

Lethal Necrotizing Fasciitis Triggered by Plaster: Case Report and Review of Literature

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What to Learn from this Article?

Necrotizing fasciitis is life-threatening rare complication of plaster and apart from high index of suspicion and prompt surgical debridement, author recommends proper pre-cleaning of limb, use of sterile water and adequate wrap for gypsum plasters.

Abstract

Introduction: Plasters have been frequently associated with known complications such as infection, and compartment syndrome or deep vein thrombosis. However, life-threatening complication of necrotizing fasciitis (NF) has not been frequently attributed to plaster.

Case Report: We had a case of a 62-year male developing a lethal NF triggered by a below knee plaster for undisplaced fracture medial malleolus after twisting injury. He had no history suggestive of diabetes, renal impairment, and predisposing allergic factors or any comorbidity. Despite early diagnosis and aggressive management with above knee amputation, death occurs due to septic shock on the 20th day. A similar case of reported lethal NF triggered by plaster has also been reviewed in this report.

Conclusion: This case highlights a life-threatening rare complication of plaster and author recommends thorough clinical history taking, pre-cleaning of limb, use of sterile water and use of adequate wrap around skin for gypsum plasters as prevention apart from high index of suspicion for early diagnosis, and rapid management.

Keywords: Necrotizing fasciitis, plaster, *Pseudomonas aeruginosa*.

Introduction

Necrotizing fasciitis (NF), commonly known as flesh-eating disease is a rare infection of the deeper layers of skin and subcutaneous tissues which easily spreads across the fascial plane within the subcutaneous tissue [1]. NF is a severe disease of sudden onset that progresses rapidly. The most consistent feature of NF was first described in 1952 as necrosis of the subcutaneous tissue and fascia with relative sparing of the underlying muscle [2].

Case Report

A 62-year-old male came to author at a suburban secondary care private hospital for an ankle twisting injury in February 2016. On the bases of undisplaced fracture medial malleolus in X-ray, he was treated with below knee ankle plaster (slab) and advised elevation. His medical history was negative for diabetes or other allergic conditions. He was given analgesic with proteolytic.

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After 36 h of plaster, he presented with symptoms of itching, pain, swelling, and erythema up to distal thigh. Slab was removed and the clinical diagnosis of necrotizing was made on the bases of fever, progressive swelling, crepitus, blisters getting peeled off easily with serous discharge, and sequential discoloration of tissue from pinkish to velvety followed by blackening due to necrosis along with foul smell (Fig. 1) [3].

The laboratory risk indicator for NF score [4] used to facilitate diagnosis was 10/13. Laboratory results showed erythrocyte sedimentation rate 103 mm/h (normal: 1-7), C-reactive protein 281 mg/dL (0-5), white blood cells 19,400/ μ L (3000-10,000) (97% neutrophils, 1.9% lymphocytes), hemoglobin 9.6 g/dL (11.5-15.5), platelet 90,000/ μ L (1,50,000-4,00,000), Na 138 mmol/L (135-145), creatine kinase 474 IU/L (26-140), urea 11.8 mmol/L (1.7-8.3), alanine transaminase 84 IU/L (10-35), total bilirubin 1.8 mg/dL (0.3-1.9), albumin 17 g/L (34-50), creatinine 1.8 mg/dL (0-1.5 mg/dL), and normal blood sugar. Serology for human immunodeficiency virus, hepatitis B, and blood culture was negative. His glycosylated hemoglobin was normal, and tests for anti-nucleosome antibody and anti-dsDNA were negative. The patient was referred to tertiary care center on next day (day 3) where the 2 cm incision was made in the skin down to the deep fascia after local anesthetic agent infiltration. Lack of bleeding along with dishwater-colored fluid was noticed seeping from the wound. On gentle probing with index finger, tissue dissection was possible with ease without resistance (positive finger probe test).

Pseudomonas aeruginosa was cultured from an on table tissue biopsy done on 4th day during debridement and gas gangrene was negative ruling out another differential. *Pseudomonas* was found resistant to piperazillin-tazobactam. Therefore, it was switched over by meropenem, teicoplanin, and clindamycin. Despite early diagnosis and treatment with multiple antibiotics in an intensive care unit, lifesaving above knee amputation was done on the 7th day. NF still continued to expand above the stump and debridement was done 3 times after amputation on day 9th, 12th, and 15th. Finally, the patient died on 20th day of initial presentation due to septic shock and acute renal failure.

Discussion

Diabetes, renal impairment, immunocompromised condition and rheumatic conditions including systemic lupus erythematosus, systemic sclerosis, polymyositis, dermatomyositis, rheumatoid arthritis, and ankylosing spondylitis are known to predispose, but NF has only rarely been reported in association with plaster only [5, 6]. *P. aeruginosa* is also a rare cause of NF unlike streptococcus pyogenes or other polymicrobial infections [7]. Plaster-associated *Pseudomonas* infection as an outbreak has been reported by Houang *et al.* [8] in 1981, in Lancet. To our knowledge

and as per Medline search using the MeSH terms “NF” and “plaster or cast,” only one such case of NF associated with plaster was published by Netzer and Fuchs [9] in 2009, in AJCC, and review of comparison between the two cases has been done as below in Table 1.

In our case, although patient was not immunocompromised but his elder age is also not in favors of competent immunity. Limb cleaning was not considered before BK slab application. Severe swelling might have hampered the skin condition. The only cover of a soft roll (Soft Care 6”) was used as padding and no use of Stockey net or other wrap was done. Plaster material used was gypsum (Gypsona 6) with cotton bandage. Thermogenic effect of gypsum and inadequate wrap predispose the swollen skin to a damaged barrier. The freshly filled tap water in a plastic bucket was used for plaster, and its culture for *Pseudomonas* came positive in 1 out of 3 samples taken directly from the terrace water tank source. Plaster material of slab used in the patient was discarded could not be retrieved for culture.

We have also compared our case with recently reported cases NF in Table 2 and also reviewed two case series of NF Table 3.

Conclusion

Our case along with one another reviewed published report, serve as a reminder that NF may indeed occur after plaster. This case illustrates the fulminant nature of the infection. A high index of suspicion is advised to orthopedicians after plaster to deal with such rare life-threatening

Table 1: Comparison of our case with the only reported case of plaster induced necrotizing fasciitis

Case features	Our case (2016)	Case reported by Netzer and Fuchs
Age	62	43
Sex	Male	Female
Last history	N/A	SLE
Duration of long-term steroids	N/A	15 years
Injury	Ankle fracture	Tibia fracture
Type of plaster	Below knee slab	Full leg cast
Presentation	Skin and limb related	Shock
Diagnosis and removal of plaster	Early (day 2)	Late (2 weeks)
Organism isolated	Resistant <i>Pseudomonas</i>	No data available
Treatment	Medical+surgical (debridement and above knee amputation)	Medical
Cause of death	Septic shock	Septic shock

SLE: Systemic lupus erythematosus



Figure 1: Sequential development of necrotizing fasciitis after application of below knee plaster (slab).

Table 2: Comparison of our case with the recently reported cases necrotizing fasciitis

Case features	Our case (2016)	Weidle et al. [10]	Nazerani et al. [11]
Age	62	77	66
Sex	Male	Female	Male
History	Plaster	Undetected diabetes and bronchial carcinoma with pneumonia	Uncontrolled diabetes and coronary artery disease
Injury	Ankle fracture	Colles fracture	Chest wall and axillary injury
Presentation	Skin and limb related	Shock	Persistent pain and swelling
Organism isolated	Resistant <i>Pseudomonas</i>	Group-A-beta-hemolytic streptococcus	<i>Staphylococcus aureus</i> , <i>Streptococcus</i> , and <i>Pseudomonas aeruginosa</i>
Treatment	Medical+surgical (debridement and above knee amputation)	Medical+Surgical (debridement and shoulder disarticulation)	Medical+surgical (debridement)
Cause of death	Septic shock	Septic shock	Septic shock and renal failure
Duration between injury and death	3 weeks	4 days	2 months

Table 3: Comparison of recent case series on necrotizing fasciitis

Case series	Sharma et al. (2002) [12]	Al Shukry and Ommen (2013) [13]
Number of patients	9	10
Associated comorbidity	4	5
Presentation after illness	1-5 days	1-10 days
Duration of illness	No data available	1 day-3 month
Culture positive	9	10
Surgical debridement done in	8	10
Mortality	3 (33%)	3 (30%)

complication. Few measures are recommended by author for prevention of such case after failing to save the patient's life despite early diagnosis and radical management. Precleaning of limb with chlorhexidine or spirit should be done before plaster. Plasters made up with sterile water in

an autoclaved stainless steel bowl should be used. Plasters made up of fiberglass material is less thermogenic but more costly. The inner wrap should also be used sterile in patients with predisposing conditions.

Clinical Message

NF is difficult to diagnose in its initial stages, as it mimics cellulitis. Important early clues are pain, tenderness, itching and systemic illness out of proportion to the localized physical signs, and skin lesions like bullae and ecchymosis. A high index of suspicion is necessary, and suspected cases should be referred immediately for prompt surgical debridement. This case highlights such a life-threatening rare complication of plaster and author recommends proper precleaning of limb, use of sterile water, and adequate wrap for gypsum plasters.

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