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EVIDENCED-BASED TREATMENT OF CELLULITIS

Cellulitis is a common bacterial infection of the skin. Patients typically experience erythema, edema, warmth, and tenderness at the site of infection. The microbiology, clinical presentation, and risk factors associated with cellulitis are used to guide empiric therapy. This issue of *CLIPs* briefly summarizes an article that reviews the pathophysiology, microbiology, clinical presentation and risk factors for cellulitis. If you need further information, please contact the Center for Healthcare Innovation and Patient Outcomes Research (CHIPOR) at (205) 726-2659.

Raff AB, Kroshinsky D. Cellulitis: a review. *JAMA*. 2016;316:335-337.

Cellulitis Overview

- Cellulitis is a skin infection that results in more than 650,000 hospital admissions in the United States.
- In the US alone, 14.5 million cases of cellulitis are associated with $3.7 billion in ambulatory care costs.
- Many of the causes of cellulitis cannot be cultured; and therefore, empiric treatment may not always be appropriate.

Pathophysiology

- Cellulitis occurs as a result of a dermis breakdown of the skin.
- Skin breakdown can occur from a variety of causes including disruption in toe web space (e.g., bacteria, fungal), pressure ulcers, and venous leg ulcers.
- Cultures are performed on patients with needle aspiration or biopsy; however, the quality of the specimen is typically compromised.
- In general, a small amount of bacteria is needed to elucidate a systematic inflammatory response.

Microbiology

- The majority of cellulitis that occurs in immunocompetent adults is caused by *group A streptococci* (*Streptococcus pyogenes)* and *Staphylococcus aureus.*
- In many patients, the cause of cellulitis remains unknown, as evidenced by a recent review in which only 16% of cellulitis cultures had a bacterial diagnosis.
- Blood cultures show fewer bacterial isolates than skin infections. In one systematic review, approximately 7.9% of 1578 patients had a blood culture with measurable bacterial isolates. In this review, 28% of the isolates were gram negative organisms.
- Concerns about MRSA cellulitis have been on the increase due to the increased use of anti-MRSA antibiotics (e.g., vancomycin, trimethoprim-sulfamethoxazole, doxycycline, clindamycin) and broad spectrum antibiotics.
- As a result, narrow spectrum antibiotics against *Streptococcus* and methicillin-sensitive *S. aureus* remain the drugs of choice.
- However, MRSA should be suspected in the event of purulent infections in high risk populations (e.g., athletes, children, men who have sex with men, prisoners, military recruits, residents of long-term care facilities, individuals with previous MRSA exposure and intravenous drug users).

Clinical Presentation

- Patients typically present with an acute, spreading, poorly demarcated area of erythema.
- Other clinical features may be present (e.g., inflammation of the lymphatics).

Risk factors

- Risk factors for primary cellulitis include age, obesity, homelessness, barrier disruption; toe-web infection; edema; history of cellulitis; venous insufficiency; xerosis; dermatitis; prior saphenous venectomy; and prior breast conservation surgery.

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Risk factors (continued)

- Risk factors for recurrent cellulitis include obesity; prior malignancy; prior smoking; edema; tinea pedis; venous insufficiency; cellulitis tibial area involvement; dermatitis; and prior ipsilaterial surgical procedure.

Treatment algorithm for nonpurulent cellulitis

- Duration of therapy is dependent upon clinical response.
- Outpatient treatment options range from 5-10 days. Immunocompromised individuals may expect to receive 7-14 days of treatment.
- The affected area should be assessed within 48-72 hours of treatment.

Table 1: Cellulitis treatment options for nonpurulent cellulitis

<table>
<tr><td>Mild nonpurulent cellulitis
-No purulent drainage or pustules; no systematic signs of infection</td><td colspan="2">Moderate nonpurulent cellulitis
- No purulent drainage or pustules plus ≥1 SIRS criteria (temperature >38˚C or 90/min, RR >20/min, WBC count >12 000 or</td><td colspan="2">Severe nonpurulent cellulitis
No purulent drainage or pustules plus ≥2 SIRS criteria plus Hypotension or Immune compromise or Rapid disease progression</td></tr>
<tr><td>Oral antibiotics Cephalexin or Dicloxacillin or Penicillin VK or Amoxicillin/clavulanate If true penicillin allergy, Clindamycin</td><td><u>1 SIRS criterion or treatment failure</u>

Oral antibiotics Cephalexin or Dicloxacillin or Penicillin VK or Amoxicillin/clavulanate If true penicillin allergy, Clindamycin</td><td><u>≥2 SIRS criteria</u>

Intravenous antibiotics Cefazolin or Ceftriaxone or Penicillin G If true penicillin allergy, Clindamycin</td><td colspan="2">Broad-coverage intravenous antibiotic therapy Vancomycin + piperacillin/tazobactam, imipenem, or meropenem Consider surgical assessment for possible necrotizing disease with culture and sensitivity of any obtained tissue</td></tr>
<tr><td>For organisms not susceptible to clindamycin, azithromycin 500 mg orally once, then 250 mg/d for 4 days, or levofloxacin, 500 mg/d orally</td><td colspan="2">*SIRS-Systematic Inflammatory Response Syndrome</td><td><u>Probable S pyogenes infection and/or suspected MSSA</u>

Intravenous antibiotics Cefazolin or Cefotaxime or Ceftriaxone or Penicillin G If true penicillin allergy, Clindamycin</td><td><u>Suspected or known MRSA or treatment failure</u>

Intravenous antibiotics Vancomycin or Clindamycina or Linezolid or Daptomycin or Ceftaroline or Telavancin or Tigecycline</td></tr>
</table>

Recurrent disease / Prophylaxis

- Recurrent disease occurs in 22-49% of patients with cellulitis.
- Predisposing conditions should be modified to prevent recurrent disease.
- Prophylaxis may be considered for patients with 3-4 infections per year who have reduced risk factors.

Conclusion

- Cellulitis is a common issue and it can respond to simple, inexpensive antibiotic regimens.
- Recurrent disease is common and can be reduced by reducing modifiable risk factors.

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