A rare cause of necrotizing fasciitis: psoas abscess

一個壞死性筋膜炎罕見的成因：腰肌膿腫

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Necrotizing fasciitis always carries very high mortality and morbidity rates. It can be due to group A beta-haemolytic streptococci, which are traditionally described as the flesh-eating bacteria. More commonly, it is related to a mixed growth of bacteria that can be secondary to trauma or surgery. Secondary necrotizing fasciitis due to concomitant soft tissue infection is uncommon. We reported a fatal case of necrotizing fasciitis which was caused by a coexisting psoas abscess. A search for concomitant soft tissue infection is warranted in patients presenting with necrotizing fasciitis. This article also reviewed the clinical tools that may help to make an early diagnosis of the disease. (*Hong Kong j.emerg.med.* 2005;12:242-245)

壞死性筋膜炎總是有極高之發病及死亡率。它可以是因染上傳統上形容為「食肉菌」的A類β－溶血性鏈球菌。因創傷或手術而引起有關的混雜細菌生長更為常見。因伴隨有其他軟組織感染而引致的壞死性筋膜炎並不普遍。現報告一宗因同時存在的腰肌膿腫而引致壞死性筋膜炎的死亡個案。當病者顯示壞死性筋膜炎時，搜尋可能伴隨有其他軟組織感染的做法是有理由的。本章還評論可以幫助及早診斷出此病症的臨床工具。

Keywords: Necrotizing fasciitis, diagnosis

關鍵詞：壞死性筋膜炎、診斷

Case history

A 56-year-old man with history of bilateral renal stones and liver abscess presented in November 2004 with progressive right knee pain for a week. It was preceded by a recent history of right loin pain. There was no history of trauma. He was also dizzy and could not even walk. On arrival, he was in critical condition, but still conscious and afebrile. The blood pressure was 82/47 mmHg and the pulse rate was 136 beats/min. Oxygen saturation was 95% on room air. The physical examination showed a swollen and tender right knee. The abdomen was non-tender and the chest was clear. The chest X-ray revealed no consolidation and X-rays of the right knee showed subcutaneous gas (Figures 1a & 1b). A preliminary diagnosis of necrotizing fasciitis was made. The electrocardiogram revealed sinus tachycardia only. Bedside ultrasound did not show any free fluid in the abdomen. The urine strip test showed 4+ red blood cells and 3+ white blood cells.

He was resuscitated with fluid challenge and inotropic support. Emergent operation was arranged and confirmed extensive necrotizing fasciitis involving the whole anterior compartment of the right thigh. Incision and drainage were performed. To delineate

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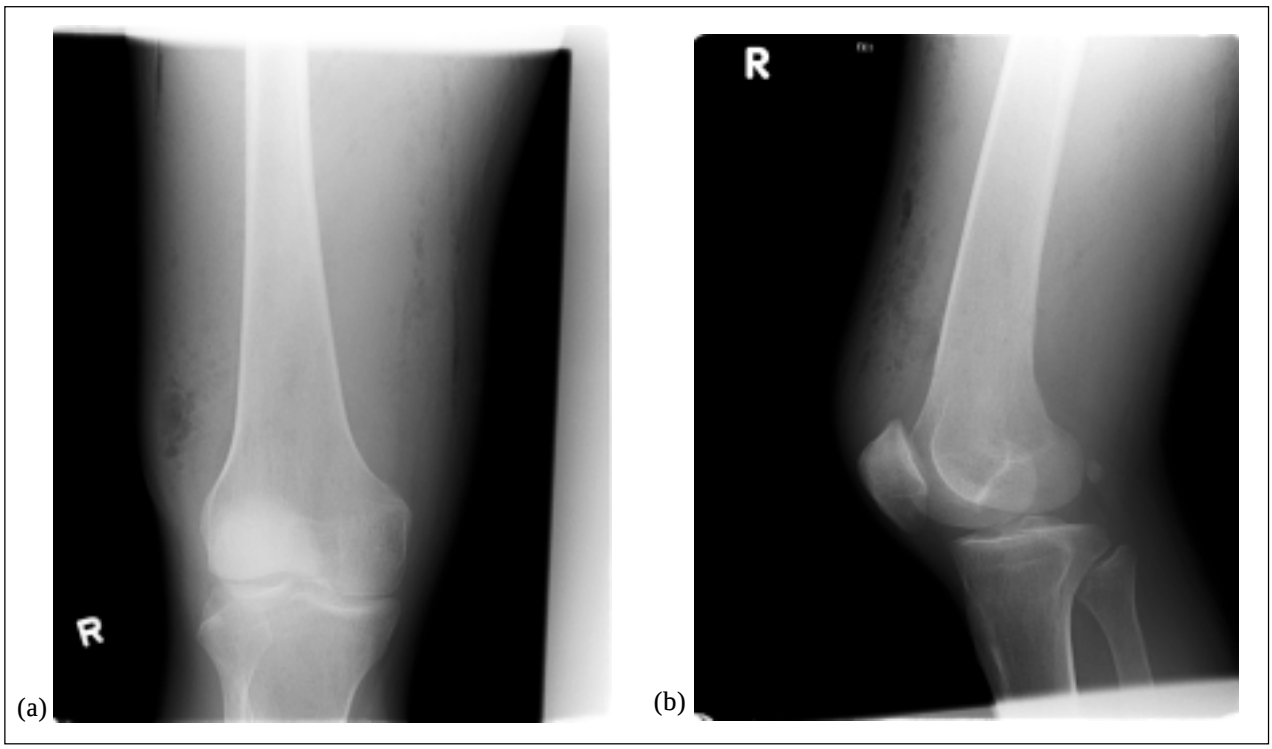

Figure 1. X-rays of the right knee showing subcutaneous gas.

the extent of the fasciitis, a contrast computed tomogram of the abdomen and right thigh was arranged. It incidentally identified abscesses involving the right psoas, right quadratus lumborum and right iliacus muscles (Figure 2). Subsequent laparotomy to drain the abscesses was required. Both cultures of the right thigh fascia and pus in the right psoas abscess grew *Proteus mirabilis*, *Streptococcus milleri* and *Bacteroides* species. The urine culture yielded *Proteus mirabilis* and the blood culture found *Streptococcus milleri*. Despite inotropic and ventilatory support and broad-spectrum antibiotics, he ran a downhill course and developed adult respiratory distress syndrome and refractory metabolic acidosis. He finally succumbed four days after admission.

Discussion

Necrotizing fasciitis is a rare soft tissue infection which can spread rapidly and carry a high mortality rate. It was first described by Wilson in 1952.[1] The course of the disease is related to the spreading of infection above the deep fascia resulting in thrombosis of vessels leading to gangrene of the subcutaneous tissue.[2] The usual presentations are fever, hypotension and signs of local infection. The infected site may show painful patchy discoloration and swelling. The margin of the involved

Figure 2. Computed tomogram of abdomen showing swollen right psoas muscle with gas inside suggesting a right psoas abscess (arrows).

region is usually not clear and there is no associated lymphangitis. In more advanced cases, gangrenous patches, haemorrhagic bullae, sensory and motor deficit may appear. The disease can lead to septic shock, multi-organ failure, disseminated intravascular coagulation and finally death. The mortality rate can vary from 5% to 50%.[3] A multivariate analysis of 182 patients with necrotizing fasciitis revealed that higher mortality was associated with age greater than 60 years (Odds Ratio = 8.1) and the presence of bacteraemia (Odds Ratio = 5.2).[4] The high mortality factor of a positive blood culture was also found in our patient.

There are two main forms of necrotizing fasciitis. The majorities are polybacterial infections and sometimes considered as type I necrotizing fasciitis. Single pathogen is only identified in about 15 to 29% of the cases and is usually due to group A beta-haemolytic streptococcal infection which is described as type II necrotizing fasciitis.[5-8] There is another subtype due to marine *Vibrio* species (e.g. *V. vulnificus*) and usually associated with exposure to fish or seawater.[2,3] The predisposing factors include diabetes mellitus, malnutrition, immunodeficiency, history of major trauma or surgery and systemic diseases.[9] Injection of non-steroidal anti-inflammatory drugs and acupuncture have also been reported as causes of necrotizing fasciitis.[10,11] Report on necrotizing fasciitis associated with concomitant soft tissue infection was uncommon.

From the literature search, there has been no case report on necrotizing fasciitis caused by psoas abscess. *Streptococcus milleri* is uncommon in necrotizing fasciitis. It has a high propensity for abscess formation while *Proteus mirabilis* is a common pathogen in urinary tract infection. It was likely that the psoas abscess was the cause of the necrotizing fasciitis as the right loin pain preceded the development of the painful right knee swelling and both yielded the same pathogens.

The keystones for survival are early diagnosis and prompt treatment including surgical drainage and debridement, broad-spectrum antibiotics and intensive care. Hyperbaric oxygen therapy has also been recommended basing on the possibility of anaerobic infection and the rapid tissue necrosis because of obstruction of the microvasculature.[12,13] Intravenous immunoglobulin has also been used in selected cases.[2]

Making an early diagnosis is usually difficult due to the discrepancy between the cutaneous signs and the progress of the disease. The disease may sometimes be misinterpreted as other less severe conditions, such as cellulitis and erysipelas. Sometimes, the presentation of the disease may be masked as other unrelated infections, such as urinary tract infection.[14] A Singaporean study showed that only about 15% of patients had a correct diagnosis on admission.[3] The classical presentation was not always found in all patients. Hypotension and fever were only found in 18% and 53% respectively. Pain out of proportion to the physical signs may alert one to the possibility of necrotizing fasciitis. X-ray might show subcutaneous gas but it was reported to be present in less than 17% of patients.[3] Computed tomogram and magnetic resonance imaging may aid the diagnosis.[2] However they are not always available or considered by the physicians in the early phase of the disease.

A scoring system (Laboratory Risk Indicator for Necrotizing Fasciitis - LRINEC) was suggested to differentiate early necrotizing fasciitis from other soft tissue infections (Table 1).[15] A total score equal to or

Table 1. Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) Score (Score ≧6 indicates a high risk of necrotizing fasciitis)

	Value, Unit	Score
C-reactive protein, mg/L	<150	0
	≧150	4
Total white cell count, per mm^3	<15	0
	15-25	1
	>25	2
Haemoglobin, g/dL	>13.5	0
	11-13.5	1
	<11	2
Sodium, mmol/L	≧135	0
	<135	2
Creatinine, μmol/L	≦141	0
	>141	2
Glucose, mmol/L	≦10	0
	>10	1

greater than 6 represents a significant risk of developing necrotizing fasciitis (positive predictive value: 92.0% and negative predictive value: 96.0%) and these patients need to be carefully evaluated. The main pitfall of the score is that the result of C-reactive protein is not readily available in most of our local emergency departments. Hypocalcaemia has also been suggested to correlate with the severity of the disease, but it has no major role in facilitating an early diagnosis.[16]

Bedside ultrasonography has also been used to improve the diagnosis of necrotizing fasciitis. A diffuse thickening of the subcutaneous tissue with a layer of fluid accumulation greater than 4 mm in depth in the deep fascial layer would suggest a diagnosis of necrotizing fasciitis. The sensitivity, specificity and accuracy performed by a Taiwan group were 88.2%, 93.3% and 91.9% respectively.[17] However, the technique is still new to our local emergency physicians and is also operator dependent.

Tissue oxygen saturation measured by near-infrared spectroscopy is another tool under study. Wang et al used 70% tissue oxygen saturation as a cut off point for diagnosing early necrotizing fasciitis involving the lower limb (sensitivity: 100%, specificity: 97%, positive predictive value: 76% and negative predictive value: 100%).[18] However tissue oxygenation can also be affected by the presence of peripheral vascular disease, systemic hypoperfusion and hypoxia.

With reference to our case, the patient presented with shock and tender right knee swelling. Although he did not have fever, these had already alerted us to the possibility of this devastating condition. The diagnosis was further substantiated by the presence of subcutaneous gas. Unfortunately, he could not survive because of the complexity of the disease. Even if he could present earlier, the chance of survival would still not be altered if the diagnosis of psoas abscess was not made and appropriate treatment initiated immediately. It is suggested that concomitant soft tissue infections should be looked for, if a case of necrotizing fasciitis is suspected.

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