

Case report: necrotising fasciitis with epidural abscess

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Necrotising fasciitis is relatively uncommon in Hong Kong. Its rapid progression and deterioration is the reason for high mortality. We report a patient who presented with this condition which was complicated with epidural abscess after incision and drainage. Early recognition is the key to save the patient. (*Hong Kong j.emerg.med.* 2003;10:49-53)

Keywords: Epidural abscess, hyperbaric oxygen, necrotising fasciitis

Clinical summary

Our patient was a 62-year-old gentleman with known history of alpha-thalassaemia trait and with a baseline haemoglobin 10 g/dL. He also suffered from peripheral vascular disease with an aorto-femoral bypass graft done in 1999.

He presented with dizziness and general malaise to our Accident and Emergency department on 3 January 2002. Transient loss of consciousness was noted. No other significant history was noted. Examination showed he was pale and afebrile. Cardiovascular examination showed irregular pulse rate of 100/min. Respiratory and abdominal examination did not reveal any abnormality. Per rectal examination showed yellowish stool and no palpable mass. A 7 cm² non tender mass over the left hip region was detected. His haemoglobin level was 6.8 g/dL, ECG showed atrial flutter. Chest X-ray and pelvis X-ray showed only soft tissue swelling over left hip region. He was admitted to the Medical ward of Ruttonjee Hospital.

On admission, upper endoscopy was performed which showed reflux oesophagitis and biopsy of the lesion showed acute inflammation. Haemoglobin was 5.7 g/dL and blood transfusion was given. On 4 January 2002, he developed acute left hip pain, low-grade fever with elevated white cell count and the clinical diagnosis then was left hip abscess. The surgical team was consulted and incision and drainage was done on 8 January 2002. Operative finding showed deep intramuscular abscess with more than 100 ml of pus. However, there was persistent purulent discharge and he developed a swinging fever. A second debridement was done on 12 January 2002. On 15 January 2002, he developed diffuse tenderness over his left thigh and buttock with persistent purulent wound discharge. Clinically necrotising fasciitis was diagnosed and extensive debridement was done again. On 16 January 2002, an operative change of dressing was done and the wound was clean. During the spinal anaesthesia, some pus was aspirated from the spinal needle. On 17 January 2002, he became disorientated and CT brain and lumbar spine performed raised the suspicion of infected bypass graft with the involvement of spinal canal at L5 level and right iliacus muscle. (Figure 1) The patient was transferred to Queen Mary Hospital since there was no vascular surgical support in Ruttonjee Hospital.

Laparotomy was performed and intra-operatively, there were no sign of active infection and the aorto-

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bifemoral prosthetic graft was well incorporated into the retroperitoneal tissue. MRI of the spine was done which showed epidural abscess from T3 to L5. (Figure 2)

Laminectomy for decompression was done on 23 January 2002. Post-operatively, the patient developed hypotension and required inotropic support with dopamine and noradrenaline. Amiodarone was also given for the treatment of his atrial flutter. He was transferred to general ward on 30 January 2002 and exploration, debridement and suturing were performed on 4 February 2002. Eighteen days later, he developed intestinal obstruction which responded well to conservative treatment. He was transferred on 1 March 2002 to Dutchess of Kent Hospital for rehabilitation.

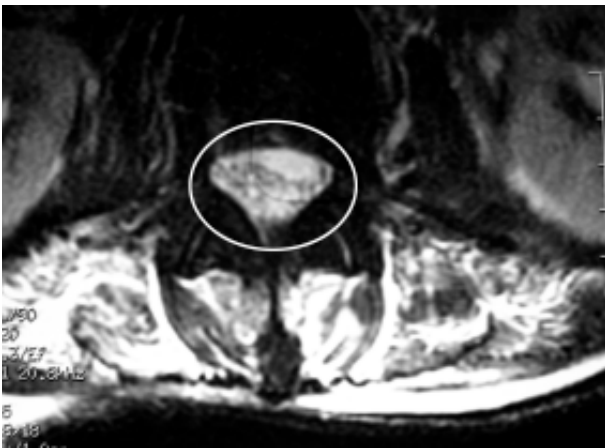


Figure 1.

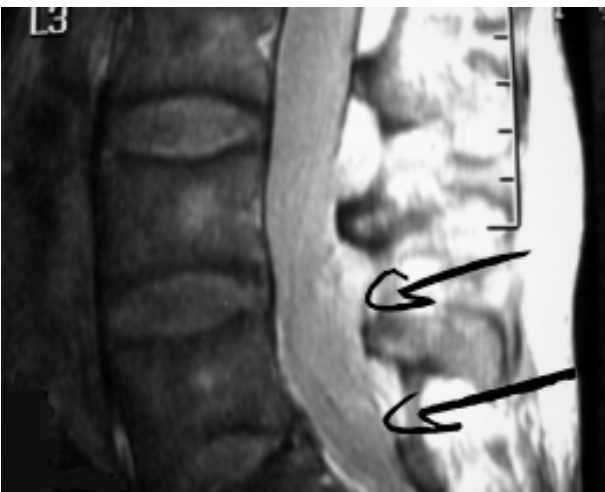


Figure 2.

Discussion

Necrotising fasciitis (NF) is defined as infection of skin, subcutaneous tissue, and fascia. However, its rapid deterioration and invasion frequently involve the muscles causing myonecrosis. It was previously classified into categories according to the invading bacteria.¹ Nowadays, most authors use the term more liberally because of the confusion in nomenclature and the overlap with other necrotising condition.^{2,3} Fournier gangrene, not discussed here, is a subtype of NF which is limited to the perineum, scrotum and penis.

Epidemiology

From 1882 till 2001, there are about 500 cases reported in the United States.³ The mean age was 38 to 44-year-old. There is a male predominance of 2-3:1. The mortality rate is very high, up to 76% worldwide.^{3,4} The mean age for survivors is 35 and that for non-survivors is 49. In Australia, Trubuhovich and Streat⁵ reported eleven cases of NF between 1 January 1987 to 30 June 1998. The incidence in Asian countries is not known but that may be attributed to under-reporting. Tang et al⁴ in Hong Kong reported 24 patients, with proven histological diagnosis that were treated in Queen Mary Hospital between 1992 to 1998. The mean age was 59.8 years. The overall mortality was about 33%. Those with involvement of the limbs above the knee or elbow on admission had a significantly higher mortality rate than those with distal lesion. However, there is no direct relationship between mortality and advanced age or between amputation and survival.

Risk factors

In NF, anaerobic, usually together with aerobic gram-negative organisms, proliferate in a hypoxic environment of local tissue in patients with trauma, patients with recent surgery or concomitant medical diseases. The list of risk factors^{1,3,4} is shown in the table below:

Medical risk factors	Surgical risk factors
Chronic alcoholism, chronic liver disease.	Vascular insufficiency.
Diabetes mellitus.	After trauma.
Cancer patient.	Post-operative such as incision and drainage.
Immunocompromised patients.	Foreign body in the wound.
HIV.	Deep seated abscess.
Drug addict.	
Organ transplant patient.	
Long-term steroid therapy.	
Intramuscular or intravenous injection.	
Insect bites – may introduce streptococcal infection into wound.	
Idiopathic.	

Diabetes and hepatic cirrhosis were the most common risk factors.⁴ Some studies reported that NF will develop at the site of varicella infection if NSAID e.g. ibuprofen was prescribed for pain relief. Up to now, we still do not know whether it is the casual role of NSAID or a natural progression of varicella infection. Further case reports or research studies are still pending.^{3,6,7} Non-clostridial myonecrosis usually attacks drug addicts whereas *Vibrio vulnificus* is the predominant organism in patients with chronic diseases.^{3,4}

Organism involved

Usually infections involve mixed organisms and they include group A haemolytic streptococcus (most common group),^{4,8} *Staphylococcus aureus*, *Bacteroides*, *Clostridium*, *Peptostreptococcus*, *E. Coli*, *Proteus*, *Pseudomonas*, *Klebsiella* and *Bacteroides fragilis*.

Clinical features

Most of them present with pain at the affected site and may be relatively benign looking.^{1,3,4} A high index

of suspicion is needed on occasion to diagnose this condition. About 80% of patients present with shock on admission.^{4,8} Mild erythema, blister, discharge, necrosis and haemorrhagic bulla may be present. Lack of the classical inflammatory sign and presence of crepitus are highly suggestive of this fatal condition. Sometimes, the disease deteriorate so rapidly that thrombosis of the subcutaneous blood vessel and nerves occurs, causing anaesthesia and severe myonecrosis. Cliff et al⁹ reported a case in which a 54-year-old homosexual man suffered from disseminated NF all over his trunk and limbs four days after he presented to his private practitioner with painful vesicle over his finger. Acute renal failure and shock were noted on admission. Fortunately, he responded to intravenous antibiotics, intravenous pulsed methylprednisolone and extensive debridement of the necrotic tissue. Actually multi-organ failure and disseminated intravascular coagulation are not uncommon.⁸

Differential diagnosis^{1,3,4}

Because of its relatively benign looking features during the early phase, other differential diagnosis may be considered:

- Cellulitis
- Ecthyma gangrenosum
- Livedo reticularis in polyarteritis nodosa
- Erysipelas
- Toxic epidermal necrolysis
- Deep seated abscess
- Compartment syndrome
- Deep vein thrombosis

Investigations

Complete blood count with differential count, renal function, liver function, INR, arterial blood gas, tissue biopsy and culture should be performed. X-ray of corresponding sites may show gas along subcutaneous fascial plane but may not be present in all cases. Gas formation was previously thought to be due to

clostridium. However, *E. Coli*, peptostreptococcus and bacteroides may also produce gas.³ Computerized tomography is used to delineate the lesion by demonstrating necrosis with asymmetric fascial thickening and the presence of gas in the tissues. MRI is widely used now. The absence of gadolinium contrast enhancement in T1 images reliably detects fascial necrosis and the need for surgical debridement. Tissue biopsies can be performed from the spreading periphery of the necrotising infection or the deeper tissues to obtain specimens for cultures, but not from the actual necrosis or granulating center, as bacteria that neither cause nor add to the infection would be detected.

Definitive care¹⁻³

Definitive care include the provision of the following:

1. High flow of oxygen.
2. Intubation with ventilation may be necessary for unstable, haemodynamically compromise patients.
3. Intravenous line with inotropic support.
4. Good exposure and examination, especially the limbs and perineal area, are essential.
5. Consider this diagnosis as a differential diagnosis of shock.
6. Antibiotics are usually initiated in the emergency department in European countries³ whereas they are rarely started in Hong Kong. The choice of antibiotics should cover both aerobic and anaerobic bacteria. This includes the use of ampicillin to cover for enterococci, third generation of cephalosporin or metronidazole. Gentamicin in addition to clindamycin or chloramphenicol have to be considered.
7. Early consultation with surgical colleagues and transferral to intensive care unit for definitive care.^{2-4,10}

Surgical treatment includes early and extensive incision of skin and subcutaneous tissue into healthy tissue. Excision of all necrotic fascia and nonviable skin and subcutaneous tissue is indicated. This may trigger profuse bleeding and hence meticulous

haemostasis is indicated. Within 24 hours, the wound should be examined under general anaesthesia to look for development of further necrosis which requires further excision and debridement. This process may need to be repeated many times. Delayed closure, fasciotomies and even amputation may be needed in extremities with compromised viability.

Sometimes the deterioration is so rapid that radical debridement in the form of amputation above the lesion should be done.⁴ It may even be life-saving in patients with concomitant medical diseases, such as end-stage liver disease and poorly controlled diabetes mellitus.

Hyperbaric oxygen (HBO) is the standard adjunctive treatment in NF.^{2,3,8,11} It increases the oxygen saturation at the site of infection by a thousand fold. It is useful in both clostridial and non-clostridial infection. It works by:

- Rendering the environment less favourable to anaerobic growth and spread by reducing the oxygen reduction potential.
- Inducing vasoconstriction and decreasing oedema due to the high oxygen content.
- Enhancing polymorph phagocytic function to destroy bacteria.
- Promoting angiogenesis and thus promotes the formation of granulation tissue.

Monochamber	Multichamber
<ul style="list-style-type: none"> • Monochamber at 2.5-2.8 ATA. • 100% O₂ for 90 minutes. • Day 2: Twice daily. • Till granulation or total 10-15 treatments. 	<ul style="list-style-type: none"> • Multichamber at 3 ATA. • 100% O₂ for 90 minutes in the first 24 hours. • Total 3 sessions.

The mortality rate is about 9-20% if treated with combination of radical surgical intervention, broad-spectrum antibiotic and HBO whereas mortality is about 30% to 50% if no HBO is given.^{3,8,11-14} Certainly, some authors did not agree with this⁴ since there is no large, controlled clinical trial.

Lesson to learn

The most important message is not to be misled by the relatively benign looking clinical features in the early phase of NF. Pain at early stage may be out of proportion to the clinical manifestation. History and examination are important in eliciting risk factors and differential diagnosis. Its mortality rate is relatively high because of the rapid deterioration and dissemination. High index of suspicion and early recognition are the keys to ensure survival.

References

1. Knoop KJ, Stack LB, Storrow AB. Atlas of emergency medicine. U.S.A.: McGraw-Hill Companies, Inc.; 1997:318-36.
2. Cline DM, Ma OJ, Tintinalli JE. Emergency Medicine: A Comprehensive Study Guide (5th ed.). New York: McGraw-Hill Companies Inc.; 1999:858-9.
3. Maynor M, Kardon E, Talavera F, et al. EMedicine Journal 2001;2(8).
4. Tang WM, Ho PL, Fung KK, et al. Necrotising fasciitis of a limb. J Bone Joint Surg Br 2001;83(5):709-14.
5. Trubuhovich RV, Streat SJ. Necrotising fasciitis and infective myositis. N Z J Surg 1999;69(Suppl):A92.
6. Zerr DM, Alexander ER, Duchin JS. A case-control study of necrotizing fasciitis during primary varicella. Pediatrics 1999;103(4 Pt 1):783-90.
7. Zerr DM, Rubens CE. NSAIDS and necrotizing fasciitis. Pediatr Infect Dis J 1999;18(8):724-5.
8. Burge TS, Watson JD. Necrotising fasciitis. BMJ 1994; 308(6942):1453-4.
9. Cliff S, Griffin G, Ostlere LS. Disseminated necrotizing fasciitis. Br J Dermatol 1997;137(50):32.
10. Ward RG. Necrotising fasciitis. Immediate surgical opinion is essential. BMJ 1994;309(6950):341.
11. Neumeister M. Hyperbaric oxygen therapy. EMedicine Journal 2001;2(12).
12. Baker DJ. Selected aerobic and anaerobic soft tissue infections - diagnosis and the use of hyperbaric oxygen. Hyperbaric Medicine Practice 1994;395-418.
13. Demello FJ, Haglin JJ. Comparative study of experimental Clostridium perfringens infection in dogs treated with antibiotics, surgery, and hyperbaric oxygen. Surgery 1973; 73:936-41.
14. Riseman JA, Zamboni WA, Curtis A. Hyperbaric oxygen therapy for necrotizing fasciitis reduces mortality and the need for debridment. Surgery 1990;108(5):847-50.