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Case report

Life-threatening necrotizing fasciitis of the neck: an unusual consequence of a sore throat

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***Background*: Necrotizing fasciitis is life-threatening bacterial infection which spreads with frightening speed along the fascial planes resulting in extensive tissue necrosis and often death. The infection is caused by either Group A streptococci or a combination of aerobic and anaerobic bacteria. Necrotizing fasciitis of the neck is rare and commonly has a dental origin.**
***Case report*: Here we present a unique case of the condition that was preceded by a sore throat in a young immunocompetent woman. We also describe, for the first time, a successful outcome involving primary skin closure and daily irrigation of the wound with hydrogen peroxide.**

Key words: Necrotizing fasciitis – Neck – Streptococci – Sore throat – Primary wound closure – Hydrogen peroxide

The term necrotizing fasciitis was first used by Wilson in 1952 to describe a severe fulminant soft tissue infection characterised by rapidly spreading necrosis of superficial fascia.[1] However, the clinical entity was previously described under various synonyms such as hospital gangrene,[2] necrotizing erysipelas[3] and streptococcal gangrene.[4] Recent public interest in this condition has been generated by the lay press with phrases such as 'flesh eating bug' and 'killer bug ate my face'.

Necrotizing fasciitis most frequently occurs in the abdomen, perineum and extremities after trauma or surgery[5,6] and is caused by either Group A Streptococci or a synergistic combination of aerobic and anaerobic bacteria.[7] The disease occurs rarely in the neck and is associated with dental infections,[8] peritonsillar abscess,[9] insect sting,[10] tonsillectomy,[11] laryngectomy,[12] radiotherapy[13] and steroid neck injection.[14] Occasionally, the origin of the infection remains unknown.[15] We report a new case of cervical necrotizing fasciitis as a sequela of a sore throat in an otherwise fit young woman and describe a novel approach to the management of the condition.

Case report

A previously healthy 32-year-old Caucasian woman was referred to the ENT team with a 3-day history of a sore throat followed by increasing cervical pain and right-sided neck swelling. On examination, she had normal tonsils and an inflamed pharynx. The right side of her neck was mildly erythematous, swollen and severely tender. Nasendoscopy revealed generalised swelling in the right lateral pharyngeal wall. Lateral neck X-ray showed prevertebral soft tissue swelling extending from the skull base to the clavicle (Fig. 1). Ultrasound scan demonstrated extensive lymphadenopathy only. Initial abnormal blood results were leukocytosis 44.8 x 10^9/l, CRP 340 mg/l and ESR 80 mm/h.

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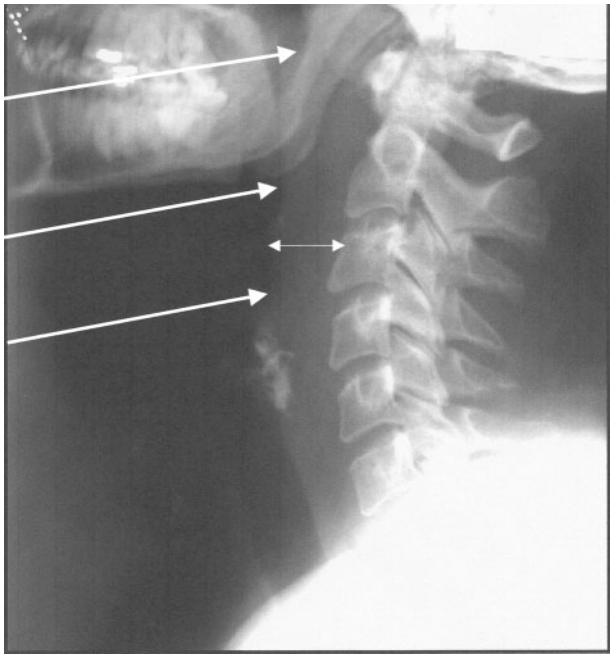

Figure 1 Lateral neck X-ray. There is diffuse increase in the prevertebral soft tissue shadowing (arrows), measuring more than 1 cm (double arrow) – normal < 5 mm at C3. Vertebral bodies and disc spaces are normal.

The working diagnosis was cellulitis and i.v. benzylpenicillin (1.2 g/6 hourly), flucloxacillin (1 g/6 hourly) and metronidazole (500 mg/8 hourly) were given empirically. Over the next 24 h, the patient's pain, erythema and neck-stiffness got worse. An urgent CT scan demonstrated loss of clarity in all the muscle planes and subcutaneous fat along with a generalised diffuse inflammatory process and possible fluid collections extending from skull base to upper mediastinum (Fig. 2). No free pocket of air was seen.

The CT findings and severe neck pain (which was disproportionate to the appearance of the overlying skin) raised the possibility of necrotizing fasciitis and the microbiologists suggested urgent surgical exploration. At surgery, a thin custard-coloured fluid was found along all the fascial planes from the skull base to the upper mediastinum. The fascial layers with adjacent muscle tissue were debrided and the whole area was washed thoroughly with 3% hydrogen peroxide. The wound was closed with two 4 mm suction drains in dependent positions and one 2 mm drain in the upper neck. The large drains were placed on continuous suction whilst the small drain was used to irrigate the wound daily with 3% hydrogen peroxide. The patient spent one night on ITU. Gram-staining of the intra-operative specimen revealed streptococci, prompting the addition of i.v. clindamycin (900 mg/6 hourly) and an increased dose of benzylpenicillin (1.8 g/4 hourly) to

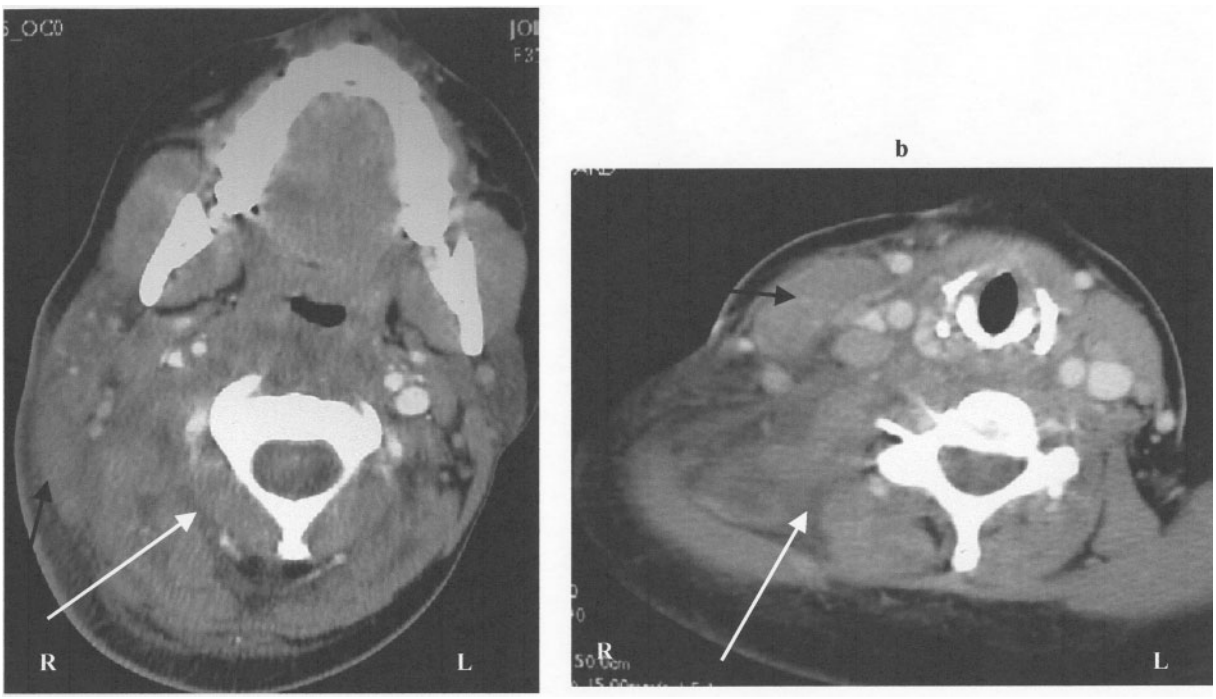

Figure 2 Axial CT scans. There is swelling of the right side of the neck with diffuse loss of clarity of the fat planes (compared to the left), low density areas interspersed between the abnormally thickened muscles (black arrows) consistent with inflammation/infection. The low density areas (white arrows) represent diffuse oedema and/or fluid. Involvement of all spaces in the neck, muscles and subcutaneous tissues would be consistent with necrotizing fasciitis.

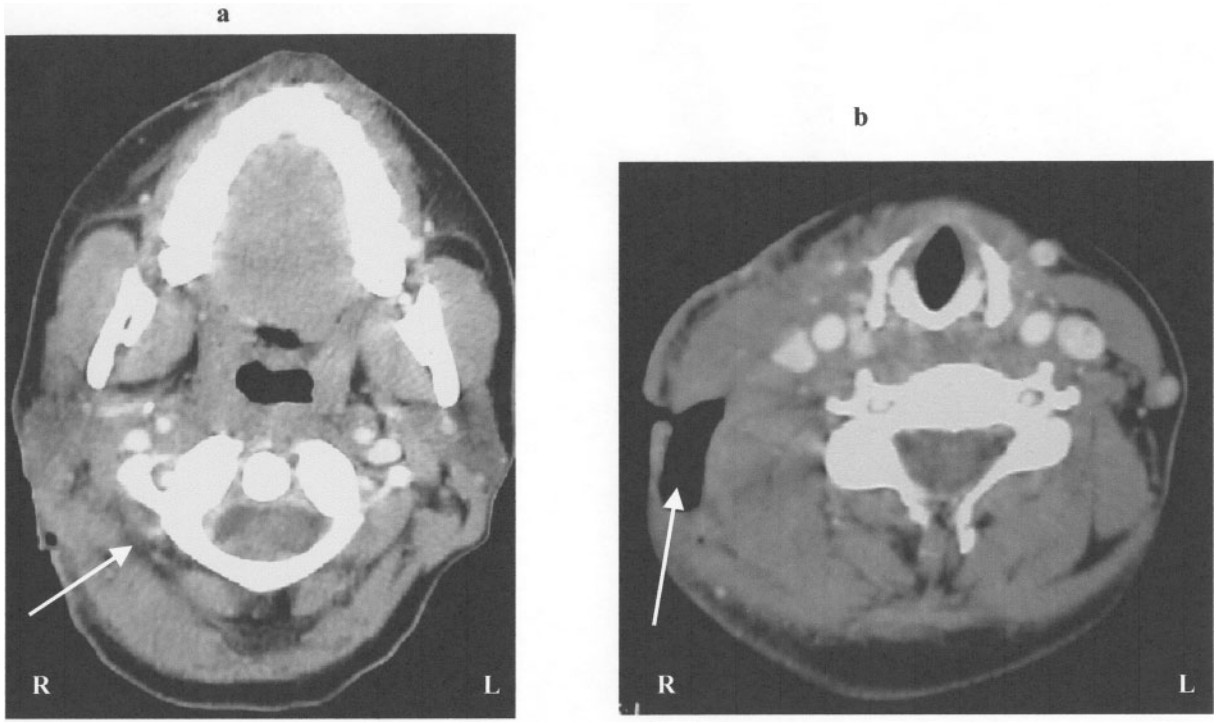

Figure 3 Follow-up CT scan postoperatively. Right-sided surgical defect present (arrow in B) with return of the fascial fat planes (arrow in A) and resolution of inflammatory changes.

optimise treatment for Group A streptococcal necrotizing fasciitis.

Six days later, the wound started to discharge pus and the skin edges appeared necrotic. The patient was taken back to theatre for further debridement. At this stage, there was marked liquefaction necrosis of muscles, especially sternocleidomastoid and omohyoid. Muscles and skin edges were debrided until bleeding tissue was seen. Again it was possible to achieve primary closure of the wound. The patient's condition improved daily. Another CT scan performed on day 19 showed reduced tissue oedema and return of the fascial planes (Fig. 3). The patient was discharged from hospital 28 days after admission. Three months later she remains well.

Discussion

We report a case of a sore throat complicated by cervical necrotizing fasciitis in a young healthy woman in whom a successful outcome was achieved with a combination of early diagnosis and aggressive therapy, including radical debridements, appropriate antimicrobial therapy and intense supportive care. However, making the diagnosis of necrotizing fasciitis of the neck was not straightforward partly because of the rarity of this disease and partly because this case was different in many ways from other reports. The majority of previously described cases of cervical necrotizing fasciitis were linked to dental infections, trauma or surgery.[6,8] This patient only had a sore throat prior to developing the condition. Necrotizing fasciitis is more common in male patients over 40 years[3] with underlying immunocompromising conditions such as diabetes mellitus and alcoholism.[8,16] Our patient was a 32-year-old woman with no medical problems. Patients affected by necrotizing fasciitis usually display a low or high grade fever with signs of generalised toxicity.[5,6,8] Our patient remained apyrexial and systemically well, despite significantly raised white cell count and inflammatory markers. In the majority of previously reported cases, gas was present in the tissue[8] but it was absent in our patient. The only feature typical of cervical necrotizing fasciitis, at initial presentation, was severe pain that was out of proportion with the cellulitis present.

After two surgical debridement procedures, we closed the wounds primarily and used hydrogen peroxide to irrigate the affected area on a daily basis. We believe that these practices may have contributed toward a successful outcome and limited the number of necessary surgical debridements. Primary closure of surgical incisions made for cervical necrotizing fasciitis has not been reported previously. In addition, this is the first report of using essentially atomic oxygen (derived from hydrogen peroxide) as a chemical debriding agent in the management of cervical necrotizing fasciitis. Previously,

hyperbaric oxygen therapy has been advocated as adjuvant treatment because it is bactericidal to anaerobes and also promotes wound healing by improving hypoxia.[17] More recently, maggots have been used successfully to treat cervical necrotizing fasciitis in a patient who was medically unfit for repeated surgical debridement.[18]

Early detection of cervical necrotizing fasciitis is also crucial to a good outcome as it prevents serious complications, including airway obstruction, septic shock, great vessel thrombosis, mediastinitis, pneumonitis and pleural or pericardial effusion.[5,6,19] Spread of necrotizing fasciitis from the neck to the mediastinum is associated with a mortality rate of up to 50%.[19] Mortality in cervical necrotizing fasciitis is 4 times that of craniofacial necrotizing fasciitis.[8] Death usually results from septic shock and multi-organ failure caused by superantigen-induced excessive activation of cytokines, complements and the clotting cascade as well as production of oxygen free radicals and nitric oxide.[20]

Necrotizing fasciitis may be classified in terms of the causative organisms.[7] Type I necrotizing fasciitis is polymicrobial in origin and culture often reveals a mixture of aerobic and anaerobic Gram-negative rods, together with Gram-positive cocci. Gas is often present in the tissue due to anaerobic metabolism. Type II necrotizing fasciitis is classically caused by *Streptococcus pyogenes* (bbb-haemolytic streptococcus, Lancefield Group A), sometimes in combination with staphylococci. Importantly, gas production is unusual in Type II necrotizing fasciitis and progression is generally faster than in Type I necrotizing fasciitis, often leading to streptococcal toxic shock syndrome.

In our case only streptococci was identified at microscopy. Cultures were repeatedly negative presumably because of antibiotic therapy.

The pathological mechanism of necrotizing fasciitis is not fully understood. However, bacterial proteolytic enzymes, such as collagenases and hyaluronidases, may lead to the rapid spread of the infection and necrosis along the tissue planes.[16] In addition, proteolytic compounds in the cell walls of bacteria may combine with collagen to promote tissue necrosis.[16] The pathogenic process can also induce local thrombosis which results in ischaemic necrosis of overlying structures such as the subcutaneous fascia and skin.[20] Penetration of antibiotic into ischaemic and necrotic tissue is poor and thus antibiotic treatment of conditions such as necrotizing fasciitis is ineffective without surgery.[21] In our case, the relatively early diagnosis of cervical necrotizing fasciitis reached by a multidisciplinary team probably contributed to minimal skin damage which facilitated primary closure of the wounds and a good cosmetic result.

Finally, necrotizing fasciitis of the neck is not the only potentially fatal consequence of a sore throat. Vohra *et al*.[22] described a young woman with a sore throat, septicaemia and respiratory failure. More recently, Clarke *et al*.[23] presented two cases of Lemierre's syndrome, caused by *Fusobacterium necrophorum*, as a life-threatening sequela of a sore throat that is characterised by septicaemia, internal jugular vein thrombophlebitis and metastatic septic emboli. The increased incidence of Lemierre's syndrome may be due to reduced antibiotic prescribing for sore throats; however, as this condition is relatively uncommon and as the alarming rise in antibiotic-resistant bacteria continues, it is difficult to recommend a change in the current policy.[23]

Conclusions

We present a unique case of cervical necrotizing fasciitis as a consequence of a sore throat in a previously healthy young woman. This is also the first report of cervical necrotizing fasciitis in which a successful outcome was achieved partly by primary skin closure and daily hydrogen peroxide irrigation of the wound. We hope that our article will help to raise awareness amongst medical professionals of this serious condition which should be considered in any patient with unexplained severe pain and spreading erythema in the neck. This paper also highlights the importance of a multidisciplinary team approach in the diagnosis and management of the disease.

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