CASE REPORT

Widespread surgical emphysema following trivial injury to the hand

William Kristian Miles Gietzmann, Joana Mousinho, Karuna Tandon, Samuel Turner

East Sussex Hospitals NHS Trust, Eastbourne, East Sussex, UK

Correspondence to
William Kristian Miles Gietzmann,
w.gietzmann@nhs.net

Accepted 7 June 2014

SUMMARY

A 23-year-old glazer presented to the A&E department with pain in his left arm following a 2 mm puncture injury to his left thenar eminence. Examination showed crepitus throughout the arm and over the chest wall. Plain X-rays confirmed extensive surgical emphysema but no evidence of pneumothorax. Clinical observations and laboratory markers for infection were normal. The patient was prescribed broad spectrum antibiotics for presumed gas-producing organism infection. After 24 h cultures returned negative and no other signs of infection were detected. Treatment was discontinued and the patient was allowed home. Several days later he experienced severe diarrhoea and as a result required time off work. No cause was found on investigation. We postulate a benign aetiology for the surgical emphysema in this case. In future it may be possible to recognise benign surgical emphysema at presentation and avoid prescribing unnecessary antibiotics.

BACKGROUND

Widespread surgical emphysema without any history of significant trauma suggests a diagnosis of gas-producing organism infection.¹ While it is reasonable to treat such patients with empirical broad spectrum antibiotics, these drugs are not without side effects and may cause morbidity. In the absence of further evidence of infection, it is also reasonable to consider other potentially benign causes of surgical emphysema. This has been reported elsewhere.¹⁻⁶ This case of extensive yet benign surgical emphysema following trivial injury to the hand is a rare but important differential diagnosis to consider before prescribing potentially harmful medication.

CASE PRESENTATION

A 23-year-old glazer presented to the emergency department with pain throughout his left arm 8 h after an injury to his left hand. He had been carrying a window frame with a sharp plastic edge that cut his hand leaving a small puncture injury. The patient was fit and well with no significant medical history. He was not taking any regular medication and he had no allergies.

On examination vital signs were normal and the patient was non-feverish. Over the left thenar eminence of the hand there was a 2 mm puncture wound. It was not possible to assess the depth of the injury. There was no surrounding erythema or discharge. Full range of active and passive movement was preserved in the hand and limb causing only moderate pain. There was widespread crepitus

over the thenar eminence, dorsum of the hand, flexor aspect of the arm and forearm, and over the left anterior chest wall.

INVESTIGATIONS

Blood tests revealed white cell count (WCC) $6.8 \times 10^9/L$, C reactive protein (CRP) 3 mg/L and raised bilirubin at 86 $\mu\text{mol/L}$. Plain X-rays of the left arm and chest showed gas in the tissue planes from the hand to the chest wall (figure 1). There was no pneumothorax.

DIFFERENTIAL DIAGNOSIS

Soft tissue infection at the wound site with gas-producing organisms was suspected. Compartment syndrome was discounted as it was not consistent with the mechanism of injury or with clinical findings.

TREATMENT

Advice was taken from the hospital microbiology department. The patient was treated with intravenous flucloxacillin and clindamycin in order to cover clostridium species. Metronidazole was also given to provide increased anaerobic cover.

OUTCOME AND FOLLOW-UP

After 24 h all clinical and laboratory markers of infection remained normal. Wound swabs and blood cultures were sterile. As at this point there was no clear evidence of infection all antibiotics were stopped. The patient was discharged home without further treatment. Several days after discharge the patient experienced severe diarrhoea, for which he visited his general physician. Full blood count, erythrocyte sedimentation rate and stool cultures at the time were normal. Eight weeks later he was seen in the surgical outpatients department by which time his musculoskeletal and gastrointestinal symptoms had completely resolved. Abdominal examination and rigid sigmoidoscopy were unremarkable. The patient confirmed complete resolution of all symptoms at 6-month telephone follow-up.

DISCUSSION

There are few published case reports of benign surgical emphysema of the limb. In general, it is considered a sign of significant infection and clinicians may be considered brave to withhold antibiotics in this setting.¹ We believe a benign aetiology should be considered when the presentation is early (up to 8 h following injury) and when there is minimal pain, no cellulitis, normal observations, normal

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To cite: Gietzmann WKM, Mousinho J, Tandon K, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2014-203809

Figure 1 X-ray on presentation to emergency department.

WCC count and normal CRP. In this case empirical antibiotics were prescribed but then discontinued after 24 h of observation. We postulate that the extensive surgical emphysema was the result of a one-way valve forming in the small break in the skin and that a pump action from the muscles of the upper limb caused infiltration of air into the tissue planes. This has been suggested by Fox *et al.*² Despite our relatively sparing use of antimicrobial therapy, the patient nevertheless experienced significant gastrointestinal upset, which we suspect was iatrogenic. We suggest that in similar cases of surgical emphysema with no

other signs of infection, antibiotics can be withheld safely while awaiting blood culture results. The patient should be observed for at least 24 h and given antibiotics only if further evidence of infection emerges.

Learning points

- ▶ Benign surgical emphysema can be caused by seemingly trivial injuries.
- ▶ Possible aetiologies include a skin valve and muscle pump mechanism.
- ▶ It is safe to withhold antibiotics in patients without clinical or biochemical signs of infection, instead observing them for 24–48 h.

Contributors All authors have been responsible for reviewing the case and writing the article.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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