Necrotizing fasciitis of the perineum

Yasemin Akın, Ayşenur Cerrah Celayir, Tayfun Aköz, Hasret Ayyıldız Civan, Gökmen Kurt, Turgut Ağzıkuru, Ceyhan Şahin

Istanbul, Turkey

Background: **Necrotizing fasciitis is a severe soft tissue infection characterized by rapidly progressing necrosis, involving subcutaneous tissues. This rare condition carries a high mortality rate and requires prompt diagnosis and urgent treatment with radical debridement and antibiotics; but early diagnosis, which is essential to successful treatment, remains a challenge.**

Methods: **Physical examination findings, pre-operative and operative findings, histopathological results of the structure, and follow-up results of the patient are discussed with related reports.**

Results: **A 15-month old girl had a history of trivial perineal dermatitis after treatment of anemia and pneumonia. Perineal dermatitis progressed fastly as necrotizing fasciitis which was successfully managed with intensive medical treatment, surgical debridement and reconstructive surgery.**

Conclusions: **Lack of cutaneous findings early in the disease makes the diagnosis challenging, so a high suspicion is essential. Recovery of the patient from this life-threatening condition needs a multi-disciplinary approach involving pediatrics, pediatric surgery, and plastic and reconstructive surgery.**

World J Pediatr 2013;9(2):185-187

Key words: **child;**
Fournier's gangrene;
necrotizing fasciitis;
perineum

Author Affiliations: First Department of Pediatrics, Dr. Lütfi Kırdar Kartal Educational and Research Hospital, İstanbul, Türkiye (Akın Y, Civan HA, Ağzıkuru T); Department of Pediatric Surgery, Zeynep Kamil Maternal and Child Educational and Research Hospital, İstanbul, Türkiye (Celayir AC, Kurt G, Şahin C); Department of Plastic and Reconstructive Surgery, Dr. Lütfi Kırdar Kartal Educational and Research Hospital, İstanbul, Türkiye (Aköz T)

Corresponding Author: Ayşenur Cerrah Celayir, Zeynep Kamil Kadın ve Çocuk Hastalıkları Eğitim ve Araştırma Hastanesi, Başhekim, Arakiyeci Hacı Mehmet Mah. Op.Dr.Burhanettin Üstünel Cad. No:10, 34668, Üsküdar, İstanbul, Türkiye (Tel: +90 216 343 20 73; Fax: +90 216 343 92 51; Email: acelayir@ttmail.com)

doi: 10.1007/s12519-011-0294-4

Introduction

Necrotizing fasciitis (NF) is a severe soft tissue infection characterized by rapidly progressing necrosis involving mainly the fascia and subcutaneous tissues, but can also extend to involve muscles and skin.[1-4] This rare life-threatening condition has been recognized since the 18th century with various names including phagedena gangrenosum, hospital gangrene, Meleney's gangrene, and Fournier's gangrene. NF is seen primarily in adults but there are also some pediatric and neonatal series. The diagnosis of NF can be challenging because of its rarity, and knowledge of all available methods is key for early and accurate diagnosis. This report focuses on the review of different methods available for diagnosis and treatment of NF in children.

Case report

A 15-month-old girl was admitted to the pediatric unit from the emergency department because of trivial diaper dermatitis and pale 15 days ago. Physical findings on admission included an extensive erythematous, edematous, and tender area over the perineum with extensive inflammatory lesions over the inguinal area, perineum and buttock (Fig. 1). The skin lesion extended rapidly from both inguinal areas through the gluteus; the affected skin became violaceous in color and indurated. Laboratory findings showed a hemoglobin level of 6.7 g/dL, Hct 21.8%, leukocyte count 3600/mm^3, platelet count 577 000/ mm^3. The C-reactive protein (CRP) level was 148 mg/L (normal <5 mg/L). Ultrasonography of the affected area revealed thickened fascial plane and fluid accumulation between subcutaneous fat tissue and muscular layer, and hepatosplenomegaly was determined. On the second day after admission, the erythematous, edematous, and tender areas over the perineum and buttock became bullous lesions. The patient had a temperature of 39.5°C, prothrombin time 51 s, partial thromboplastin time 18.8 s, international normalized ratio 5.8, albumin 2.5 g/dL, but normal markers of hepatitis. On the fourth day after admission, the erythematous, edematous, and bullous areas over the perineum changed to gangrenous lesions (Fig. 2). Wound cultures were positive for oxacillin-resistant *Staphylococcus Aureus*.

The patient was pre-diagnosed with NF and sepsis,

and entered the pediatric surgery department. A Foley catheter was inserted into the bladder. Blood and wound cultures were made. Oxygen therapy with hood began for respiratory insufficiency, and oral intake was avoided. Intravenous fluids therapy, total parenteral nutrition and dopamine therapy for insufficiency of the circulation, and antibiotic therapy including piperacillin, gentamicin, and metronidazole were given initially. They were changed to meropenem. After stabilization of the general condition in first hours, a sigmoid colostomy and debridement of lesions in the inguinal area were performed urgently (Fig. 3). The patient was taken to the operating theatre again for re-examination and re-excision, showing more necrotic areas in the perineum, which were debrided two days later. More extensive excision along with debridement of all necrotic subcutaneous tissue and fascia was performed around the labia majus and anus, and a penrose drain was inserted into the rectum from the anus (Fig. 4). Biopsy specimens showed micro-vascular thrombosis, tissue ischemia and liquefactive necrosis, which suggest NF. Wound culture was positive for *Esherichia Coli* and *Pseudomonas Auroginosa.*

Intravenous hydration and oxygen therapy were maintained throughout the treatment with close observation of renal functions. Dressing was changed twice daily. Blood, urinary and wound cultures were negative. Laboratory findings showed a hemoglobin level of 12.4 g/dL, Hct 36.2%, and a leukocyte count of 11 400/mm^3. The CRP level was decreased to 6 mg/L (normal <5 mg/L). The patient was referred to the Department of Plastic and Reconstructive Surgery on the 11th day, and V-Y and Z skin flaps were used for wound closure by one reconstructive operation (Fig. 5). The patient was discharged with good eschar formation one month later.

Six months later, colostomy was closed. For subcutaneous infection, wound culture was positive for *Pseudomonas Auroginosa*. The patient was discharged one month later.

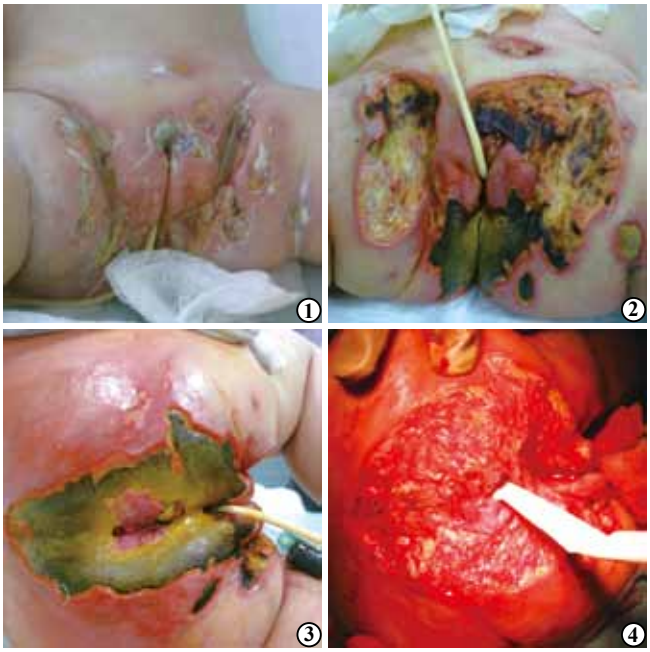

Fig. 1. Perineal and buttock skin lesions within the first week.
Fig. 2. Three days after the first debridement of the inguinal area.
Fig. 3. Deep necrotic lesions around the anus and both labium majus.
Fig. 4. Very deep debridement during the second operation, and a penrose drain was inserted into the rectum.

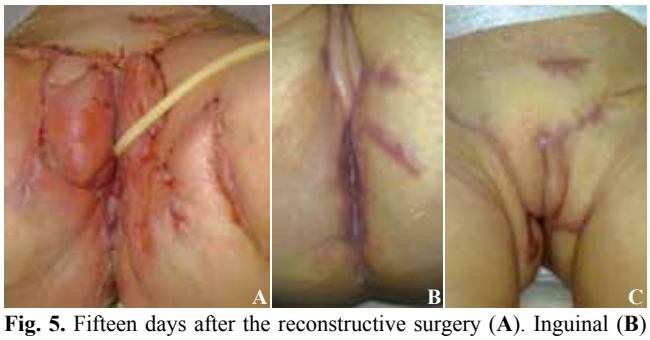

Fig. 5. Fifteen days after the reconstructive surgery (**A**). Inguinal (**B**) and perineum (**C**) appearences of the patient 6 months later.

Discussion

Joseph Jones described necrotizing soft tissue infection in soldiers during the American civil war in 1871 and reported a mortality rate of 46%. In 1883, Jean Alfred Fournier also described similar NF of the perineum in 5 male patients. In 1952, NF was described for the first time to include both gas-forming and non-gas-forming necrotizing infection.[5,6] More recently, necrotizing soft tissue infection (NSTI) was suggested to encompass all of these necrotizing infections and an approach is needed for the diagnosis and treatment of the disease.[6] NSTI can be classified according to the anatomic location involved or the depth of infection as necrotizing adiposities, fasciitis, or myositis. The most common site of infection was the extremities (57.8%) followed by the abdomen and perineum.[6]

NF is characterized by rapidly spreading infection in the subcutaneous tissues. Microbial invasion of the subcutaneous tissues occurs either through external trauma or direct spreads from a perforated viscus particularly the colon, rectum, or anus. Bacteria then track subcutaneous tissues, producing endo and exotoxins that cause microvascular thrombosis, tissue ischemia, liquefactive necrosis, and often systemic illness, which can progress to septic shock, multisystem organ dysfunction, and death.[7] The mortality associated with the disease varied from 6% to 76% in the reported series.[1,4,7,8] Diagnostic methods like US, CT, MRI, and infrared spectroscopy are helpful in detecting suspicious cases.[9] Examination of biopsy specimen taken from the

affected sites including the deep fascia and muscle is required for early diagnosis of NSTI.[10]

Early diagnosis and surgical debridement and use of broad spectrum antibiotics are essential to the successful treatment of NF. The initial regimen usually includes agents against aerobic gram-positive cocci, gram-negative rods, and a variety of anaerobes. The usual multidrug regimens include high-dose penicillin, high-dose clindamycin, and a fluoroquinolone or an aminoglycoside. Vancomycin or linezolid should be considered until methicillin-resistant *Staphylococcus aureus* infection has been excluded.[7,8,11] This should be accompanied with supportive measures such as fluid replacement, blood pressure support, especially analgesia, nutritional support and intensive care involvement. Hyberbaric oxygen therapy has also been used as an adjunct to other treatments. There is no agreement as to the usefulness of hyberbaric oxygen therapy in the treatment of NF.[12-14]

Urinary catheterization is preferred to cystostomy so as to avoid urinary contamination. Suprapubic cystostomy is required when there is gross urinary extravasation or periuretral inflammation.[12] Colostomy should be done only in selected cases as it is not a procedure free of complications. We performed colostomy for our patient because abdominal distention progressed fastly and the perinum was affected by NF and necrotic tissue around the anus. Thus fecal contamination was unavoidable. After colostomy, toxic appereance was seen in the patient within a short time.

Urgent surgical exploration and debridement of tissue are the cornerstone of successful management, and also aid in the diagnosis of NF.[10] The basis of surgical debridement is to remove all infected and gangreneous necrotic tissue in a single operation, but repeat debridement can be needed before wound closure in most of the cases. Wound closure should be carefully planned as early closure carries the risk of residual infection and poor wound healing. Several methods have been used for wound closure such as secondary suturing, shoe lace technique, skin grafting, muscle flaps, and vacuum-assisted closure.[13,14]

The common early signs of the disease are erythema, local warmth, skin induration, and edema. But these often make early diagnosis of the disease difficult or even it is misdiagnosed as cellulites, abscess or septic arthritis. NF is suspected only when the patient fails to respond to broad spectrum antibiotics or develop cutaneous manifestations. Patches of skin necrosis, tissue crepitus, fluctuance and systemic evidence of sepsis such as hyperthermia, tachycardia, hypotension, and pain are alarming signs.

In conclusion, NF in children is a rare but life-threatening condition that requires prompt diagnosis and surgical debridement and treatment with broad spectrum antibiotics. Patients with NF can recover after a multi-disciplinary treatment involving pediatrics, pediatric surgery, and plastic and reconstructive surgery.

Funding: None.
Ethical approval: Not needed.
Competing interest: None declared.
Contributors: Akın Y and Celayir AC wrote the first draft of this paper. All authors contributed to the intellectual content and approved the final version. Celayir AC is the guarantor.

References

1 Pandey A, Gangopadhyay AN, Sharma SP, Kumar V, Gopal SC, Gupta DK. Surgical considerations in pediatric necrotizing fasciitis. J Indian Assoc Pediatr Surg 2009;14:19-23.
2 Hsieh WS, Yang PH, Chao HC, Lai JY. Neonatal necrotizing fasciitis: a report of three cases and review of the literature. Pediatrics 1999;103:e53.
3 Wakhlu A, Chaudhary A, Tandon RK, Wakhlu AK. Conservative management of necrotizing fasciitis in children. J Pediatr Surg 2006;41:1144-1148.
4 Bingol-Kologlu M, Yildiz RV, Alper B, Yagmurlu A, Ciftci E, Gokcora IH, et al. Necrotizing fasciitis in children: diagnostic and therapeutic aspects. J Pediatr Surg 2007;42:1892-1897.
5 Ozalay M, Ozkoc G, Akpinar S, Hersekli MA, Tandogan RN. Necrotizing soft-tissue infection of a limb: cinical presentation and factors related to mortality. Foot Ankle Int 2006;27:598-605.
6 Anaya DA, Dellinger EP. Necrotizing soft-tissue infection: diagnosis and management. Clin Infect Dis 2007;44:705-710.
7 Wong CH, Chang HC, Pasupathy S, Khin LW, Tan JL, Low CO. Necrotizing fasciitis: clinical presentation, microbiology, and determinants of mortality. J Bone Joint Surg Am 2003;85:1454-1460.
8 Childers BJ, Potyondy LD, Nachreiner R, Rogers FR, Childers ER, Oberg KC, et al. Necrotizing fasciitis: a fourteen-year retrospective study of 163 consecutive patients. Am Surg 2002;68:109-116.
9 Chao HC, Kong MS, Lin TY. Diagnosis of necrotizing fasciitis in children. J Ultrasound Med 1999;18:277-281.
10 Stamenkovic I, Lew PD. Early recognition of potentially fatal necrotizing fasciitis. The use of frozen-section biopsy. N Engl J Med 1984;310:1689-1693.
11 Lee TC, Carrick MM, Scott BG. Incidence and clinical characteristics of methicillin-resistant *Staphylococcus Aureus* necrotizing fasciitis in a large urban hospital. Am J Surg 2007;194:809-812.
12 Ekingen G, Isken T, Agir H, Oncel, Gunlemez A. Fournier's gangrene in childhood: a report of 3 infant patients. J Pediatr Surg 2008;43:e39-e42.
13 Huang WS, Hsieh SC, Hsieh CS. Use of vacuum-assisted wound closure to manage limb wounds in patients suffering from acute necrotizing fasciitis. Asian J Surg 2006;29:135-139.
14 Wang TL, Hung CR. Role of tissue oxygen saturation monitoring in diagnosing necrotizing fasciitis of the lower limbs. Ann Emerg Med 2004;44:222-228.

Received April 6, 2010
Accepted after revision August 31, 2010