CASE REPORT

Pulmonary tuberculosis presenting as post-operative fever of unknown origin

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SUMMARY

Post-operative fever is common following emergency surgery. Investigation and management of post-operative fever can be challenging when a clear source of sepsis is not evident or the underlying source of infection is not recognised. We herein report a case of secondary pulmonary tuberculosis presenting as post-operative fever following emergency laparotomy for a perforated duodenal ulcer. This case of tuberculosis was diagnosed on day 41 post-operatively and prior inconclusive results meant that we relied mainly on re-visiting history and examination in order to identify 3 targeted investigations: plain chest X-ray, sputum sample and blood test. Accordingly, the co-management of this complex patient achieved a good outcome.

BACKGROUND

This case highlights the importance of perseverance and regular reviews in daily clinical practice. The delays and missed opportunities identified throughout reflect typical clinical circumstances. This case highlights the complexity of patients requiring extensive surgical, medical and social care and further recognises multi-disciplinary teamwork, communication and decision-making as essential factors in achieving a good patient outcome.

The acute case presentation as perforated duodenal ulcer is seen less frequently since the turn of the century corresponding with the introduction of *Helicobacter pylori* eradication therapy,¹ alongside improved access to medicines and endoscopy. Peptic-ulcer disease remains prevalent in areas of socioeconomic deprivation and is associated with alcohol and tobacco use,¹ which in turn are also risk factors for tuberculosis (TB).²

The burden of TB has reduced in high-income countries following the introduction of widespread vaccination and treatment; however, it still remains an important public health concern. TB is a notifiable disease meaning all suspected or confirmed cases should be notified within 3 days.³ The National Institute for Health and Care Excellence (NICE) guidance on diagnosis, screening, epidemiology and strategy remains relevant as many clinicians may not have encountered the disease and will benefit from this clear, accessible guidance updated in January 2016.⁴ We argue that a working knowledge of TB is particularly important given the epidemiological trends and increasing drug resistance.⁵

CASE PRESENTATION

A 63-year-old white male presented to A&E by ambulance with a 2-week history of severe epigastric pain radiating to the back. He admitted to tobacco-smoking and alcohol dependence. On initial assessment, he had a low-grade fever (37.7°C), hypotension (78/50 mm Hg), sinus tachycardia (124 bpm), tachypnoea (36rpm) and low oxygen saturation (SaO₂ 88%) on room air. His initial venous lactate is 7.9 mmol/L. On examination, he appeared generally unkempt and profoundly cachectic with visible difficulty in breathing. He displayed generalised peritonism on abdominal palpation, markedly over the epigastrium. A Focused Assessment with Sonography for Trauma (FAST) scan to rule out acute aortic and traumatic pathology provided limited information due to severe probe tenderness. Unfortunately, no portable erect chest X-ray was performed. An urgent CT Abdomen and Pelvis (CTAP) with contrast was requested though transfer got delayed due to immediate resuscitation needs.

Initial investigations show a haemoglobin of 164 g/L, white cell count of $7.2 \times 10^9/L$ and C reactive protein of 146 mg/L. Moderate electrolyte

Figure 1 Coronal view of CT Abdomen and Pelvis with contrast imaging displaying pneumoperitoneum associated with free fluid consistent with a perforated abdominal viscus. A nodular liver is also noted.

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abnormalities include sodium 126 mmol/L and potassium 5.2 mmol/L alongside urea 3.7 mmol/L, creatinine 79 µmol/L, amylase 38 U/L and albumin 24 g/L. There was no derangement of liver enzymes. A repeat lactate after 1 L of normal saline at 500 mL/hour was 4.2 mmol/L (reduced from 7.9 mmol/L). After the initial resuscitation the CT performed demonstrated free intra-abdominal gas associated with free fluid, consistent with a perforated viscus of unclear site (figure 1). This would probably have been identified earlier had a portable erect chest X-ray been performed. Empirical antibiotics for intra-abdominal sepsis, aggressive fluid management and proton pump inhibitor therapy were initiated pre-operatively.

The patient underwent an emergency laparotomy which confirmed a 2 cm duodenal perforation with 4 quadrant biliary peritonitis. An omental patch repair was performed with 10 L of peritoneal and sub-phrenic saline lavage. Intra-operatively, a nodular liver and moderate ascites were recognised. Two large bore intra-abdominal drains were inserted at the site of repair and within the pelvis. The patient was subsequently admitted to the Intensive Care Unit (ICU) for ventilation, monitoring and management of refractory septic shock. Inotropic and vasopressor infusions were initiated resulting in distal peripheral ischaemia. Owing to the likelihood of a prolonged post-operative ileus and poor baseline nutritional status, Total Parenteral Nutrition (TPN) was started on day 3 post-operatively. On discharge from ICU on day 6 post-operatively the patient remained haemodynamically unstable and a poor prognosis was anticipated due to poor physiological reserve.

On day 7 episodes of recurrent high-grade fever ($>38.5^{\circ}\text{C}$) continued with rigors alongside a persistent sinus tachycardia, increasing oxygen requirements and a cough productive of mucopurulent sputum. On examination he displayed profound cachexia, fluctuating consciousness, gross peripheral pitting oedema and bilaterally reduced breath sounds with bibasal crepitations. Further abdominal examination demonstrated a superficial dehiscence and sloughy necrotic breakdown of the surgical wound edges with no evidence of peritonism. A diagnosis of hospital-acquired pneumonia was made and the patient continued on antibiotics as per local antibiotic guidelines with the addition of fluconazole. Auscultation of the chest later demonstrated some limited improvement as a result of cautious furosemide therapy yet despite alterations to antibiotic therapy as per specialist's advice the post-operative fever was unrelenting.

Figure 2 Portable AP chest X-ray showing bilateral lower zone and right apical opacification, the film also displays diffuse pulmonary oedema.

Figure 3 Day 41 CT Pulmonary angiogram displaying bilateral pleural effusion with right-sided consolidation and cavitating lung lesion.

Active medical treatment was continued to manage sepsis, pulmonary oedema, severe hypoalbuminaemia (11 g/L), normocytic anaemia (haemoglobin 78 g/L) and coagulopathy (PT 28.0s). A referral was also made for palliative care advice and multi-disciplinary discussion initiated regarding treatment options among medical, surgical and ICU teams. No next of kin was identified. Owing to the critical nature of these treatment decisions and the patient's fluctuating conscious level, a request was made for an Independent Mental Capacity Advocate.

INVESTIGATIONS

The initial post-operative chest X-ray showed evidence of a right-sided pleural effusion with extensive consolidation and pulmonary oedema (figure 2). Sputum culture was positive for light growth of *Candida albicans*. Intravenous line cultures grew *Staphylococcus capitis*, with no evidence of bacteraemia arising from multiple peripheral vein and line blood cultures. An echocardiogram showed no evidence of vegetation or suspicious regurgitation. All subsequent blood cultures were negative. Mid-stream urinalysis showed an insignificant amount of white cell count only. In view of minimal clinical progress a CT Chest, Abdomen and Pelvis (CTCAP) was performed, in combination with ultrasound scan a loculated 7.3 cm×6.1 cm×2.4 cm sub-hepatic collection and bilateral moderate pleural effusions were identified with underlying right lower lobe consolidation. The loculated sub-hepatic collection showed resolution with empirical antibiotic therapy on repeat interval ultrasound scan. Ultrasound-guided pleural aspiration obtained 20 mL of straw-coloured transudate with no malignant cells seen on cytology. Alcohol-Acid fast bacilli (AAFB) in pleural fluid and sputum were also negative.

Furthermore, a CT Pulmonary Angiogram (figure 3) revealed resolving pleural effusions with extensive, non-resolving right-sided consolidation and a homogenous apical lung lesion. Inflammatory markers were slowly improving with continued empirical antibiotic therapy and the episodes of high-grade fever were predominantly nocturnal. A presumptive clinical diagnosis of pulmonary TB was made and an interferon-gamma release assay (IGRA) blood test taken. The result identified gamma-interferon effector T-cells reactive to the *Mycobacterium tuberculosis* complex. Further sputum samples were obtained for AAFB smear and culture to fully confirm this case of TB. All samples subsequently isolated *M. tuberculosis*. A fast track PCR was completed by Public Health England at the National Mycobacterium reference laboratory (NMRL) isolating a fully sensitive *M. tuberculosis*.⁶ No concurrent HIV infection was identified.

DIFFERENTIAL DIAGNOSIS

- ▶ Bacterial pneumonia
- ▶ Aspiration pneumonia
- ▶ Fungal pneumonia for example, Aspergillosis
- ▶ Lung malignancy
- ▶ Empyema
- ▶ Tuberculosis
- ▶ Cryptogenic organising pneumonia

TREATMENT

On diagnosis of pulmonary TB we started treatment with advice from the Respiratory physicians. The patient was transferred to a negative pressure isolation room for first-line therapy with isoniazid, rifampicin, pyrazinamide and ethambutol. Subsequently, he began making steady clinical progress, regaining appetite, tolerating oral diet and fluids, gaining weight and mobilising with assistance. His surgical wound also started healing well with negative pressure wound therapy and regular sharp debridement of slough.

OUTCOME AND FOLLOW-UP

With dietician, occupational therapy, physiotherapy, pharmacy and tissue viability input the patient made good progress. A point to note is that he reported of stigmatisation and social isolation while being treated in a negative-pressure isolation room. Unfortunately, he developed neuropathic pain alongside demarcating dry necrotic distal digits and started on amitriptyline. While mobilising on the ward unaided he fell and sustained a head injury resulting in a right-sided visual field deficit. A CT head was performed showing evidence of a small traumatic subdural haemorrhage. Despite this setback and without neurosurgical management he continued his promising recovery. The chest X-ray prior to discharge showed progressive improvement of bilateral pleural effusions with residual right apical opacification (figure 4) and the patient was discharged to a community rehabilitation unit for further physiotherapy on day 90 post-operatively.

On retrospective completion of family, travel, occupation and social history we identified that the patient was born in London to parents from south western Ireland, a rural region historically

known to have had a high prevalence of TB.⁷ Additionally, in the 1980s he had travelled to work in Sri Lanka and self-reported a chronic productive cough with night sweats, unintentional weight loss and fatigue. He has since been discharged home and is living independently with community TB-specialist nurse support for directly observed therapy three times per week. We have arranged for clinic follow-up and repeat chest X-ray. Our Department of Infection Control has also begun contact tracing and testing measures.

DISCUSSION

This case highlights the importance of perseverance and teamwork in achieving a good outcome for patients in daily clinical practice. There were delays and missed opportunities throughout reflecting everyday pragmatic challenges: failure to request and perform a portable erect chest X-ray on admission, difficult best interest decisions, complex capacity assessment, interdisciplinary disagreements, misleading or inconclusive investigations and unfamiliar or overlooked diagnoses. This case highlights multi-disciplinary complexity with over a dozen specialties and allied professionals involved in patient care. Furthermore, it reflects the simplicity of reaching a treatable diagnosis of TB through basic history and examination, sputum sample for AAFB smear, chest X-ray and IGRA blood test.

Secondary TB occurs commonly as reactivation of dormant *M. tuberculosis* years following primary infection, particularly in states of immunocompromise. Developments in rapid TB diagnostics have contributed to improving early diagnosis and treatment of TB. In the UK, the National Institute for Health and Care Excellence (NICE) TB guidance recommends the use of interferon-gamma release assays (IGRAs) as a highly sensitive blood test for both latent infection and active TB disease.⁴ We also relied on detection of TB and exclusion of MDR-TB

Patient's perspective

I cannot remember too well all that happened whilst I was in hospital, nor realise how unwell I was at the time but I want to thank all the kind staff who looked after me during these three months. I think I will live another year at least!

Learning points

- ▶ Teamwork, communication and shared decision-making among multi-disciplinary team members was crucial and led to a good patient outcome, however it can still be improved.
- ▶ A portable erect chest X-ray performed on admission could have aided earlier diagnosis of pneumoperitoneum and prevented unnecessary delay to emergency laparotomy.
- ▶ Perseverance and regular patient review is important. Re-visiting history, examination, investigations and results can help identify a previously missed diagnosis.
- ▶ An interferon-gamma release assay (IGRA) is available as a sensitive test for both latent infection and active tuberculosis disease. Tuberculosis is a globally re-emerging infectious disease with ease of worldwide travel and increasing drug resistance, we need to be prepared.

Figure 4 Chest X-ray prior to discharge showing right apical lung lesion consistent with pulmonary tuberculosis and near resolution of bilateral pleural effusions.

through a fast-track real-time PCR provided by Public Health England.⁶

Despite a promising reduction in the recent incidence of TB cases in the UK; it holds the highest prevalence in Western Europe. According to Public Health England there were an estimated total of 7892 UK cases in 2013.² With established migration trends from British Commonwealth countries with a high burden of TB such as India and Pakistan, we argue that UK physicians need to consider secondary TB as a possible cause of post-operative fever and be prepared to recognise this re-emerging disease.

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Contributors All authors made substantial contributions to the case report as the clinical team with primary responsibility for this patient. All authors were involved in drafting the work and revising it critically, providing final approval for publication. We agree to be accountable for all aspects of the work.

Competing interests None declared.

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