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Original research article

The investigation of cellulitis of the leg with subcutaneous pressure and its relationship to management

Dr. Sujatha Dasari
MS General Surgery, Assistant. Professor, Department of General Surgery, Kakatiya Medical College, Warangal, Telangana, India

Corresponding Author:
Dr. Sujatha Dasari

Abstract

Introduction: Studying how subcutaneous pressure affects the need for amputation in cases of cellulitis of the leg. Cellulitis refers to an infection of the skin and the tissues just under it. Subcutaneous edoema is a result of an inflammatory process that also produces redness, heat, and discomfort.

Methods: Twenty individuals with unilateral cellulitis of the legs participated in this observational study. Subcutaneous pressure was evaluated in both healthy and cellulitic limbs of subjects who were voluntarily sampled. Patients with lower-extremity cellulitis of the knee who sought care at the surge or the Department of General Surgery, Kakatiya Medical College, Warangal, Telangana, India, and were admitted to the surgery wards between the December 2021 to November 2022 were included in the research.

Results: Patients who had their cellulitic legs treated conservatively fared worse than those who had surgery. The study participants' signs and symptoms were identical to those previously documented in the medical literature. The symptoms were swelling, redness, heat and pain.

Conclusion: This study provides more evidence that individuals with cellulitic leg have elevated subcutaneous pressure. Incidences of local complications increase in tandem with increases in subcutaneous pressure. Surgery was performed on individuals with excessive subcutaneous pressure the day they were hospitalised or the day after conservative therapy had failed.

Keywords: Subcutaneous pressure, cellulitis, relationship to management

Introduction

Infected skin and subcutaneous tissue are what constitute cellulitis. As fluid builds up under the skin due to an inflammatory response, the afflicted area becomes red, hot, and painful. Although bacterial infections are the most common cause of cellulitis, fungal infections can also result in the condition [1, 2]. Both the elderly and the middle-aged are at increased risk for developing cellulitis. The Western world sees a skewed incidence among males. Cellulitis most often affects the legs of adults. Long hospital stays and chronic disability are frequent outcomes of lower limb cellulitis [3]. A significant percentage of people who had cellulitis in their lower extremities ended up in the hospital. The average length of hospitalisation for lower limb cellulitis was 10 days. Recurrence of cellulitis of the leg occurs in 29% of patients within 3 years and other long-term consequences include chronic edoema and recurrent leg ulceration. Most cases of cellulitis are caused by skin commensals such streptococci and staphylococci [4, 5].

Infections can occur everywhere there is a breach in the skin's protective barrier. Infections are made worse by co-existing conditions including diabetes, renal failure, lymphedema, and other abnormalities of the immune system. Medication and rest with the afflicted limb elevated are usually effective treatments for cellulitis [6]. Surgical intervention is necessary in cases of abscesses, necrotizing soft tissue infections and severe sepsis with multi-organ involvement. Patients with lower limb cellulitis have limited access to high-quality, peer-reviewed literature for treatment. This is a major area of healthcare concern [7, 8] since chronic sickness often prevents patients from returning to work, causing financial hardship.

Recommendations for the management of cellulitis in the lower extremities are not yet available. It varies in real-world healthcare settings according on the level of training of the accompanying physician or surgeon [9]. To assess subcutaneous pressure in patients with cellulitis of the leg. To establish a link between the use of subcutaneous pressure and the requirement for surgical intervention in cases of leg cellulitis. This research aims, in part, to evaluate the differences between cellulitic and healthy legs with regards to subcutaneous pressure. Subcutaneous pressure should be monitored following surgical

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removal of cellulitis from the leg.

Materials and Methods

In this study, we provide a high-level overview of the data sources and research techniques we employed. Patients with cellulitis of the lower limb, affecting one side, below the knee, who visited the surgery outpatient clinic or Department of General Surgery, Kakatiya Medical College, Warangal, Telangana, India, and were admitted to the surgery wards between the December 2021 to November 2022 were included in this study.

Inclusion criteria

- Cellulitis exclusively affecting one leg.
- Adults older than 18 years old, unilateral.

Exclusion criteria

- Bilateral cellulitis and pedal edema
- Second, necrotizing fasciitis
- A parasitic leg
- Deep vein thrombosis
- Tibia and fibula fracture
- Cellulitis patient who has already received an antibiotic course
- Diabetic foot with skin necrosis and ulceration

As early as the first day of hospitalisation, the patient gave the researcher their consent after being fully apprised of the risks involved. The swelling of the cellulitic leg was measured by taking its circumference. A black skin marking was used to denote the anteromedial, lateral, medial, and lateral aspects of a body. It was calculated from the tibial tuberosity as to how far away the target was. We waited 10 seconds after needle insertion before administering the 0.5 ml of saline. It was measured and found that the pressure was stable. The subcutaneous pressure was assessed in four different spots on the cellulitic leg. The proforma contained both the BP readings and patient data. No one mentioned the pressure measurement to the surgical surgeon. Based on the patient's condition, the treating surgeon decided if antibiotics and conservative treatment were necessary.

Statistical analysis

To test the hypothesis of equal variance among independent samples, we utilized the t-test, the Whitney U-test, and Levene's test. The statistical significance of the difference in subcutaneous pressure between two places on the cellulitic leg was determined using a paired t test. To investigate the significance of the pressure difference in relation to the distance from the tibial tuberosity, the Mann-Whitney U test, a nonparametric variation of the sample t-test, was utilized. Levene's test of equality of variance was used to rule out any differences in variability between conservatively treated and surgical patients. We discovered a statistically significant difference in subcutaneous pressure between the antibiotics and surgery groups using an independent sample t-test.

Results

20 people made up the sample size that was initially estimated for the study. Twenty patients were enrolled in the trial throughout the course of the two years. The study's patient population had a mean age of 59.

Table 1: Patient age distribution in the study group

Age	20-30 years	30-40 years	40-50 years	50-60 years	60-70 years	70-90 years
Number of patients	2	2	2	5	5	4

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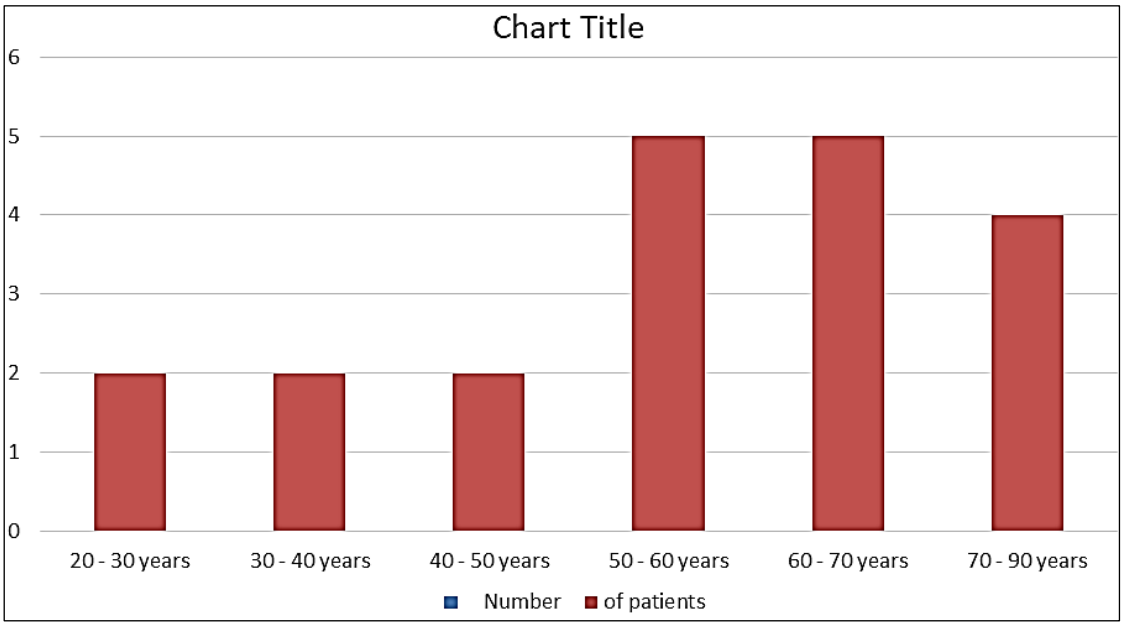

Fig 1: Patient age distribution in the study group

In accordance with the findings of the previous research, the majority of the patients were above the age of sixty, as indicated in figure 1.

Clinical presentations

Pain, edoema, and fever were the most often observed clinical manifestations. Fever was also evident among the study group, as did pain and edoema (Fig. The vast majority of these individuals also suffered from other medical conditions.

Table 2: Symptom distribution in the study group

Symptoms	Pain	Swelling	Fever
No of patients	10	5	5

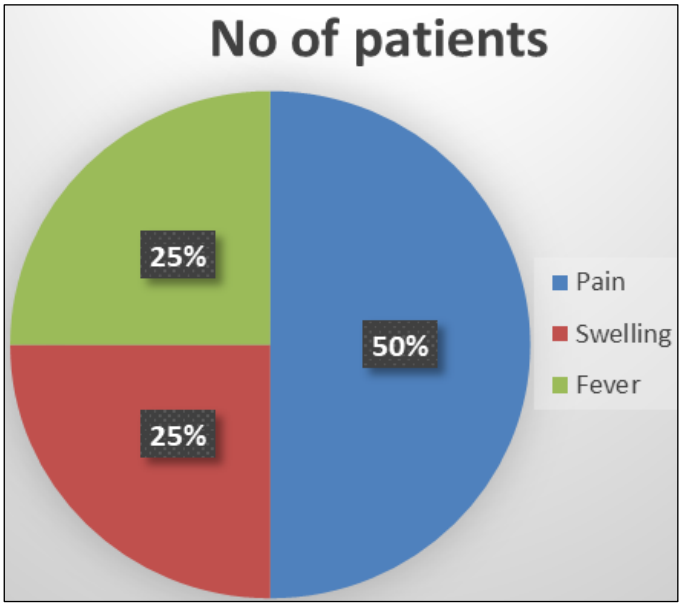

Fig 2: Symptom distribution in the study group

The majority of the patients were experiencing edoema and 25% of them were also experiencing pain and fever correspondingly, as shown in Figure 2.

Table 3: Comorbid condition distribution in the research group

Comorbid Conditions	Diabetes mellitus	Hypertension	Chronic renal disease
No of patients	12	6	2

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We discovered that the majority of patients with cellulitis of the leg had medical comorbidities, as previously mentioned in the literature. The figure shows that diabetes affected the majority of the participants in the study group. Diabetes mellitus was discovered in a subset of the research sample.

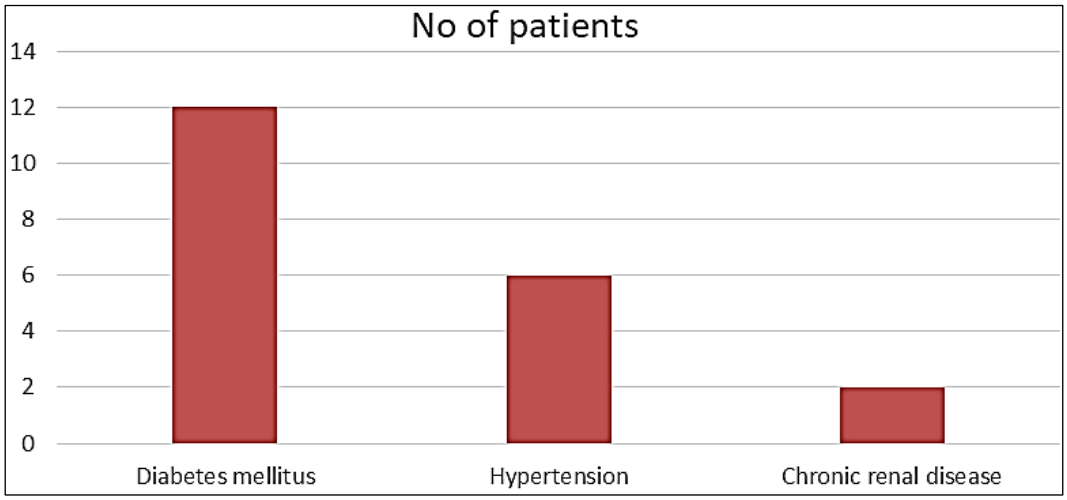

Fig 3: Comorbid condition distribution in the research group

Table 4: Documented signs at the time of admittance

Signs	Frequency	Percentage (%)
Swelling	10	50
Erythema	07	35
Warmth	02	10
Tenderness	01	05

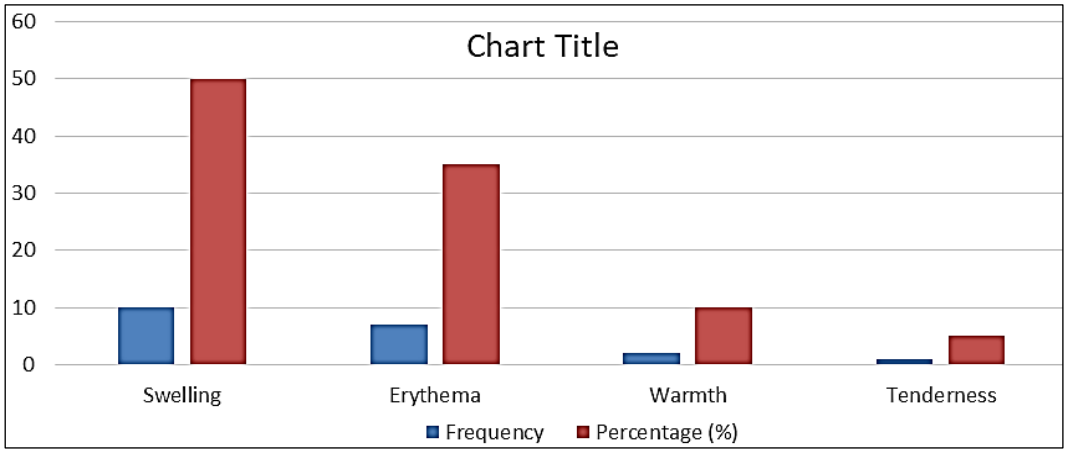

Fig 4: Documented signs at the time of admittance

All of the indications and symptoms experienced by the research group mirrored those described in the published literature. Swelling, redness, heat, and discomfort were the symptoms noted. Table 4 demonstrates that only some participants had erythema, although all participants reported feeling swollen, heated, and sensitive. Clinical indications such as symptoms and signs were utilised to evaluate progress made throughout therapy. Subcutaneous pressure was highest in the site of cellulitis on the affected leg.

Discussion

Antibiotics, anti-inflammatory drugs and methods to reduce swelling (anti-edema) are all part of the conservative care of cellulitis now recommended by recommendations. Most cases of systemic sepsis or necrotizing soft tissue infection require surgical intervention due to the severity of the infection. In cases of severe cellulitis with skin alterations, the decision to do surgery is taken on the basis of the treating surgeon's subjective evaluation. Cellulitis of the leg is one of the few surgical conditions for which there are no agreed-upon criteria for treatment.

The primary motivation behind the effort to measure subcutaneous pressure and find a correlation to surgical intervention is the need to establish diagnostic criteria for the operation. Subcutaneous pressure in the cellulitic leg was shown to be considerably higher in individuals who underwent surgical

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intervention compared to those who were treated conservatively in this research [10]. If subcutaneous pressure is taken upon admission, it can help determine the best course of therapy. Comparing the accuracy of arterial manometers, Whitesides apparatuses, and Stryker pressure monitors in the diagnosis of compartment syndrome, Boody *et al*. As the study found, the straight needle has a propensity to overestimate the pressure, whereas the side port needle and slit catheter were more accurate. Pressure in a compartment may be measured precisely using an arterial manometer or a Stryker device. As a result, we utilised a Stryker intra compartmental pressure monitor connected to an 18G side port needle to assess the pressure beneath the skin [11-14].

An additional study by Hsiao *et al*. reveals that infections with Aeromonas and vibrio species, as well as the presence of malignancy, hypotension and the occurrence of band form WBC count greater than 10%, are independent predictors of mortality, whereas infections with streptococci and staphylococci were not. Pain and soreness throughout the affected skin and underlying muscle is the defining symptom of necrotizing fasciitis, as stated by Olafsson *et al*. The pain is so severe that a ruptured muscle could be the only reasonable explanation. It's possible that your perception of pain is disproportionate to the underlying medical evidence [15-17].

One further research by McHenry *et al*. found that the average time between admission and surgery for patients who did not survive necrotizing infection of the soft tissues was around 90 hours, but for those who did survive, this period was only about 25 hours. The results show that the death rate dropped dramatically when early intervention and infection cleanup began. Patients admitted with elevated subcutaneous pressure who were first managed conservatively ultimately required surgical intervention [18, 19]. An early surgical intervention in this patient population can prevent the development of an ascending infection with systemic sepsis, significant debridement owing to a developing necrotizing soft tissue infection and the need for a longer hospital stay and course of antibiotics.

Conclusion

This research confirms that people with cellulitic leg had higher than average subcutaneous pressure. As subcutaneous pressure rises, so do the risks of developing local problems. Once conservative treatment had failed, patients with high subcutaneous pressure were given surgery the same day they were admitted or the following day. Therefore, higher subcutaneous pressure in cellulitis of the leg correlates with surgical intervention.

Conflict of interest: None.

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