

Original Research Article

Lower limb cellulitis in non-diabetic patients: a prospective study

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ABSTRACT

Background: Lower limbs are commonly involved in cellulitis as they are more susceptible to injuries. This study analyzes the various causes and risk factors for cellulitis in the non-diabetics.

Methods: This prospective study was conducted at the Department of General Surgery, Government Thanjavur Medical College and included 100 non-diabetic patients with lower limb cellulitis. The severity of cellulitis was graded as per the CREST guidelines. Demographics, risk factors, grades, management and treatment outcomes were recorded and analyzed.

Results: Cellulitis was more common in females (58%) and old age group (37%). It was more unilateral (86%) and resulted more from post bite wounds (21%). 76% had culture-positive wound infections. Severe grades of cellulitis needed surgical intervention and many patients needed skin grafting.

Conclusions: Nondiabetic patients with lower limb cellulitis can also result in severe morbid consequences but in the absence of co-morbid illness, they usually recover with minimal residual disabilities. Nondiabetic elderly patients have to be motivated to take care of their feet as the diabetic patients, as neglect of minor trauma or bites can lead to morbid illness necessitating major treatment like skin grafting.

Keywords: Cellulitis, CREST guidelines, Lower limb, Non-diabetic

INTRODUCTION

Cellulitis is a condition which is characterized by inflammation of the connective tissue of the skin with severe involvement of dermal and subcutaneous layers.¹ It is principally a bacterial infection, the organism can be either the normal skin flora or an exogenous one.² It involves mostly the skin which is more prone to the breaks, cracks, blisters, ulcerations, cuts, bite wounds or hospital-related injuries like surgical wounds or the intravenous cannulae.³ Lower limbs are the most commonly involved sites as the skin over there is much susceptible to the injuries mentioned.⁴ As commonly known, diabetics are the most susceptible population for the lower limb cellulitis primarily because of the fact they

have more incidence of foot ulcers (due to the neuropathy and vasculopathy which ensues in the form of sensory loss and poor distal circulation) and also because they are immunocompromised.⁵ Poor glycemic control aids the growth of organisms in the ulcers which develop and eventually results up in cellulitis. Yet, there is a significant section of the population who are non-diabetics and also more prone to the development of lower limb cellulitis and its complications.⁶ This group is gaining attention now as the number of patients affected shows an increasing trend. The management of this group differs from the diabetics in such a way that effect of altered body metabolism, glycemic control, and sensory compromise is negotiated.⁷ Early cellulitis in the Non-diabetics can be managed in out-patient unit with oral

antibiotics, analgesics and treating the primary cause. But cellulitis of higher grades, with its complications like blisters, myositis, and fasciitis needs hospital admission, parenteral antibiotics, and surgical management.⁸

METHODS

This prospective case series study includes 100 non-diabetic patients, who got admitted for lower limb cellulitis and its complications, at the Department of General Surgery, Thanjavur Medical College. The study period is between November 2010 and August 2012.

Patients who had completed 18 years and those willing to give informed consent were included in the study. Patient demographics and general condition were recorded in the preformed questionnaire. All patients had relevant blood investigations along with the bacterial culture of the wounds. Doppler studies and X-rays were performed where necessary and patients were managed according to the severity. The severity of limb involvement was graded as per the CREST guidelines for cellulitis.⁹ Class I patients will not have signs of systemic toxicity or any comorbidities and are routinely treated with oral antibiotics in the medical or surgical outpatient departments. Class II patients either have a systemic illness, in the form of fever due to the infective focus or have some co-morbidity like a Peripheral vascular disease, chronic venous insufficiency or morbid obesity which can affect the resolution of infection. Class III patients have either significant systemic problems or limb-threatening infection due to vascular compromise and the patient presents with edema, blistering and devitalizing changes in the site or with unstable comorbidities. Class IV patients include those with severe life-threatening infections like necrotizing fasciitis or cellulitis associated with sepsis syndrome. Cellulitis occurring in the immunocompromised individuals is also included under this category.

Statistical analysis

Results were computed and analyzed with SPSS software version 17.

RESULTS

Post-bite cellulitis was responsible for most cases of cellulitis in the study group 21% (n = 21), followed by traumatic ulcers which were infected and web space infections/intertrigo (17%) (n = 17) It was also noted that as the age increases, the severity of cellulitis (grade III and IV) increased. It was (n = 8/14) in 21-30 age group (58%) and (n = 31/37) in 51-60 age group (84%). Cellulitis was more severe in females with 81% (n = 47/58) presenting with grade III or IV cellulitis. Post-bite cellulitis was more common in females (n = 15/58) (25%) followed by webspace infections (n = 10/58) (16%). In males, trauma was the most common cause (n = 11/42)

(27%) followed by web space infections and chronic kidney disease (n = 7/42) (17%).

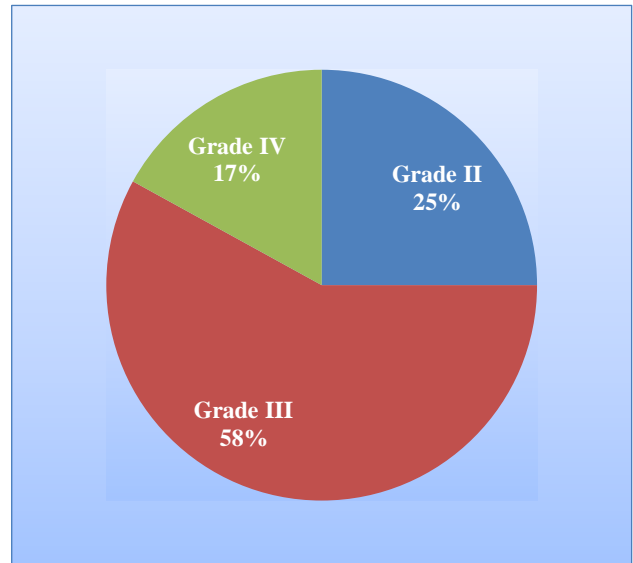


Figure 1: Distribution of grading in lower limb cellulitis among non-diabetics.

In the present study group, 59% of the patients (n = 59) had an infection with single microbe by culture studies, while 24 patients showed no growth in culture. Most common organism isolated was *Streptococcus* species (43%) followed by *Staphylococcus* species (31%). Microbes were most sensitive to Piperacillin-Tazobactam (61%) followed by Imipenam (58%). No bone involvement was seen in any of the patients.

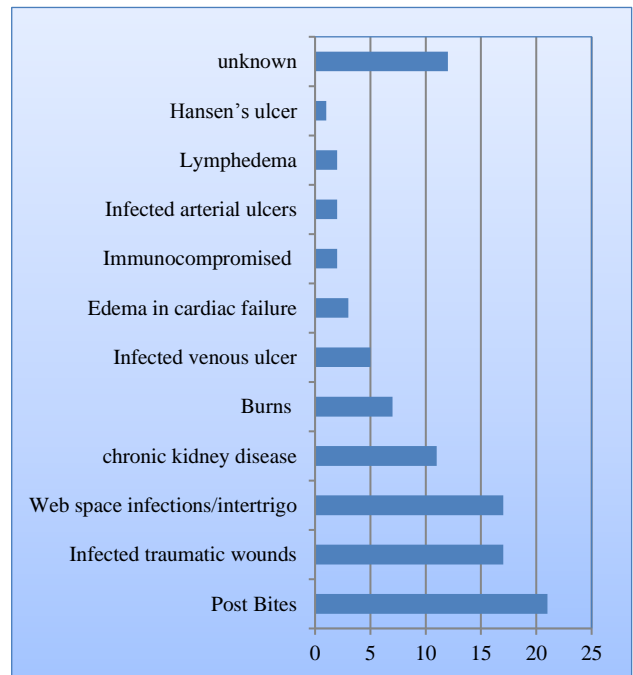


Figure 2: Distribution of causes of lower limb cellulitis in non-diabetics.

It was observed that 76% of the patients in the study group required surgical debridement (n = 76), 45 of them required decompression of some muscular compartment by means of fasciotomy, while 4% of individuals required amputation (Figure 3).

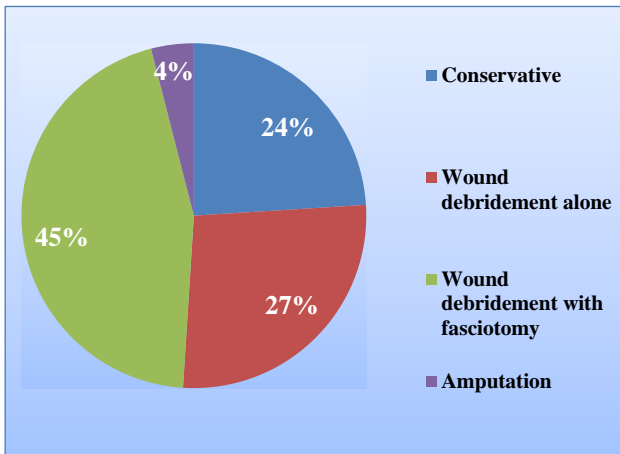


Figure 3: Distribution of management outcomes in non-diabetic patients with lower limb cellulitis.

Almost all the patients managed conservatively (n = 24) had an uneventful recovery, and among those who needed surgical intervention, 66% (n = 66) had residual wound that needed further management, 3 patients had residual disability (candidates for amputation) and 6 patients died during treatment, worsened by their co-morbid illness (Figure 4).

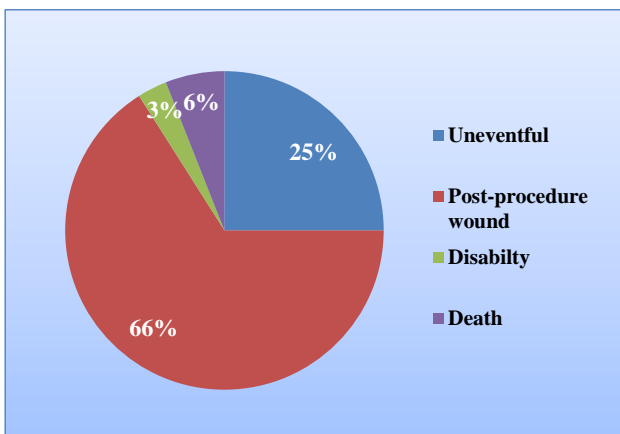


Figure 4: Distribution of outcome in non-diabetic patients with lower limb cellulitis.

It was observed that 73% of the resultant wounds were managed with split skin grafting (n = 48), 17% of the wounds healed by secondary intention (n = 11) and the remaining 10% (n = 7), had delayed primary closure.

DISCUSSION

Cellulitis is more common in patients with Diabetes and its co-morbidities. But many non-diabetics have lower

limb cellulitis who have a better prognosis than diabetic patients. But this group is often overlooked and studies on cellulitis are sparse in the Indian setup. This study was instigated to find out the causes of lower limb cellulitis in nondiabetics and to study the pattern of outcomes while managing these patients. Most of the patients were in the elder age group which showed that as the age increases, the incidence of cellulitis increases. This result was similar to the result obtained in the study by Rongey C et al who had a mean age of 48.8 years in the cellulitis group but lower than the results obtained by Sigridur et al (66.7 years).^{10,11} It was also found that as the age of the patient increases, the severity of cellulitis also increases. Females were more affected in our study group 58% while males were more affected in the studies by Rongey C et al and Sigridur et al.^{10,11}

In the present study, we have observed that 86% of the patients had unilateral lower limb involvement and 14% of the patients had bilateral lower limb involvement, but according to Smith et al the incidence of bilateral lower limb involvement is extremely rare.¹² Patients complicated with edema due to chronic kidney disease or cardiac failure and patients with a history of barefoot walking, resulting in web space infections, were candidates for bilateral limb involvement. Microbial growth (*Staphylococcus* and *Streptococcus* species) was more commonly isolated in the present study which was similar to the results obtained by Sigridur et al.^{11,13} This is in contrast to Shankar et al and Gadepalli et al whose study of cellulitis in diabetics showed that gram-negative organisms were more prevalent.^{14,15} Piperacillin-Tazobactam was the most effective antibiotic in the present study but first-generation cephalosporins were frequently used in the study by Rongey C et al.¹⁰ Traumatic amputation or arterial ulcer leading to amputation was not included in the study group. Cellulitis superimposed on lower limb edema resulting from chronic kidney disease, lymphedema, and heart failure constituted a considerable proportion of the present study. Superadded fungal infection can be a cause of cellulitis in intertriginous infections and where the bacterial culture was negative. This is supported by the study by Roujeau et al who showed that onychomycosis and dermatophyte infection in the web space can be a risk factor for cellulitis.¹⁶ Also, in about 12 patients the exact cause responsible for the cellulitis was unknown which shows that patients had a very trivial injury, or the organisms were not cultivable by routine aerobic cultures.

Nondiabetic patients with lower limb cellulitis can also result in severe morbid consequences but in the absence of co-morbid illness, they usually recover with minimal residual disabilities. Nondiabetic elderly patients have to be motivated to take care of their feet as the diabetic patients, as neglect of minor trauma or bites can lead to morbid illness necessitating major treatment like skin grafting. Recognition of cellulitis in early stages can minimize hospital admission and expenditure.

CONCLUSION

Nondiabetic patients with lower limb cellulitis can also result in severe morbid consequences but in the absence of co-morbid illness, they usually recover with minimal residual disabilities. Nondiabetic elderly patients have to be motivated to take care of their feet as the diabetic patients, as neglect of minor trauma or bites can lead to morbid illness necessitating major treatment like skin grafting.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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