PHOTO QUIZ FROM URGENT CARE

Mastoiditis

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CASE HISTORY

A 3-year-old female presents on a Friday afternoon with left ear redness and persistent pain for the last four days. The patient's mother — the main source of history — states that the child has been having fevers since Tuesday, with the highest recorded temperature of 104˚F this morning.

The patient has had decreased appetite and fatigue for the past 48 hours. The patient has no known allergies. A chart review shows one prior episode of uncomplicated otitis media.

Regarding the ear, there has been no drainage, change in hearing, tinnitus, bleeding, or dizziness. The mother noticed swelling and redness behind the left ear yesterday afternoon.

The mother has been giving the patient Tylenol or Motrin to help control the fever and pain.

The vital signs are normal at the time of the clinic visit. On exam, there is erythema behind the ear (see Fig. 1). Further exam shows bulging and erythematous tympanic membrane with no serous fluid present. The middle ear ossicles cannot be visualized.

Fig. 1. Photo of patient's left ear taken by provider in urgent care setting.

QUESTIONS

1. What are the symptoms and signs of mastoiditis?
2. Who is at risk of mastoiditis?
3. What are the most common microbial pathogens in mastoiditis?
4. What is the relationship between acute otitis media and mastoiditis?
5. Which lab tests are used in the workup of suspected mastoiditis in a patient?
6. What are complications of mastoiditis if not treated properly?

ANSWERS

1. Symptoms of mastoiditis include pain behind the ear and fever, which can make the patient uncomfortable. Signs of infection include erythematous skin overlying the mastoid area and proptosis of the auricle. Tenderness and inflammation over the mastoid process are signs of a potentially surgical mastoiditis.
2. Most children that present with acute surgical mastoiditis are younger than 2 years of age and do not have history of frequent otitis media.
3. The most common pathogens in mastoiditis are *Streptococcus pyogenes, Streptococcus pneumonia, group A beta-hemolytic streptococci, Staphylococcus aureus, Moraxella catarrhalis,* and *Haemophilus influenzae.*
4. In some patients with acute otitis media, the infection can spread beyond the mucosa of the middle ear cleft to develop osteitis within the mastoid air cell system or periostitis of the mastoid process. This process can be caused either through direct bone erosion or indirectly by the emissary vein of the mastoid.
5. Labs tests and other testing might include:
   a. A complete blood count and sedimentation rate to establish baseline; these can be used to evaluate the efficacy of therapy.
   b. A tympanocentesis or myringotomy to obtain a bacterial culture.
   c. Audiometry, performed after convalescence

from the acute phase and with children who have chronic mastoiditis. However, in the at-risk population (children <2 years of age), thresholds for air and bone conduction under headphones are not well established.

d. A CT scan of the temporal bone if CT scanning is not immediately available; plain radiographs of the mastoids often demonstrate clouding of the air cells with bone destruction.

6. Complications of improperly treated mastoiditis can include: permanent hearing loss, facial nerve palsy, cranial nerve involvement, osteomyelitis, petrositis, labyrinthitis, Gradenigo's syndrome, intracranial extension (meningitis, cerebral abscess, epidural abscess, subdural empyema), sigmoid sinus thrombosis, and abscess formation.

DISCUSSION

Mastoiditis is a suppurative infection of the mastoid air cells with typical symptoms of less than one month's duration. Cases may vary from uncomplicated to complicated; the latter involves one or more extra- or intracranial complications. It is known to be the most common intratemporal complication of acute otitis media.[1]

The most common bacterial species implicated are *Streptococcus pyogenes* and *Streptococcus pneumoniae.* Less common bacterial species include *Haemophilus influenza, Staphylococcus aureus* including MRSA, and *Pseudomonas aeruginosa.*

The most common risk factors are recent ear infection and young age, typically less than 2 years old. Associated findings include high fever, as well as high white blood count, absolute neutrophil count, and inflammatory markers. Less significant risk factors are previous antibiotic therapy or no history of previous middle ear infections.[2] Consultation with an otolaryngologist should occur early in the disease course.

A computed tomography with intravenous (IV) contrast of the temporal bone is the standard for evaluation of mastoiditis, with sensitivities ranging from 87% to 100%.[3] There is variability in practice style, but children with intracranial abnormalities such as abscess are more likely to undergo aspiration and drainage.[4]

Mastoiditis may be treated initially with conservative management before considering surgical intervention. Initial treatment should consist of IV antibiotic therapy and middle ear drainage with myringotomy with or without placement of a tympanostomy tube.[3] Most children with uncomplicated acute or subacute mastoiditis can be managed without mastoidectomy; however, patients should be monitored daily for clinical response, and simple mastoidectomy should be performed if there is no clinical improvement in systemic and local findings within 48 hours.[1]

Acute mastoiditis can be complicated by isolated facial nerve paralysis, which can initially be managed conservatively. Other complications may include subperiosteal abscess, Bezold's abscess, osteomyelitis involving other parts of the skull, labyrinthitis, meningitis, subdural abscess, epidural abscess, brain abscess, cerebellar abscess, or septic dural sinus thrombosis.[5]

Patients with suppurative extracranial or intracranial complications of acute mastoiditis other than facial nerve paralysis are candidates for aggressive surgical management with mastoidectomy, in addition to IV antimicrobial therapy and myringotomy.[3] Patients should follow-up with an otolaryngologist within two weeks after symptoms resolve.

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