



What is subacute necrotizing fasciitis?: A proposed clinical diagnostic criteria

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Summary Objective. Subacute necrotizing fasciitis is a poorly defined clinical entity. Its very existence has been the subject of much controversy. While rarely reported, subacute forms of necrotizing fasciitis have been documented in the literature by many authors. This paper highlights some recently reported cases in the literature that clearly shows that subacute forms of necrotizing fasciitis indeed exist and may in fact be under-reported because of the lack of awareness and a consistent diagnostic criteria.

Methods. A Medline search was performed with the following keyword; necrotizing fasciitis, subacute, variant and indolent.

Results. Majority of reported cases did not give sufficient information to satisfy the reviewer that these cases were indeed subacute forms of necrotizing fasciitis. We identified three cases of subacute necrotizing fasciitis that clearly are subacute cases and analysed their clinical presentation. A diagnostic criterion for defining subacute necrotizing fasciitis was proposed based on these cases and the authors' clinical experiences.

Conclusion. This proposed diagnostic criterion serves to facilitate future reporting and documentation of this condition. The clinical significance and implication of this are discussed.

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Introduction

Necrotizing fasciitis is perhaps the most severe and feared soft tissue infection, characterized by

a fulminant course and a high mortality.¹ Classic clinical presentation of necrotizing fasciitis is by a combination of severe local symptoms and systemic disturbances. In fact, several authors listed severe systemic sepsis as a diagnostic feature of this condition.^{2,3} While this is undoubtedly true, the emergence of what appear to be subacute forms of necrotizing fasciitis in the literature have raised concerns over the possible changing clinical presentation of this disease. Indeed, while

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the existence of subacute necrotizing fasciitis is often questioned, its clinical implications are immense. While early surgical debridement has been proven in multiple studies to decrease mortality, delayed diagnosis is often seen due to the absence of specific clinical features early in the evolution of necrotizing fasciitis. This difficulty in clinical recognition is complicated by presence of atypical manifestations of this disease such as subacute forms of necrotizing fasciitis.⁶ We reviewed the literature with the purpose of clarifying and defining what subacute necrotizing fasciitis is.

Methods

A PUBMED search of the English language literature was performed using the following keywords: Necrotizing fasciitis, subacute, variant and indolent. We did a free text search or a MeSH search wherever appropriate and used the Boolean operators to combine the terms. The identified articles were review to identify patients that fulfil the diagnostic criteria for subacute necrotizing fasciitis. Cases in which insufficient information were available to conclusively classify as subacute necrotizing fasciitis were excluded.

While the term 'subacute necrotizing fasciitis' was used by various authors, our reviewed showed that few were convincing cases of true subacute necrotizing fasciitis. The definition adopted in some papers appeared equivocal^{4,5} and many cases appeared to represent necrotizing fasciitis complicating chronic wounds.⁹ To avoid ambiguity and to standardize future reporting, the following clinical diagnostic criteria of subacute necrotizing fasciitis was proposed: (1) An indolent initial course with the absence of systemic disturbances, (2) gradual tissue necrosis with progressive cutaneous changes over the affected site, (3) progression despite the use of anti-microbials, (4) sudden deterioration with rapid progression of necrotizing fasciitis or systemic features of sepsis and (5) histological features consistent with that seen in necrotizing fasciitis (Table 1). Table 2 summarizes the clinical presentation and outcome of patients with subacute necrotizing fasciitis that fulfil the proposed criteria.

Results

Majority of reported cases did not give sufficient information to satisfy the reviewer that these cases

Table 1 Proposed diagnostic criteria for defining subacute necrotizing fasciitis

Clinical criteria for diagnosing subacute necrotizing fasciitis

Indolent initial course with the absence of systemic disturbances
 Gradual tissue necrosis with progressive cutaneous changes over the affected site
 Progression despite the use of anti-microbials
 Sudden deterioration with rapid progression of necrotizing fasciitis or systemic features of sepsis
 Histological features consistent with that seen in necrotizing fasciitis

Points 1 and 2 should both be present to diagnose subacute necrotizing fasciitis as this proves progressive ischemia due to underlying liquefactive necrosis and progressive cutaneous vessels thrombosis.

were indeed subacute forms of necrotizing fasciitis. We identified three cases of subacute necrotizing fasciitis that clearly are subacute cases and analysed their clinical presentation (Table 2). A diagnostic criterion for defining subacute necrotizing fasciitis was proposed based on these cases and the authors' clinical experiences (Table 1). Illustrated here are two patients that fulfilled the diagnostic criteria for subacute necrotizing fasciitis. These cases clearly demonstrated the existence of subacute necrotizing fasciitis.^{6,10}

Case 1

A 82-year-old woman presented with swelling and mild pain of her right hand for the past 6 days. She reported sequential skin changes from erythema to small blister formation to haemorrhagic bulla and finally fixed discolouration and skin anaesthesia. This started from her middle finger migrating proximally to involve the entire hand. She complained of persistent pain and was admitted for parenteral anti-microbial and antibiotics. During the course of the next few hours, the margins of tenderness and erythema rapidly migrated up a forearm. She was saved by a timely trans-elbow amputation 8 h after admission. Histology of resected tissue specimen confirmed the diagnosis of necrotizing fasciitis.⁶

Case 2

A 66-year-old female with poorly controlled diabetes mellitus was admitted for right loin pain for the past 7 days. She had no signs of sepsis. On examination, her right loin was slightly tender and

Table 2 Summary of some cases of subacute necrotizing fasciitis reported in the literature

Ref. No.	Age	Comorbidities	Duration of symptoms (days)	Symptoms	Initial diagnosis	Tissue culture isolate	Outcome
[10]	82	Nil	6	Mild pain and swelling	Fluid overload and oedema	<i>Proteus mirabilis</i> and <i>Enterococcus</i>	Survival
[6]	66	Diabetes	14	Mild pain (over the loin) and vomiting	Pyelonephritis	Group B <i>Streptococcus</i>	Survival
[7]	54	Diabetes mellitus	32	Fever, bilateral thigh pain	Cellulitis	<i>Staphylococcus aureus</i>	Survival

renal punch was positive. There was minimal erythema, warmth or other signs of soft-tissue infection. Urinalysis was normal. She was admitted and was started on anti-microbials. She developed a low-grade fever and her right flank pain progressively worsened. Computed tomography (CT) scan of the abdomen was done for suspected pyelonephritis 7 days after admission. This showed thickening of the lateral abdomen and chest wall with gas in the soft-tissue planes. No other intraabdominal abnormalities were otherwise seen. Operative debridement and histological examination confirmed the diagnosis of necrotizing fasciitis. She was discharged well after seven wound debridements.¹⁰

Discussion

While the term subacute necrotizing fasciitis has been variously mentioned in the literature for the past few decades, its definition remains vague and poorly defined. In fact, the existence of subacute forms of a fulminant condition such as necrotizing fasciitis is often questioned. The presence of subtypes of necrotizing fasciitis was first suggested by Leppard and Seal in 1983.⁸ They classified subacute necrotizing fasciitis as cases with symptoms developed over days to weeks, usually with localized disease. However, from their paper, it is arguable whether these are indeed true subacute forms or necrotizing fasciitis complicating chronic wounds. Later, Baker et al. alluded to the existence of subacute forms of necrotizing fasciitis in their histological study of necrotizing fasciitis.⁵ The authors defined subacute necrotizing fasciitis as soft tissue infection that failed to resolve with anti-microbials with subsequent development of a thick eschar over the affected area. This definition is contrary to our understanding of the pathophysiology of necrotizing fasciitis.^{12,13} It is

generally accepted that once established necrotizing fasciitis will progress despite anti-microbials and surgical excision is the only effective treatment. Again, it was questionable whether these cases were indeed subacute necrotizing fasciitis. Jarrett et al.⁴ distinguished necrotizing fasciitis into fulminant, acute and subacute varieties based on clinical course and duration of symptoms.

Much of this confusion over the diagnosis of subacute necrotizing fasciitis resulted from a lack of an accepted definition of this entity. The proposed diagnostic criteria (Table 1) will serve to standardize reporting, define cases and raise awareness. It is based on our current understanding of the clinical presentation and histological changes on necrotizing soft tissue infections.¹¹⁻¹³ The indolent initial course and cutaneous skin changes of progressive ischemia¹³ should both be present to diagnose subacute necrotizing fasciitis. These two points are important as the insidious and mild initial symptoms (a clinical characteristic of subacute necrotizing fasciitis) defines the tempo of the infection and progressive cutaneous changes due to increasing skin ischemia is a sine qua non of necrotizing fasciitis. Liquefactive necrosis and progressive thrombosis of perforators supplying the skin is the underlying pathological process responsible for the skin changes seen and this process is only seen in necrotizing fasciitis. When both these feature is present, subacute necrotizing fasciitis is diagnosed. Points 3, 4 and 5 confirmed the diagnosis. Table 3 shows the progressive cutaneous skin changes as necrotizing fasciitis progress through early, intermediate and late stages (stages 1, 2 and 3).¹³ This is a useful guide in serially evaluation for the disease progression.

It is clear from some recent reports in the literature that necrotizing fasciitis can begin subacutely. A recent case report by Wong and Tan was presented in case 1.⁶ Several aspect of this patient's presentation clearly demonstrated

Table 3 Progressive cutaneous changes as necrotizing fasciitis progress from early to late stages

Clinical stages of necrotizing fasciitis	Stage 1 (early)	Stage 2 (intermediate)	Stage 3 (late)
Clinical features	Erythema Swelling Warm to palpation Progressive, intense pain	Blister or bullae formation (serous fluid) Fluctuance Induration	Haemorrhagic bullae Skin anesthesia Crepitus Skin necrosis with dusky discolouration progressing to frank gangrene

The underlying pathological process responsible for these changes is progressive ischemia from thrombosis of cutaneous blood vessel supplying the overlying skin. In subacute necrotizing fasciitis, these skin changes will develop at a much slower pace (adapted from Wong and Wang, *Current Opinion in Infectious Disease* 2005 Apr;18(2):101-6, with permission).

the existence of subacute necrotizing fasciitis (Fig. 1). Her hand at admission was foul smelling and gangrenous. This patient gave a clear history of gradual demise of the hand. Progressive vessel thrombosis resulted in gradual necrosis of the hand. This is the underlying pathological process of necrotizing fasciitis. No other infection presents in this manner. Through out the initial 6 days, she did not have any systemic signs of sepsis and was actually quite well. She gave a clear description of the progressive skin changes associated with the demise of her hand. Her subsequent deterioration and operative debridement proved that she was indeed afflicted by necrotizing fasciitis.



Figure 1 A patient with subacute necrotizing fasciitis of the hand. While the initial symptoms were mild with only slight discomfort to the patient, this patient reported gradual discolouration and necrosis of the hand over 6 days duration. When seen at admission, the hand was already gangrenous and dead. The margins of violaceous erythema and tenderness rapidly migrated proximally from the wrist to the middle of the forearm within 6 h of admission (arrows). Reproduced with permission, Wong and Tan, *Lancet* 2004;364:1376.

The clinical implications of the existence of a subacute form of necrotizing fasciitis are immense. Classically, necrotizing fasciitis is associated with systemic toxicity and severe local symptoms such as pain. Contrary to the presentation of classical necrotizing fasciitis, subacute forms present with indolent course with mild local symptoms and absence of systemic disturbances. However, after the infection reached a certain threshold, sudden deterioration is a clinical feature. Like other forms of necrotizing fasciitis, early diagnosis and aggressive surgical debridement is the cornerstone of treatment.^{1,12,13} Early diagnosis and operative debridement reduces mortality and morbidity of the condition regardless of whether it is subacute or classical necrotizing fasciitis.¹ This is extremely difficult for even for the 'classical' necrotizing fasciitis and may be almost impossible for subacute necrotizing fasciitis.^{6,10} In this regard, managing subacute necrotizing fasciitis presents an immense diagnostic challenge as missed diagnosis and delayed treatment are commonplace. Therefore, in the assessment of soft tissue infections, awareness and a high index of suspicion are important. While it seems certain that subacute necrotizing fasciitis is a clinical reality, its true incidence is unknown and probably under-reported. Further studies into this enigmatic entity are warranted to better define this important clinical entity.

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