

Prospective Observational Study on Therapeutic Management of Cellulitis in Tertiary Care Hospital

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Abstract: Importance: Cellulitis is an infection of the deep dermis and subcutaneous tissue, presenting with expanding erythema, warmth, tenderness, and swelling. Methodology: A prospective observational study on therapeutic management of complicated and uncomplicated cellulites was done on 30 IN patients with subsequent follow up for 1 month. The duration of stay of uncomplicated patients in hospital was average 20 days whereas complicated patients was 1 month 18 days. 10% of uncomplicated patients were on single antibiotic along with supportive therapy and for complicated cellulites patients 100% were on combinational antibiotic therapy. Out of 13 complicated cellulites patients 4 patients were suffering with recurrent cellulites infections. Culture sensitivity was done to all complicated patients but delay in culture sensitivity test prolonged 2 patients stay in hospital, treatment failure, financial burden of patient, and 1 patient underwent amputation. The most common isolated micro-organisms for complicated cellulites were to be *E.coli*, *klebsilla*, *p.aerogenosa*. Conclusion: The efficacy of antibiotic therapy to uncomplicated patients were 90% and complicated patients were 60%. Early detection of sensitive antibiotics among individual patients with early culture sensitivity test orders may lead to right choice of antibiotics. Proper therapeutic management and early positive outcomes along with decreased financial burden on patient.

Keywords: Uncomplicated cellulites, complicated cellulitis, Combinational antibiotic therapy.

1. Introduction

Cellulitis is an inflammatory condition of sub-cutaneous connective tissue under the skin[1] or we can say cellulitis is an infection of the deep dermis and subcutaneous tissue, presenting with expanding erythema, warmth, tenderness, and swelling.[2]

Bacteria involved most commonly are *Streptococci* and *Staphylococci* in simple cellulites.[1] When they get beneath the skin tissue through possible cuts or bruises, play a big role in the pathogenesis of this condition[3](in our study 8 cellulites patients out of 30 had trauma)

If untreated, cellulitis may be highly dangerous. Managing cellulitis with integrative and complementary medicine involves three areas of focus: Anti-inflammatory and antibacterial approaches; rejuvenating factors; and enhancing immunity.[4]

An apparent cellulitis with ecchymoses, bullae, any dermal gangrene, extensive edema suggests an under-lying necrotizing infection and mandates operative exploration to confirm the diagnosis and definitively treat the infection.

Necrotizing soft tissue infections occur predominantly in patients predisposed by immune compromise, diabetes mellitus or vascular insufficiency and mortality from necrotizing soft tissue infections can be reduced by expeditious diagnosis and adequate early debridement.[5]

Here we intend to study the treatment efficacy of various antibiotics used in complicated and uncomplicated cellulites and to find out the factors which holding these patients to stay in hospital for prolonged time than required to stay.

Uncomplicated cellulites means simple cellulitis with no comorbid conditions, complicated cellulites means cellulitis

with comorbid conditions like diabetes, HTN, DVT, cellulites turned to gangrene or necrotizing fasciitis.[2]

2. Literature Survey

According to standard treatment guidelines of India (2015 4th edition) cellulites treatment as follows;

Patient may be treated depending on severity and presence(A) or absence(B) of systemic features, i.e. high grade fever and symptoms of endotoxic shock.

REGIMEN A;

Cap. Cloxacillin 500mg 6 hrly for 7 days OR Cap. Cephalexin 500mg 6 hourly for 7 days.

REGIMEN B;

INJ. Amoxicillin 500mg plus clavulanic acid 125 mg tid for 7 to 10 days.

If Localized Cellulitis;

Cap. amoxicillin 500mg orally 8 hourly. OR cap. Cephalexin 500mg orally 6 hourly. Antibiotic should be given for minimum 10 to 14 days without replacing it with other antibiotic to see the response.

If patient come with deep abscess or necrotizing fasciitis or gangrene do debridement and dressing as soon as possible if delayed may have to do amputation. If patient is diagnosed with the cellulites and unbearable pain in affected area then do fasciotomy when compartment syndrome is confirmed.

Non pharmacological therapy; Counselling

Where a leg is affected, it is important to keep it elevated for comfort and to relieve edema. A bed cradle may be used to keep bed sheets off sore legs.

Drink adequate fluids to prevent dehydration

Seek immediate advice if antibiotics are not tolerated, if the cellulitis becomes worse, or if systemic symptoms develop or worsen (such as high temperature or nausea and vomiting)

Avoid compression garments

Testing for meticillin-resistant *S. aureus* is important in patients who have recently been in hospital, who have had antibiotic treatment, who fail to respond to initial treatment or in whom the infection rapidly progresses.[6]

People with poor circulation in the legs, for instance, often develop scaly redness on the shins and ankles; this is called "stasis dermatitis" and is often mistaken for the bacterial infection of **cellulitis**. [3]

The following may result if cellulitis isn't treated or treatment doesn't work:

- 1) Blood infection (sepsis)
- 2) Bone infection (osteomyelitis)
- 3) Inflammation of the lymph vessels (lymphangitis)
- 4) Inflammation of the heart (endocarditis)
- 5) Meningitis.
- 6) Shock.
- 7) Tissue death (gangrene)[7, 6].

Bacteria from the skin **can** spread **into** a person's bones, a complication of **cellulitis** called **osteomyelitis** [6,11]

Purpose

The main objective which drove us to do this small study on therapeutic management of cellulitis was to find the reasons, which forced cellulitis patients for prolonged stay in hospital, as day by day in tertiary care hospital there is increasing IP admissions of these patients but their discharge rate from hospital is very slow.

3. Materials and Methods

It is a prospective observational cohort study done by selecting patients randomly in a tertiary care hospital with a follow up of 1 month by means of wireless telecommunication network.

Inclusion Criteria

Male and female patients of all age groups except pediatric population, and only patients with comorbid conditions of diabetes and Hypertension.

Exclusion Criteria

Pediatric age group, pregnant ladies, comorbid conditioned patients other than diabetes and hypertension.

4. Results and Discussion

Gender	AGE					
	<=29	30-39	40-49	50-59	60-69	>=70
Male	1%	4%	30%	15%	35%	15%
Female	10%	1%	10%	10%	40%	30%

Therefore Males ≥ 40 years are at higher risk of developing cellulitis irrespective of comorbidity of disease.

Females irrespective of comorbidity conditions will have higher chance of developing cellulitis at ≤ 60 years.

Uncomplicated Cellulites		
Hospital Stay	< 1 Month	More Than 1 Month
Number of Pts (in %)	97%	3%

Mean stay in hospital for uncomplicated cellulites patients in 20 days. (But according to other studies it should be ≤ 15 days)

Physician's actual therapeutic plan of cellulites in practice in tertiary care hospital;

96% of patients in IP are given combinational antibiotics whether simple or complicated cellulites, initially 3 antibiotic combination are given, most commonly given antibiotics combinations are;

- 1) metronidazole+ clavulanic acid + amoxicillin,
- 2) amoxicillin+clavulanic acid + clindamycin,
- 3) ampicillin+sulbactam + metronidazole

If patient is not recovering even after 10 days then physician orders for culture sensitivity then according to microorganism isolated and antibiotic sensitivity antibiotics combination is made.

But if patient comes with pus immediate culture sensitivity is ordered and debridement is done.

If pus is not there then along with combinational antibiotic physician prescribes complementary medicines which involves three areas of focus: Anti-inflammatory and antibacterial approaches; rejuvenating factors; and so enhancing immunity. The signs of cellulites include redness, warmth, swelling, tenderness and pain in the involved tissue[6]

But in practice if therapy for simple cellulites fails the most common complication which occurs is gangrene, out of 17 uncomplicated cellulites patients 1 patient suffered gangrene after 2nd relapse. Several studies suggest that a high proportion of cellulitis sufferers develop recurrent episodes, especially those with untreated predisposing factors.[8]

Venous insufficiency has been reported to be the commonest predisposing factor and lymphoedema is the most important risk factor in the development of recurrent cellulitis — each episode of cellulitis adds to the lymphatic damage.[9, 10, 6]

- 1) In our study 3% recurrent cellulitis patient showed formation of necrotizing fasciitis, mostly after 1st relapse of cellulites.
- 2) In our study out of 30 patients 8 underwent fasciotomy and 10 underwent debridement, 2 underwent both fasciotomy and debridement.

In our study we found following factors which is prolonging patient stay in tertiary care hospital;

- 1) Bacteria from the skin **can** spread **into** a person's bones, a complication of **cellulitis** called **osteomyelitis** [6,11]

out of 13 complicated cellulites patients ,in 6 patients cellulites turned into ulcer but only 3 patients were ordered to for x ray and out those 3 patients 1 patient was found to be suffering with osteomyelites. Out of 13 complicated cellulites patients only 5 underwent doppler test to find risk of DVT and only in which 2 people showed dvt positive. So, these errors in diagnosing can be considered one of the factors of improper treatment of cellulites which is causing increased stay of cellulites patients in tertiary care hospitals.

- 2) In our study we found 8% patients having uncomplicated cellulites stayed for longer then should be because of lack of recovery, still culture sensitivity was not done. Either delay in culture sensitivity test or no culture sensitivity contributes a lot to therapeutical failure and prolonged hospital stay of patient.
- 3) In 4 patients with severe infection dosing error was found.
- 4) Antibiotic regimen selection was not proper due to delayed or no culture sensitivity tests done when needed in 2 complicated cellulitis patients
- 5) Quick antibiotics replacement and giving no time for antibiotic to act was seen in 2 complicated cellulitis patients.
- 6) Drug duplication was found in 1 patient.

Other things which came into light while studying on cellulites patients therapeutic management was;

- 1) Out of total cellulitis patients who are admitted as IP , 7% cellulitis patients came to know they have DM, before that they didn't know.
- 2) In our study 10% diabetic cellulitis patients due to lack of taking certain precautions in diabetes like wearing shoes while going out etc they are at major risk of developing cellulitis and this is totally due to unawareness not negligence of patient.
- 3) 4% of uncomplicated cellulitis patients have recurrence of cellulites or ulcer formation due to non-adherence to medication, as a result reactivation of infecting organisms caused further hospital stay.

Reasons for non adherence of patient to medication in our study noted are;

- 1) Older patients doesn't listen to their care takers or physicians regarding treatment because they feel depressed by no fast recovery as they expect despite doing all what is told .so they suddenly get reluctant to what they are told to do regarding their infection to cure.
- 2) Adults in spite of medication adherence mainly males due to the pressure of doing work to support their families financially they can't make their affected limb elevated or immobilized for a long time, as a result patient recovery duration increases or doesn't recover as fast as expected by patient so their medication adherence gradually decreases.

5. Conclusion

If proper diagnosis of cellulitis is done by ruling out all other predisposing factors and checking for other complications due to cellulites time to time ,doing culture sensitivity tests when needed to individualize antibiotic combinations for effective treatment , by giving time for

antibiotics to show its action instead of switching to different antibiotics quickly, by minimizing drug duplication and drug underdosing, by maintaining patients medication adherence and non pharmacological adherence will bring down the total duration of stay of especially complicated cellulites.

6. Limitations

Sample size is small so complete reliability on results is not possible.

7. Future Scope

More studies on cellulites treatment will lead to know the efficacy of present treatment and the need of any other treatment plan in future or changes needed in present treatment plan.

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