

Necrotizing Fasciitis of the Abdominal Wall Cellulitis in a Child with Chicken Pox: A Case Report

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Abstract

Background: Necrotizing Fasciitis (NF) is an uncommon but disastrous complication of chickenpox in young children. NF should be suspected in case of varicella infection and persistent swelling and pain in any part of the body with fever, erythema, and lethargy. Timely surgical debridement with broad-spectrum antibiotic therapy and fluid resuscitation is critical to avoid fatal outcomes.

Case Presentation: We describe the case of a previously healthy 6-year-old female who presented with unusual pain in the lower abdominal wall. Urgent debridement was performed because of an inadequate response to primary conservative therapy with antibiotics and a subsequent deterioration in general condition.

Conclusion: This report highlights the need for the consideration of the condition for diagnosis and timely surgical intervention for effective management of NF.

Key Words: Chicken pox, Necrotizing Fasciitis, Virus Infection.

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1- INTRODUCTION

Varicella, also known as chickenpox, which is caused by the varicella-zoster virus, is a frequent childhood infection. In addition to mild fever, headache, nausea, and malaise, the disease presents with a characteristic exanthema. Varicella typically has a benign course. However, potential complications might be lethal, including soft tissue infections, osteomyelitis, sepsis, and encephalitis. Dermatologic complications are usually superficial but sometimes end in Necrotizing Fasciitis (NF), hemorrhagic chickenpox, and varicella gangrenosa. Though the occurrence of chickenpox complications is higher in immunocompromised children, adolescents, and adults, healthy, immunocompetent children may also be affected (1, 2). The hospitalization rate for varicella is approximately 3-7 per 1,000 cases, and the complication rate is 2- 4% (1, 3, 4). It has been shown that more than half of the cases of hospitalization associated with chickenpox are owing to superinfection, usually cellulitis or abscess formation, expected at more than 30%. Rare complications consist of neurologic sequelae (8%) or pulmonary complications such as acute respiratory distress syndrome and pneumonitis (3.1%). Less than 1% are estimated to be due to NF of all hospitalizations due to primary varicella infection in children (5, 6). The NF necessitates close monitoring, especially in children (7). This condition should be managed with proper clinical care and antibiotic therapy. Although it is not always clear whether surgical debridement is required, immediate surgical intervention appears to be the most reliable treatment; non-surgical treatment of AF is chosen when surgery is not possible (8).

We report the case of a previously healthy 6-year-old female with chickenpox who developed varicella-related NF of the lower abdominal wall. This report

represents a fatal complication in an immunocompetent child and emphasizes the need for rapid and applicable intervention that ultimately saved and changed the girl's life.

2- CASE REPORT

A previously healthy 6-year-old female presented to the emergency room with severe abdominal pain four days after developing a characteristic chickenpox rash. On examination, she was febrile with rigors and chills, irritability, lethargy; and she had purple discoloration and erythema of the lower abdominal wall (Fig. 1), tenderness and swelling in the left lower quadrant of the abdomen. She had a history of contact with a single classmate who was suspicious of varicella-zoster.

Drug history included only oral paracetamol and diphenhydramine and no acyclovir. In our case, there was no history for taking Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) or topical calamine. Varicella-zoster Varicella-shaped crusted skin lesions were visible on the face, scalp, and extremities. The child looked ill and had a pulse rate of 128 beats per minute, respiratory rate of 23 breaths per minute, and a blood pressure of 99/60 mmHg, oral temperature of 39 degrees Celsius, and body weight of 22.300 kgr. Blood test showed a hemoglobin concentration of 11.1 g/dL (normal 12-16), a total white blood cell count of 21600 (normal 4000-10000) with 96% neutrophils, 194 platelets/nL (normal 150-450), serum glucose of 143 mg/dl (normal 70-100), serum albumin of 3g/dL (normal 3.5-5.2) with a serum calcium level of 7.9mg/dL (normal 8.6-10.3), serum sodium of 131 meq/l(normal 135-145), serum creatinine level of 0.68mg/dl (normal 0.7-1.4) and a C-reactive protein concentration of 26 mg/dL(normal titre up to 6). Urinalysis was normal and urine and blood cultures were negative. The coagulation indices and chest X-ray were unremarkable.



(a)



(b)

Fig. 1: Scattered, crusted chickenpox lesions on the lower abdomen with swelling and erythema; and purple and bluish discoloration of the skin

The child was admitted to the pediatric intensive care unit and treated conservatively with wide-spectrum intravenous antibiotics and fluids, respiratory physiotherapy, and local wound care. On examination the next day, the child was still lethargic and appeared ill, and the abdominal pain, tenderness, erythema, and swelling were not decreased, but the respiratory status was

relatively stable. Given her unusual degree of pain and scattering erythema, NF was upraised as a chief differential. Repeated blood tests revealed a total leukocyte count of 7,200 with 74% neutrophils, a platelet counts of 44/nL, a hemoglobin concentration of 9.4 g/dL, and a serum albumin level of 2.4 mg/dL, serum calcium of 8.1 mg/dl, serum sodium of 134 meq/L, and serum creatinine level of 0.43mg/dl.

Urinalysis revealed traces of blood and protein. However, the coagulation picture and liver function tests, as well as a chest X-ray, were unremarkable. Urine, blood, and skin swab cultures were germ-free. The child was treated with non-invasive ventilation and intravenous antibiotics. Ampicillin, vancomycin, and clindamycin were administered at the beginning of admission, but within 24 hours, meropenem was added due to the severity of symptoms and the need for surgical intervention, as well as rifampin for more

complete coverage including *Staphylococcus aureus* and gram-negative streptococci. She also received intravenous Apotel, oral pantoprazole, and diphenhydramine. Less than 24 hours after antibiotic therapy, an urgent surgical consultation was requested, which ordered urgent surgical debridement. Necrotic portions of the fascia and subcutaneous tissue were removed and the wound was kept open, with repeated irrigation, debridement, and gradual closure of the overlying skin (Fig. 2).



Fig. 2: Postoperative visit after surgical debridement (wound dressing uncovered)

The tissue culture result was negative. However, the pathology specimen showed subcutaneous necrosis of the abdominal wall; the initial blood and wound cultures were negative. The child's general condition improved dramatically after debridement; she was discharged from the hospital after 17 days of admission. She is in an improving general condition during follow-up visits for three months.

3- DISCUSSION

Chickenpox is an ever-present infectious condition that affects over 60% of children. In most cases, it resolves

without complications; severe complications such as NF account for <1% of cases (9). Secondary cases in children younger than five years have an elongated course, higher morbidity, and greater risk of developing severe outcomes. Bacterial skin superinfection, pneumonia, and cerebellitis are the most common serious outcomes of chickenpox (10).

Varicella infection has been described as the most prevalent precipitating factor in children diagnosed with NF (11). The NF-related mortality rate is predicted to be about 20%, although some studies have reported a mortality rate of 60% and over

80% in neonates (11-13). Immunosuppression, hypotension, shock, and hypothermia have been revealed to be significant mortality predictors in a child with NF (11). Beside the high risk of mortality, NF is also associated with significant morbidity. It is appraised that 78%-91% of NF surviving children have serious long-term complications such as functional joint derangement, scarring, and limb amputation (11). Reports have not publicly examined the long-term psychosomatic adverse effects of the condition on the patient and his/her family members, although it is considered to be a main reason for morbidity (14).

NF is characterized by extensive necrosis of the skin, subcutaneous fat, and muscle fascia (12, 15, 16). Group A streptococci is the most commonly isolated germ in NF. Worldwide, there is growing evidence of a rise in invasive group A streptococcal infection, although the reason is not yet clearly acknowledged. The release of cytokines in response to bacterial antigens is considered for the high mortality and morbidity (13).

The majority of cases with childhood chickenpox would be free of fever after 48 hours of illness. If fever persists or recurs after 48 hours, a precipitating cause should be considered. The pain and discomfort, out of proportion to the clinical findings near the infected chickenpox vesicle, would help distinguish NF from simple cellulitis (17, 18). Tachycardia is often considered one of the classic signs of NF (16).

In our case, we thought of NF, purpura fulminans, and hemorrhagic varicella as differential diagnoses. Hemorrhagic varicella was excluded, as the child was beforehand immunocompetent and developmentally normal. For purpura fulminans, a history of palpable purpuric lesions which become confluent, resulting in well-defined eschar with characteristics of disseminated intravascular coagulation

is usually noted (19). NSAIDs are linked with an augmented risk of developing NF (20). In addition, NSAIDs can mask symptoms and delay the diagnosis of NF (21). However, an increased risk of developing streptococcal group A NF as a result of NSAID use, independent of VZV infection, has not been established in a previous review (22). In a previous case series study, exacerbation from using NSAIDs including diclofenac (23), was reported, but in our case there was no history of NSAID use for pain before and after admission.

Magnetic resonance imaging could help authorize the diagnosis and involvement of NF but it would postpone timely surgical intervention. Delayed initiation of debridement may result in scar hypertrophy and joint dysfunctions which may require additional revision surgery. Therefore, surgical intervention should not be postponed due to lack of imaging studies (20, 24).

Laboratory findings could not constantly deliver reliable information, as they are not the most essential meters for the assessment of suspected NF (25). Timely diagnosis of NF remains a major challenge owing to the misconception of initial symptoms with erysipelas and cellulitis. The distinction between cellulitis, superinfection, and NF could be principally difficult (26). Timely addressing the NF depends largely on awareness for uncommon signs, including disproportionate pain and possible rapid progress into septic shock. In particular, cases who present with erythema, local swelling, septicemia, and disproportionate pain must be monitored closely, especially when they come with varicella infection (25).

Treatment of NF typically requires resuscitation with fluids, appropriate antibiotic therapy, and radical debridement of all necrotic tissues. Debridement requires removal of the whole necrotic

tissue (20). The skin layer may look normal apart from edema, but would not bleed after incision; the skin should be debrided to the viable margins. If necessary, a muscle fasciotomy should be performed to stop involvement of the underlying muscles. Histologic verification of NF was performed to approve the diagnosis. Cosmetic and reconstructive considerations may be necessary, as inadequate debridement is a risk factor for complications (16). A recent report found that the use of Vacuum-Assisted Closure (VAC) therapy after debridement improves local circulation and wound healing, decreasing infection rates; and thus facilitates recovery.

Delay in treating the NF could be convoluted by systemic toxicity and renal insufficiency. Once NF is suspected, fluid resuscitation should be initiated along with proper antibiotic therapy, and early surgical intervention is required. Morbidity and mortality of patients with varicella-related NF can be decreased by applying these principles to treatment. The above complications of chickenpox are preventable by vaccination, which has been shown to prevent and decrease the severity of infection. A number of reports have supported that vaccination can prevent the infection and thus reduce varicella complications (27-30).

4- CONCLUSION

High suspicion is essential for the diagnosis of NF. A combination of prolonged pain, swelling, erythema, and systemic inflammatory response syndrome after varicella infection may indicate an early stage of NF even in immunocompetent children, especially if they do not respond to acceptable antibiotic and supportive therapies. In addition, treatment requires adequate resuscitation with fluids and administration of intravenous antibiotics along with timely surgical debridement to prevent catastrophic outcomes.

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6- ETHICAL CONSIDERATIONS

The manuscript has been reviewed and approved by the IRB. The authors declare that patient consent has been signed and obtained in accordance with the journal's patient consent policy.

7- CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

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9- AUTHORS' CONTRIBUTIONS

All authors contributed equally to the study design, clinical procedures, and writing of the manuscript.

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