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CELLULITIS AND IT'S MANAGEMENT - A REVIEW

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ABSTRACT

Cellulitis is a common skin and subcutaneous tissue infection. Cellulitis is an acute spreading pyrogenic inflammation of the dermis, epidermis and superficial fascia. The number of hospitalizations due to cellulitis is substantially increased in the last few years. The majority of cellulitis cases are caused by staphylococcus aureus and β-hemolytic streptococci. The diagnosis based on clinical manifestations and culture & sensitivity test help to proper treatment of cellulitis. The treatment is done by using antimicrobial agents according to CREST guidelines. In recurrent cases a prophylaxis methods are used. This review aims to help the healthcare professionals for the treatment of cellulitis using the appropriate antibiotics. It help to decrease the antibiotic resistance and better management of cellulitis patients.

KEYWORDS: Cellulitis, Risk factors, CREST guidelines, Antibiotics.

INTRODUCTION

Cellulitis is an acute infectious process that represents a serious type of skin and soft tissue infection. Cellulitis is an infection of the dermis, epidermis and superficial fascia. Most commonly caused by staphylococcus aureus, β-hemolytic streptococci. Cellulitis is an acute, pyrogenic, spreading infection. It is a common infection of the skin and subcutaneous tissue characterized by erythema, warmth, swelling and pain. The skin and soft tissue infections including cellulitis are located most frequently on the upper extremities. Acute cellulitis with mixed aerobic and anaerobic pathogens may occur in diabetics, following traumatic injuries, at site of surgical incisions to the abdomen or perineum, where host defenses have been otherwise compromised. The number of hospitalizations due to cellulitis is substantially increased in the last few years. Cellulitis is a very dangerous disease because of its tendency to spread infection through blood or lymph and deep penetration in to the structure causing severe forms of necrotizing fasciitis. Cellulitis is very serious disease that can be prevented by suitable preventive methods. Proper diagnosis and identification of preventable risk factors can reduce infection related morbidity and cost, thus improve patient management.[1]

Figure no: 1 Cellulitis of lower limb.

Etiology

Cellulitis develops as a result of bacterial entry via breaches in the skin barrier. Cellulitis is caused by different types of organisms. The majority of cases are caused by staphylococcus aureus and β- hemolytic streptococci.

Table 1: Types of bacteria causing cellulitis.[2]

Different types of cellulitis	Organism
Typical cellulitis	Streptococcus pyrogenes
Typical cellulitis- pus forming	Staphylococcus aureus
Cat or dog bite	Pasteurella multocida
Fresh water exposure	Aeromonas hydrophila
Salt water exposure	Vibrio vulnificus
Puncture wound	Pseudomonas aeurogenosa
Face, arms & upper torso infection	Hemophilus influenza

Epidemiology

The exact prevalence of the disease is uncertain it affects all racial and ethnic groups and occurs in men and women in equal chances. It is more common in middle aged individuals and older adults. The presence of foreign body such as an intravenous catheter, also increases the risk of developing cellulitis. Approximately 4 million patients were hospitalized for cellulitis between 1998 and 2006.[3]

Pathophysiology

Cellulitis is a skin and subcutaneous tissue infection that occurs when bacteria enter into the dermis, through breaks in the skin such as fissure, cut, insect or animal bite and puncture wound. Cutaneous barrier disruption can be caused by toe web space bacteria, fungal foot infections (Eg:-tinea pedis), pressure ulcer and venous leg ulcers. The bacteria entered through breaks in the skin produce hyaluronidase enzyme and it enzymatically breaks down the glycosamino glycan component of a connective tissue of dermis. It allows the organism to spread and produce the signs & symptoms of cellulitis. The histological features of cellulitis are nonspecific and include dermal edema, lymphatic dilation and diffuse, heavy neutrophil infiltration around blood vessels.[4]

Clinical Manifestation

It is typically found in the lower extremities, although it can appear on any area of the skin and is often found in the upper extremities in patients who are intravenous drug users. The signs and symptoms help to diagnose the disease and differentiate cellulitis from other skin diseases.

Table 2: Clinical presentation of cellulitis.[5]

Signs	Symptoms
Erythema	Fever
Edema	Chill
Warming	Malaise
Tenderness	Pain
Inflammation	lymphangitis
Lesions	

Risk Factors

Systemic and local risk factors are associated with the development of cellulitis. The main risk factors for developing cellulitis infection are exposed cuts, wounds or scrapes on the skin even small ones.

Risk factors for developing cellulitis

- Injury :- Any cut, fracture, burn or scrape that makes an entry point for bacteria.
- Weak immune system:- Conditions such as leukemia, diabetes and AIDS leave you more susceptible to infections by decreasing your immunity. Certain medications such as corticosteroids also can weaken the immune system.
- Skin conditions:- Skin disorders such as eczema, athlete's foot, toe – web intertrigo, varicose veins, psoriasis and shingles can cause breaks in the skin and give bacteria an entry point.
- History of cellulitis :- Patients with previous history of cellulitis are more prone to develop it again.[6]
- Chronic swelling of your arms or legs (lymphedema) :- Swollen tissue may crack, leaving your skin vulnerable to bacterial infection.[7]
- Intravenous drug use:- People who inject illegal drugs have a higher risk of developing cellulitis.
- Bites:- Bites from insects, animals or humans also lead to cellulitis.
- Obesity:- Obesity increases the risk of developing cellulitis and having recurring episodes.
- Other factors:- old age, smoking, alcohism, body posture in the job (Eg;-sitting).

Diagnosis

Several skin infections can easily be confused with cellulitis but must be recognized early to facilitate initiation of appropriate therapy.

- Clinical manifestation:- The diagnosis is done by using the physical examination is the main step of diagnosis. The differential diagnosis of the cellulitis from the other skin diseases is very important in the management.
- Blood test:- C reactive protein and white blood cell count are indicators of bacterial infections including cellulitis, but it is not a specific test for cellulitis.
- Culture and sensitivity test:- The blood cultures, cultures from skin biopsies, aspirations and wound swab cultures are used to identify the pathogens and proper antibiotic use in the therapy.[8]
- Imaging techniques:- Imaging techniques are useful when there is suspicion of an underlying abscess associated with cellulitis, necrotizing fasciitis or when diagnosis of cellulitis is uncertain. Ultra sound scanning and MRI are commonly used for diagnosis of cellulitis. It helps for the management of cellulitis by detection of occult abscess, prevention of invasive procedures and providing guidance for further imaging or consultation.[9]
- Medical history of patient:- The history of the patient is very important, if they are taking any immunosuppressant drugs and in the case of patients

with diabetes, hypertension and Deep Vein Thrombosis (DVT).

Complication

- Blood infection (septicemia)
- Bone infection (osteomyelitis)
- Inflammation of lymph vessels (lymphangitis)
- Endocarditis
- Meningitis
- Shock
- Gangrene[10]

Management

The management of cellulitis can be done by Pharmacological and Nonpharmacological methods. The effective management of cellulitis can reduce infection related morbidity and cost, thus improve patient management.

Management of locally effected area should include the following:-

- Adequate analgesia to ensure pain relief
- Monitoring and management of pyrexia
- Consider hydration by oral or intravenous route
- Recording of the site or limb effected
- Mark the extent of erythema present on admission
- Give antibiotics to decrease the inflammation

Nonpharmacological management

- Clean the wound site, if any (with debridement of dead tissue if necessary)
- Resting the affected limb or area, and elevating it
- Apply moist heat to minimize the edema and to promote suppuration & drainage
- Surgery – hypodermectomy

Pharmacological management

The use of simple clinical diagnostic criteria should be encouraged and should avoid over diagnosis and inappropriate antibiotics. Cellulitis presents as the acute and progressive on set of red, hot, swollen, painful and tender area of the skin. Oral antibiotic therapy is suitable for majority of patients.

According to CREST guidelines, the classification of patients can serve as a useful guide to the admission and treatment decisions.

Class I:- Patients have no signs of systemic toxicity, have no uncontrolled co-morbidities and can usually be managed with oral antimicrobials on an outpatient basis.

Class II:- Patients are either systemically ill or systemically well, but with co-morbidity such as peripheral vascular disease, chronic venous insufficiency or obesity, which may complicate or delay resolution of their infection.

Class III:- Patient may have a significant systemic upset such as acute confusion, tachycardia, tachypnoea, hypotension or may have unstable co-morbidities that may interfere with a response to therapy or have a limb threatening infection due to vascular compromise.

Class IV:- Patients have sepsis syndrome or severe life threatening infection such as necrotizing fasciitis.[11]

The laboratory investigations are useful in the treatment of the cellulitis. All patients have raised white cell count and elevated ESR or C-reactive protein levels like all other infections. The laboratory test that can be done in the class II and III patients are given in the table 3.

Table 3: The normal laboratory Investigations that can be done for the patients.

Class II-IV	Selected patients
FBC	Blood cultures only Class III or Class IV infections
ESR/CRP	Streptococcal serology only in refractory cases where diagnosis is in doubt.
Culture any skin break/ ulceration/ blister fluid	Skin biopsy where differential diagnosis includes other non-infectious inflammatory lesions

The drug therapy can be done according to the class of patients included

- Class I patients usually managed with oral antimicrobials in an outpatient basis
- Class II patients are suitable for an short term (up to 48 hrs) hospitalisation and discharge on outpatient parenteral antimicrobial therapy (OPAT), where this service available.
- Class III and class IV patients require hospitalisation until the infected area is clinically improving, systemic signs of infection are resolving and co-morbidities are stabilized.

Table 4: Suitable Drug Therapy for Typical Cellulitis in CREST guidelines.

	First line	Second line
Class I	Flucloxacillin 500mg qds po	Penicillin allergy: Clarithromycin 500mg bd po
Class II	Flucloxacillin 2g qds IV or Ceftriaxone 1g od IV (OPAT only)	Penicillin allergy: Clarithromycin 500mg bd IV Or Clindamycin 600mg tds IV
Class III	Flucloxacillin 2g qds IV	Penicillin allergy: Clarithromycin 500mg bd IV Or Clindamycin 900mg tds IV
Class IV	Benzylpenicillin 2.4g 2-4 hourly IV + Ciprofloxacin 400mg bd IV + Clindamycin 900mg tds IV (If allergic to penicillin use Ciprofloxacin and Clindamycin only)	

In human bite cases, cover for anaerobes as well as staphylococci and streptococci is essential and provided with co-amoxiclav monotherapy.

Most cases of uncomplicated cellulitis can be successfully treated with 1-2 weeks of therapy and complicated cases may require more prolonged therapy. The patients can be discharged from the hospital in the following conditions

- Pyrexia settling
- Co-morbidities stable
- Less intense erythema
- Falling inflammatory markers

Suitable agents consider for oral switch therapy is Flucloxacillin 500mg qds. If penicillin allergy occurs, consider Clarithromycin 500mg bd or clindamycin 300mg qds. The new drugs like dalbavancin and oritavancin are long acting antibiotics that create opportunities for early hospital discharge.

The antibacterial prophylactic therapy prevents recurrent cellulitis. The prophylaxis considering for 1-2 years in patients with predisposing conditions, who have atleast two episodes of cellulitis at the same site and the therapy include Pencillin V 250mg bd or Erythromycin 250 mg bd for up to 2 years.[12]

Patient Education

- Take all your medicine as prescribed
- Take care of your skin. Any measure that prevent injury to your skin will help to prevent cellulitis.
- Use pain relievers as needed.
- Use support stoking to prevent fluid buildup.
- Use moisturizers to keep your skin from dryness and cracking.
- Take care of your feet may, especially if you have or other condition that may increase the risk of infection.
- Topical antibiotics should not be used in the management of cellulitis.[13]

CONCLUSION

Cellulitis is a common and expensive problem worldwide. It generally responds to relatively simple and inexpensive antibiotics. The recurrent cellulitis is common and can be minimized by optimizing the risk factors such as lymph edema and skin damage. The appropriate use of antibiotics can cure the cellulitis and reduce the recurrence of the disease. Proper diagnosis and identification of preventable risk factors can reduce the infection related morbidity and cost, thus improve the patient management.

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