Cellulitis

Odontogenic infections arising in the mandible first spread upward, into the masseter and/or medial pterygoid muscles in the masticator space, and downward, into the sublingual and/or submandibular spaces, and then spread into the spaces or muscles adjacent to one or more of these locations. Infections from the masseter muscle spread into the parotid space to involve the temporalis and lateral pterygoid muscles. Infections from the medial pterygoid muscle spread into the parapharyngeal space to involve the lateral pterygoid muscle.

Infections in the maxilla did not spread downward; instead, they tended to spread upward and superficially into the temporal and/or masseter spaces and deeply involve the lateral and/or medial pterygoid muscles in the medial masticator space.

CONCLUSION: **CT may be useful to depict the extent of infection and to plan treatment of Cellulitis**

OVERVIEW:

An acute, spreading infection of the dermis and subcutaneous tissue. Several entities are recognized:

• Cellulitis of the extremities - characterized by an expanding, red, swollen, tender or painful plaque with an indefinite border that may cover a wide area

• Recurrent cellulitis of the leg after saphenous venectomy - patients have an acute onset of swelling, erythema of the legs arising months to years after coronary artery bypass. (Surgery using lower extremity veins for bypass grafts.)

• Dissecting cellulitis of the scalp - recurrent painful, fluctuant dermal and subcutaneous nodules

• Facial cellulitis in adults - a rare event. Patients usually develop pharyngitis, followed by high fever, rapidly progressive anterior neck swelling, tenderness and erythema associated with dysphagia

• Facial cellulitis in children - potentially serious. Swelling and erythema of the cheek develop rapidly, usually unilateral.

• Perianal cellulitis - bright perianal erythema extending from the anal verge approximately 2 to 3 cm onto the surrounding perianal skin

• Pseudomonas cellulitis - may be a localized phenomenon or it may occur during pseudomonas septicemia

System(s) affected: Skin/Exocrine
Genetics: No known genetic pattern
Incidence/Prevalence in USA: Unknown
Predominant age:

• Perianal cellulitis - principally in children

• Facial cellulitis - in adults, usually older than 50 years. In children, between 6 months and three years.

Predominant sex: Male = Female (perianal cellulitis more common in boys)

SIGNS AND SYMPTOMS:

• General
• Local tenderness
• Pain
• Erythema
• Malaise
• Fever, chills
• Involved area is red, hot, and swollen
• Borders of the area are not elevated and not demarcated
• Regional lymphadenopathy is common
• Recurrent cellulitis
• Same as above
• Edema
• High fever, chills and toxicity
• Dissecting cellulitis of the scalp
• Purulent drainage from burrowing interconnecting abscesses
• Facial cellulitis in adults
• Malaise
• Anorexia
• Vomiting
• Itching
• Burning
• Dysplasia
• Anterior neck swelling
• Facial cellulitis in children
• Irritability
• Upper respiratory tract infection symptoms
• Perianal cellulitis
• Intense perianal erythema
• Pain on defecation
• Blood streaked stools
• Perianal pruritus

CAUSES:

• By site
• Cellulitis of the extremities: *Group A streptococcus, Staphylococcus aureus*
• Recurrent cellulitis of the leg: Non-group A beta hemolytic Streptococci (group C,G,B)
• Dissecting cellulitis of the scalp: *Staphylococcus aureus*
• Facial cellulitis in adults: *H. influenzae* type B
• Facial cellulitis in children: *H. influenzae* type B, over 3 years with portal of entry: staphylococcal and streptococcal
• Synergetic necrotizing cellulitis: Mixed aerobic-anaerobic flora
• Intravenous drug use: *Staphylococcus aureus*, Streptococci, Enterobacteriaceae, Pseudomonas, Fungi

• Synergetic necrotizing cellulitis: Mixed aerobic-anaerobic flora
• Specific diseases
• Diabetes mellitus: *Staphylococcus aureus*, Streptococci, Enterobacteriaceae, Anaerobes
• Human bites: Eikenella corrodens
• Animal bites (cat and dog): Staphylococci, *Pasteurella multocida*
• Patient groups
• Neonates: *Group B streptococcus*
• Immunocompromised
• Bacteria (Serratia, Proteus and other Enterobacteriaceae)
• Fungi (*Cryptococcus neoformans*)
• Atypical mycobacterium
• Children with nephrotic syndrome: *E. coli*
• Environmental and occupational exposures
• *Erysipelothrix rhusiopathiae*
• *Vibrio species*
• *Aeromonas hydrophilia*
• Rare causes
• Anaerobic
• *Clostridium perfringens* (gas forming cellulitis)
• Tuberculosis
• Syphilitic gumma
• Fungal: Mucormycosis, Aspergillosis

RISK FACTORS:

• General
• Previous trauma (laceration, puncture, human or animal bite)
• Underlying skin lesion (furuncle, ulcer)
• Surgical wound
• Recurrent cellulitis
• Post coronary artery bypass in patients whose saphenous veins have been removed
• Lower extremity lymphedema secondary to a) radical pelvic surgery b) radiation therapy c) neoplastic involvement of pelvic lymph nodes
• Mastectomy
• Diabetes mellitus
• Intravenous drug use
• Immunocompromised host
• Burns
• Environmental and occupational factors

DIAGNOSIS

DIFFERENTIAL DIAGNOSIS:

• Perianal cellulitis
• Candida intertrigo

• Psoriasis
• Pin worm infection
• Inflammatory bowel disease
• Behavioral problem
• Child abuse
• Others
• Acute gout
• Fasciitis/myositis
• Mycotic aneurysm
• Ruptured Baker's cyst
• Thrombophlebitis
• Osteomyelitis
• Herpetic whitlow
• Cutaneous diphtheria
• Pseudogout

LABORATORY:

• Aspirates from the point of maximum inflammation. Yield a 45% positive culture rate as compared to a 5% from leading edge culture.
• Blood cultures - potential pathogens isolated in 25% of patients
• Mild leucocytosis with a left shift
• A mildly elevated sedimentation rate
• CBC

Drugs that may alter lab results: Previous antibiotic therapy may alter the results
Disorders that may alter lab results: N/A

PATHOLOGICAL FINDINGS:

Biopsy of skin shows marked infiltration of the dermis with eosinophils and inflammatory changes

SPECIAL TESTS:

• Serial serological testing with antistreptolysin O, anti-deoxyribonuclease B, and anti-hyaluronidase tests may be successful in diagnosing cellulitis caused by group A, C, or G hemolytic streptococci
• Sinus drainage and culture of aspirate

IMAGING:

• Gas forming cellulitis
• Plain x-rays show gas bubbles in the soft tissue
• CT shows gas and myonecrosis

DIAGNOSTIC PROCEDURES:

• Skin biopsy
• Lumbar puncture should be considered for all children with H. influenzae type B cellulitis

TREATMENT

APPROPRIATE HEALTH CARE:
Outpatient for mild cases, inpatient for severe infections

GENERAL MEASURES:
• Immobilization and elevation of the involved limb to reduce swelling may be needed in *H. influenzae type B*
• Sterile saline dressings to decrease local pain
• Moist heat to localize the infection
• Cool Burrow's compresses for pain relief

SURGICAL MEASURES:
• Debridement for gas/purulent collections
• Intubation or tracheotomy may be needed for cellulitis of the head or neck
• Wide filleting incision in necrotizing cellulitis

ACTIVITY:
Ambulatory in mild infection; bedrest in severe infection

DIET:
Regular diet

PATIENT EDUCATION:
• Good skin hygiene
• Avoid skin traumas
• Report early skin changes to physician

MEDICATIONS

DRUG(S) OF CHOICE:
Treat 10-30 days. Guided by culture results whenever possible.
• Mild early suspected streptococcal etiology: Aqueous penicillin G, 600,000 U, then IM procaine penicillin at 600,000 U q8-12 hrs
• Staphylococcal infection or no clues to etiology: penicillinase-resistant penicillin (e.g., oxacillin 0.5-1.0 g po q6 hrs)
• Severe infection: penicillinase-resistant penicillin (e.g., nafcillin 1.0-1.5 g IV q4 hrs)
• Gram negative bacillus as possible etiology: aminoglycoside (gentamicin) plus a semisynthetic penicillin
• Rapidly progressive cellulitis after a fresh water injury: penicillinase-resistant penicillin plus gentamicin or chloramphenicol
• Human bites: amoxicillin-clavulanate (Augmentin)
• Animal bites (cellulitis at the saphenous site): penicillin or nafcillin, in high dosage, IV for 7 days before switching to oral therapy
• Facial cellulitis in adults and children: (H. influenza B) cefotaxime IV
• Gas forming cellulitis: Aqueous penicillin G 10-20 million U/day IV

• Diabetes mellitus: Cefoxitin or if toxic, clindamycin and gentamicin
• Intravenous drug abuse: Vancomycin and gentamicin
• Compromised hosts: clindamycin and gentamicin
• Burn patients: vancomycin and gentamicin

Contraindications:
• Allergies to the antibiotic
Precautions: Renal failure, other organ failure
Significant possible interactions: Refer to manufacturer's literature

ALTERNATIVE DRUGS:
• Mild infection
• Penicillin allergy: erythromycin, 500 mg po q6 hrs
• Severe infection
• Vancomycin 1.0-1.5 g/day IV
• Human bite and animal bites: IV cefoxitin
• Gas forming cellulitis
• Metronidazole 500 mg IV q6h
• Clindamycin 600 mg IV q8h

FOLLOW UP

PATIENT MONITORING:
• A blood culture at the end of treatment to ensure cure
• Repeat needle aspirate culture
• Repeat blood count if patient was toxic
• Repeat lumbar puncture in case of meningitis

PREVENTION/AVOIDANCE:
• Treatment of tinea pedis with antifungal (such as clotrimazole) will prevent recurrent cellulitis of the legs in patients who have had coronary bypass
• Avoid trauma
• Avoid swimming in fresh water or salt water in the presence of skin abrasion
• Avoid human or animal bite
• Support stocking with peripheral edema
• Good skin hygiene
• For recurrent cellulitis - prophylactic penicillin G (250-500 mg po bid)
• H. influenzae cellulitis - rifampin prophylaxis for entire family of index case or in day-care classroom in which one or two children exposed. Dosage: 20 mg/kg/day (maximum: 600 mg/day) for 4 days.

POSSIBLE COMPLICATIONS:
• Bacteremia
• Local abscesses
• Super infection with gram negative organisms

• Lymphangitis especially in recurrent cellulitis
• Thrombophlebitis of lower extremities in older patients
• Dissecting cellulitis of the scalp - scarring; alopecia
• Facial cellulitis in children - meningitis in 8% of patients
• Gas forming cellulitis - gangrene; amputation; 25% mortality

EXPECTED COURSE AND