better.

In late presentations, thoracotomy is the best approach, because it avoids the adhesions that will have usually developed between the herniated abdominal contents and the intrathoracic structures. It also provides a much better exposure of the diaphragmatic edges for repair, which is usually by direct suture. Only rarely is a prosthetic graft necessary. In fresh injuries, use of pledgets is advised as the edges

Case Report

A 30-year-old male Caucasian was involved in a road traffic accident, where he sustained a severe right chest injury. There was a 15 cm long laceration on the anterolateral part of the right chest below the nipple, which involved chest wall muscles but the intercostal muscles were intact. A chest radiograph revealed fractures of the posterior right eighth, ninth and tenth ribs, with associated haemopneumothorax for which an intercostal drain was inserted. Repeat chest radiograph revealed an elevated right hemidiaphragm. There were no associated abdominal injuries. The chest laceration was repaired under general anaesthesia, and the patient was later discharged.

He presented again 21 weeks later with persistent right chest discomfort, and a chest radiograph showed persistence of the right diaphragmatic elevation (*Figure 1*). A computed tomography scan of the chest and abdomen suggested a possible traumatic rupture of the right hemidiaphragm.

A right thoracotomy through the sixth intercostal space was performed. Multiple adhesions between the lung and the chest wall were dissected revealing a 7–8 cm tear in the diaphragm, with the right lobe of the liver protruding through it (*Figure 2*). The edges of the tear, which were thickened and fibrotic, were dissected free and closed primarily with interrupted mattress prolene-0 stitches without tension. These were then oversewn.

The patient did well and was discharged 5 days after surgery.

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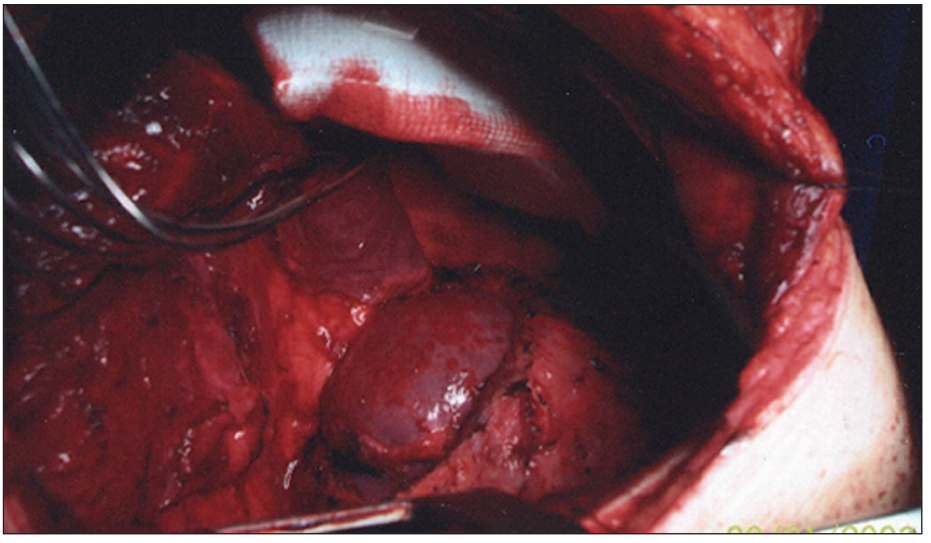

Figure 2. Intraoperative photograph showing the right lobe of the liver protruding through the rupture in the right dome of the diaphragm.

might still be friable. In late presentations, the edges are likely to have become thickened and fibrotic, and pledgets are not necessary.

Conclusions

The difficulty in diagnosing right-sided diaphragmatic ruptures secondary to blunt trauma poses a challenge to the clinician, and a high index of suspicion must be exercised. Patients might complain of only vague right-sided chest pain that can easily be explained away as 'post-traumatic pains'. A persistently elevated right hemidiaphragm on routine radiography must arouse suspicion and lead to more investigations to rule out the condition. **BJHM**

Dosios T, Papachristos IC, Chrysicopoulos H (1993) Magnetic resonance imaging of blunt traumatic rupture of the right hemidiaphragm. *Eur J Cardiothorac Surg* **7:** 553–4

Killeen KL, Mirvis SE, Shanmuganathan K (1999) Helical CT of diaphragmatic rupture caused by blunt trauma. *AJR Am J Roentgenol* **173:** 1611–16

Mihos P, Potaris K, Gakidid J et al (2003) Traumatic rupture of the diaphragm: experience with 65 patients. *Injury* **34:** 169–72

Sato M, Kosaka S (2002) Minimally invasive diagnosis and treatment of traumatic rupture of the right hemidiaphragm with liver herniation. *Jpn J Thorac Cardiovasc Surg* **50:** 515–17

Shah R, Sabanathan S, Mearns AJ, Choudhury AK (1995) Traumatic rupture of diaphragm. *Ann Thorac Surg* **60:** 1444–9

IN THE PUBLIC'S VIEW...

Man about the House

There will be 22 episodes of the American medical drama House (Channel 5, Thursdays). Hollywood likes to have its villains played by British actors – think of Alan Rickman in Die Hard. House has Hugh Laurie: yes, he of the foppish royalty in Blackadder. But he's not exactly a villain, and he's playing an American. Dr Gregory House MD is the most brilliant doctor in the hospital. His female boss would like to sack him, because he's rude to everybody and doesn't like doing his outpatient clinics. She can't sack him because: 'He's the best doctor we have.'

What this means is that he is a brilliant diagnostician: he is head of the Department of Diagnostic Medicine. I'm not aware of any UK hospitals that have such a department. Doctors here are rapidly giving up all pretence at diagnosis, becoming instead specialists in hypertension or gastrointestinal endoscopy, and experts in knowing what to do by following evidence-based medicine guidelines.

In the first episode of House, a pretty infant school teacher is diagnosed with intracranial tapeworm cysts. In the second, a 16-year-old collapses on the lacrosse field and starts suffering night terrors. This turns out (if I followed the medical jargon correctly) to be subacute sclerosing panencephalitis, which is cured by a single injection of intra-cisternal interferon.

The programme reminded me of the BBC's Waking the Dead, in which curmudgeonly Trevor Eve insults the specialist 'cold case' team that he heads while they solve closed murder cases. House follows the same pattern. His team includes a black doctor whom House lets know he took on because of his juvenile record of burglary, and a good-looking female doctor who was bright but not the top in her year, but was good looking. House tells them so without apology, and that's how he talks to his patients – if forced to do so: normally he avoids speaking to them altogether because it interferes with diagnosis, 'Patients lie.' His team seem able to do anything: magnetic resonance images, DNA analysis, lumbar puncture – whatever needs doing, they do right away without seeming to fill in any forms. The EWTD has not reached them: when the 16-year-old is on the roof of the hospital in the middle of the night, imagining he is on the lacrosse field, they are all there to save him.

In the outpatient clinic he attends reluctantly, he has the variety of cases that only a GP would be likely to see in the UK. He sees a boy with asthma. The boy is not improving. His mother is not giving him his prescribed drugs because she thinks drugs are bad for him. House deals with her in the way we would all dearly love to deal with some of our patients. He tells her in some detail what asthma does to the breathing, tells her there's no point his seeing her if she won't take medical advice, and stomps out. Another thing about House is that he has a limp and walks with a stick.

Laurie is brilliant and a revelation. But I'm not sure that non-medics understand a word of it and medics get enough of this sort of thing at work. Despite this, House is into its second series in the USA, so somebody must be watching it. **BJHM**

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