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Original Research Article

Necrotizing Fasciitis in Type 2 Diabetic Patients: A Clinical Presentation Study

Amit Harjibhai Desai[1], Ankit Kumar Bhaveshbhai Bagdai[2], Rashmin Kumar Maganlal Kalaswa[3], Harshad Shankarlal Patel[4]

[1,2,3]Associate Professor, Department of General Surgery, GMERS Medical College, Vadnagar, Gujarat, India

[4]Professor, Department of General Surgery, GMERS Medical College, Vadnagar, Gujarat, India

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Corresponding Author: Dr. Harshad Shankarlal Patel

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Abstract:

Background: Necrotizing fasciitis (NF) is a life-threatening infection that leads to the destruction of the skin and soft tissues. This condition is associated with several underlying systemic disorders, such as malignant neoplasms, chronic alcohol abuse, and diabetes mellitus (DM), all of which are considered potential risk factors for its development. This study aims to compare clinical characteristics between patients with surgically confirmed NF and those without diabetes.

Materials and Methods: A prospective descriptive study was conducted to investigate NF in patients with DM. Cases of NF were identified using the International Classification of Diseases-9 code for NF (728.86) in a tertiary care facility. The study population consisted of 91 patients diagnosed with Type II DM and extremity NF.

Results: The study included 91 participants with a mean age of 56.96 ± 10.51 years. Among them, 72 patients (79.12%) were male, and 19 (20.88%) were female. The Wagner score was employed to assess clinical presentation, with the majority of patients showing a maximum score of 3. Furthermore, the most common presentation was a score of 0 (57.14%), which corresponded to pre-ulcerative lesions, healed ulcers, and skeletal deformities.

Conclusion: This study highlights the severity of NF, particularly in patients with diabetes. Poorly controlled DM was associated with a worse prognosis for NF. Hence, early detection and aggressive treatment are crucial. Heightened awareness of the disease's atypical presentation, combined with a high degree of clinical suspicion and direct fascial examination, are essential, especially in diabetic individuals.

Keywords: Necrotising Fasciitis; Diabetes Mellitus; Wagners Score.

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Introduction

Necrotizing fasciitis (NF) is a life-threatening infection that primarily involves the skin and soft tissues, often seen in individuals aged 60-70 years. It is typically identified by features such as reticular dermal edema, infiltration of polymorphonuclear cells, and involvement of the superficial fascia in the perineogenital region.

The disease progresses rapidly, leading to necrosis of affected tissues, frequently resulting in delayed skin necrosis, multi-organ dysfunction, a syndrome resembling toxic shock, and systemic sepsis [1]. Despite aggressive treatments, including antibiotic therapy, surgical removal of necrotic tissue, and hyperbaric oxygen, the mortality rate associated with NF remains significant.

NF is often associated with systemic conditions that compromise the host, such as malignancies, chronic alcohol use, and diabetes mellitus (DM), which are recognized risk factors for the condition. Although NF may follow minor trauma, it can also affect previously healthy individuals, particularly as a postoperative or hospital-acquired infection. Immunosuppressed patients with DM are at an increased risk of developing gangrene [1, 2].

Despite the severity of NF, 85–100% of cases are often misdiagnosed at initial presentation. The Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score is a proposed diagnostic tool designed to help distinguish NF from other non-necrotizing soft-tissue infections. A score greater than 6 is associated with a 92% positive predictive value, while a score below 6 has a 96% negative predictive value. Early and accurate diagnosis is critical, as delays in surgical intervention significantly increase the likelihood of mortality [3-5].

Multiple risk factors, including chronic diseases like DM, which are implicated in up to 60% of NF cases, contribute to the heightened incidence of NF.

Both end-stage renal disease and chronic kidney disease have been independently linked to DM [6, 7]. Patients with DM may present with elevated baseline LRINEC scores, complicating diagnosis due to increased laboratory markers in this population.

Diabetes is the most common comorbidity observed in NF cases. However, there is limited research directly comparing NF patients with and without diabetes. This study aims to compare surgically confirmed NF cases in diabetic and non-diabetic patients to identify clinical features and trends that could assist clinicians in improving diagnosis and treatment strategies for NF.

Material and Methods

A prospective descriptive study was conducted to examine NF in patients with DM. All NF cases confirmed surgically were identified in a tertiary care hospital using the International Classification of Diseases-9 code for NF (728.86). NF was diagnosed based on intraoperative findings and histopathological confirmation. In surgery, NF was characterized by the inability of the normally adherent fascia to resist blunt dissection, along with necrotic fascia and the presence of purulent, foul-smelling discharge. Diabetes mellitus was diagnosed following the 2010 American Diabetes Association guidelines [8], which relied on patient clinical history and prior laboratory data. The study population consisted of 91 adults with Type II DM and extremity NF. Only patients with both Type II DM and a confirmed NF diagnosis were included, while those without Type II DM were excluded from the study.

Deep vein thrombosis and peripheral vascular disease were excluded in all cases. Each patient admitted with NF underwent a comprehensive evaluation, including medical history, physical examination, and chart review. No additional tests or procedures beyond routine care were performed, and all study protocols complied with the principles of the 1975 Helsinki Declaration, revised in 2000 [9].

The Wagner classification system [10] was used to assess wound severity. This system categorizes wounds into six grades: grade 0, no open lesions; grade 1, full-thickness skin loss; grade 2, ulcers penetrating the skin, fat, and ligaments but sparing the bone; grade 3, deeper tissue involvement such as tendinitis, osteomyelitis, or abscess; grade 4, localized necrosis in toes or the forefoot; and grade 5, extensive foot necrosis.

Results

Table 1 presents the demographic variables of the study participants. The age distribution reveals that most patients were between 46 and 55 years (39.56%). Regarding gender, the majority were male (79.12%), while females constituted 20.88% of the total sample of 91 participants.

Table 1: Demographic variables of study participants

Variable	n	%
Age Group		
<45 years	21	23.08
46–55 years	36	39.56
56–65 years	22	24.18
>65 years	12	13.19
Total	91	100.00
Gender		
Male	72	79.12
Female	19	20.88
Total	91	100.00

Figure 1 displays the distribution of controlled and uncontrolled diabetes among the study participants. Out of 91 participants, 54 individuals (59.34%) had uncontrolled diabetes, while 37 individuals (40.66%) had their diabetes under control. This indicates a higher prevalence of uncontrolled diabetes within the study population, emphasizing the importance of managing blood glucose levels in preventing complications, especially in patients with necrotizing fasciitis.

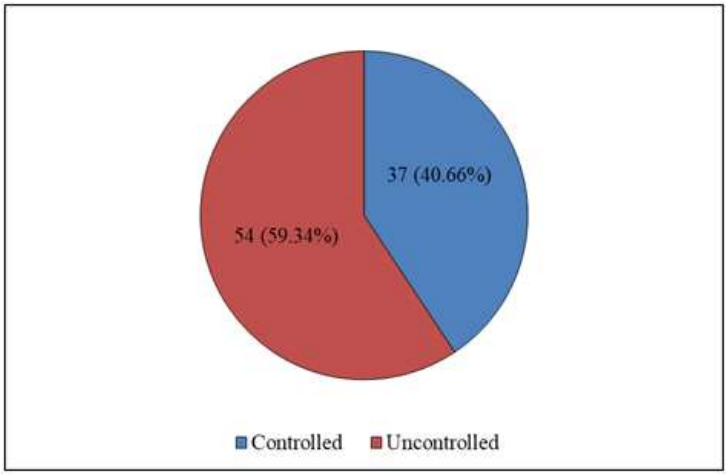

Figure 1: Control status of DM in study participants

Table 2 highlights the clinical features of NF in diabetic patients. On initial presentation, the majority of patients had a Wagner score of 0 (57.14%), indicating minimal foot involvement. Routine foot inspection was reported in 38.46% of patients, while 63.74% had lesions due to inadequate foot care. Notably, necrotic patches of skin and cellulitis were observed in 54.95% of participants. All patients required an initial debridement.

Table 2: Clinical Presentation of NF Patients in DM

Parameter	N	%
Wagner Score on Presentation		
0	52	57.14
1	18	19.78
2	9	9.89
3	12	13.19
Routine Foot Inspection done	35	38.46
Lesion Rate in Inadequate Foot Care	58	63.74
Necrotic patches of skin and cellulitis	50	54.95
Patients needing First Debridement	91	100.00
Patients needing Redebridement	25	27.47
Patients needing Below-Knee Amputation	3	3.30

Table 3 compares the age and duration of hospital stay between patients with controlled and uncontrolled diabetes. The average age in the controlled diabetes group was significantly lower (52.35 ± 7.07 years) compared to the uncontrolled diabetes group (57.56 ± 11.13 years). However, no significant difference was observed in the duration of hospital stay between the two groups.

Table 3: Age and Duration of Hospital Stay in Controlled vs Uncontrolled DM

Parameter	Controlled DM (n=37)	Uncontrolled DM (n=54)	P Value
Age (in years)	52.35 ± 7.07	57.56 ± 11.13	<0.05
Hospital Stay (in days)	17.35 ± 9.45	19.58 ± 9.05	0.26

Discussion

Necrotizing fasciitis (NF) is a rapidly progressing inflammatory condition that results in the necrosis of subcutaneous tissues. The speed at which the disease spreads is directly related to the thickness of the subcutaneous layer, as NF travels along the fascial plane. The acute phase of NF generally lasts for several days [11,12]. Diabetes mellitus (DM) is the most commonly associated comorbidity with NF, with diabetics accounting for up to 44.5% of cases. Diabetic patients, particularly those with polymicrobial infections, often experience worse outcomes compared to non-diabetics, including a higher rate of amputations. Diabetics with compromised immune systems are more vulnerable to this infection [3,13].

A prospective study was conducted in a tertiary care center, focusing on cases of NF in patients with DM. Participants were evaluated for their diabetic control status, and the severity of their wounds was measured using Wagner's score. Many patients presented with pre-ulcerative lesions, and some had healed ulcers complicated by bony deformities. Inadequate foot care was a common issue

among participants, with higher Wagner's scores observed in those not adhering to proper foot care practices.

Aggressive surgical debridement remains the cornerstone of treatment for NF, particularly in cases of Fournier's gangrene [14]. This study identified a significant difference in the frequency of surgical debridements between individuals with controlled and uncontrolled diabetes. Research by Chawla et al. showed that survivors underwent an average of 2.3 debridements, while non-survivors required 5.2 debridements [14]. Similarly, Nisbet and Thompson [15] found that diabetic patients with poor glucose control underwent more debridements. Additionally, several studies have indicated that extended hospital stays are more common in survivors, as they are deemed fit to undergo further surgical procedures. In the current study, the average hospital stay was longer for patients with uncontrolled DM. Similar results were reported by Subbaraya S et al. [16].

Conclusion

Recent research has highlighted that necrotizing fasciitis (NF) is a particularly severe condition in patients with diabetes mellitus (DM). Poorly controlled diabetes is associated with a worse prognosis for NF. Consequently, increased awareness of its atypical presentation, alongside a heightened level of suspicion and direct fascial examination, can facilitate earlier diagnosis and more effective treatment, ultimately improving outcomes, particularly in diabetic individuals.

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