The Diagnosis and Management of Mastoiditis in Children

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Other than well-child visits, the most common reason parents seek medical attention for their children is for the diagnosis and management of otitis media. Although improved antimicrobial therapy and ventilating tube placement have resulted in fewer serious complications of otitis media over the past 20 years, the primary care physician must be able to recognize such conditions in order to implement appropriate therapy and, when necessary, specialist referral.1

One of the most serious complications of acute otitis media (AOM) requiring otolaryngologic intervention is mastoiditis. The term mastoiditis in the pediatric population actually refers to two diseases—acute coalescent mastoiditis and chronic mastoiditis, which represent distinct pathologic entities requiring unique diagnostic and therapeutic modalities.

ACUTE COALESCENT MASTOIDITIS

Strictly speaking, mastoiditis actually occurs as part of all cases of otitis media because the primary disease process invariably leads to inflammatory changes of the mucosa lining the mastoid air cell system. As noted in Figure 1, the middle ear space connects with the mastoid cavity through a narrow opening, the aditus ad antrum. Although spread of inflammatory disease readily occurs through this opening, clinical acute coalescent mastoiditis occurs only after the aditus becomes blocked. When this happens, the mastoid cavity becomes a closed space, thus creating the potential for a subperiosteal abscess.2,3

Patients who develop acute coalescent mastoiditis generally have persistent otalgia, mastoid tenderness, and fever. One should be suspicious if symptoms persist for longer than 2 weeks following the onset of AOM or if symptoms reappear following a brief quiescent period. The otoscopic examination is usually consistent with AOM, ie, the tympanic membrane (TM) is bulging, erythematous, and immobile. Purulent otorrhea is commonly seen in patients with a TM perforation or a patent ventilating tube.

Edema and erythema usually overlie the mastoid bone and obliterate the postauricular crease. This results in the characteristic outward and downward
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displacement of the auricle (Figure 2). In severe cases, the posterosuperior external auditory canal may sag secondary to periosteal thickening adjacent to the aditus ad antrum. Occasionally, progression of the disease may lead to a palpable subperiosteal abscess overlying the mastoid bone. This occurs with progressive thinning of the mastoid cortex as the abscess approaches the surface and actual perforation.2,4

Although the diagnosis usually can be made from the history and physical examination, radiographic studies may be a valuable adjunct. Mastoid radiographs will demonstrate diffuse clouding caused by fluid accumulation in cases of both AOM and early acute coalescent mastoiditis. However, as coalescent mastoiditis progresses, there may be loss of the bony partitions within the mastoid cavity secondary to decalcification and coalescent bone removal. Presently, a computed tomographic (CT) scan of the temporal bone demonstrates these changes best.2,3

Acute coalescent mastoiditis resolves in most patients with intravenous antimicrobial therapy and myringotomy drainage. Ventilating tube placement may be appropriate in order to assure continued drainage. Antimicrobial therapy should be directed by culture results but initial treatment should cover those organisms found in AOM, including Streptococcus pneumoniae, Haemophilus influenzae, and Moraxella catarrhalis. Intravenous cefuroxime (between 50 mg/kg/day and 150 mg/kg/day) frequently is chosen as the initial agent. Should drainage persist, probably for longer than 7 to 10 days, a simple mastoidectomy is indicated to extirpate the inflammatory disease within the mastoid. If there is a subperiosteal abscess, incision and drainage is mandatory at the time of diagnosis. Mastoidectomy also may be needed in some patients with an abscess.1,4

Although mastoiditis can occur in any age group, it is uncommon in the first year of life because of the lack of pneumatization of the mastoid bone. Signs and symptoms are similar in older individuals, and therapy is the same as described above. The differential diagnosis of postauricular swelling in infants should include (in addition to mastoiditis) eosinophilic granuloma, rhabdomyosarcoma, and branchial cleft anomalies.

CHRONIC MASTOIDITIS
Although definitions may vary, chronic mastoiditis

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is synonymous with chronic otorrhea, persistent aural drainage either through a patent ventilating tube or a perforation that has been present for more than 2 months. The management of individuals with chronic otorrhea has undergone an evolution over the past several years. Previously, if a patient failed to respond to a combination of oral antimicrobial therapy, topical antimicrobial therapy, and vigorous aural toilet, a mastoidectomy was performed to remove the chronically inflamed tissues. However, Bluestone et al.6 and Kenna et al.6 have demonstrated that intravenous antimicrobial therapy may obviate the need for a mastoidectomy in the majority of patients with chronic otorrhea.

The incidence of chronic otorrhea is often increased in patients with craniofacial anomalies, Down syndrome, nasopharyngeal tumors, and tuberculosis. In the former three situations, the eustachian tube is obstructed. Patients with neoplasms in the nasopharynx demonstrate mechanical obstruction of the eustachian tube while those patients with craniofacial anomalies or Down syndrome experience functional obstruction. Because Mycobacterium tuberculosis is a relatively uncommon cause of chronic otorrhea, cultures for this organism are not obtained routinely and appropriate chemotherapy is not administered. Acid-fast cultures should be obtained in cases where there is refractory otorrhea that has failed to respond to aggressive therapy.

During the initial examination of a patient with chronic otorrhea, the ears should be examined under the otomicroscope so they can be suctioned and a middle ear culture obtained. Care must be taken to look for evidence of a retraction pocket or cholesteatoma, a foreign body of the external auditory canal or middle ear, or aural polyps or granulation tissue suggestive of a neoplasm. In many children, an examination under anesthesia may be necessary in order to visualize the external auditory canal and the

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Figure 1. The mastoid air cell system connects with the middle ear space through a narrow opening, the aditus ad antrum.

Figure 2. Acute coalescent mastoiditis is characterized by erythema and edema overlying the mastoid bone, loss of the postauricular crease, and downward and forward displacement of the pinna.
sidered until the child has been free of disease for at least 1 year following completion of therapy. If the child has significant problems with chronic otitis media in the opposite ear, surgery is generally delayed until this ear is free of disease.

If patients fail to respond to aggressive medical management, a tympanoplasty and mastoidectomy is performed. Both the experience of the surgeon and the extent of disease will determine the type of procedure performed. Intravenous antimicrobial therapy may be of some benefit in selected patients during the perioperative period.

As mentioned previously, the presence of granulation tissue within the external auditory canal or mucosal polyps extending through a perforation should make the physician suspicious of a neoplasm and mandates a biopsy as well as cultures. Therapy is individualized based on the type of neoplasm identified. If a cholesteatoma is identified, medical management is not appropriate, and a tympanoplasty and mastoidectomy is indicated.

In patients with chronic otorrhea, it is imperative to distinguish true chronic mastoiditis from neoplastic processes of the temporal bone or inflammatory changes of the TM, usually as a result of a foreign body reaction to a ventilating tube. Once this differentiation has been made, an appropriate treatment plan can be developed.5-7

SUMMARY

Even though mastoiditis as a complication of AOM is uncommon, its recognition is imperative to institute timely therapy. Acute coalescent mastoiditis generally follows a severe bout of AOM. Intravenous antimicrobial therapy and myringotomy drainage are usually satisfactory measures. However, refractory cases may require a simple mastoidectomy. Chronic mastoiditis in children is treated initially with intravenous antimicrobial therapy and vigorous aural toilet, which is successful in most patients. Mastoidectomy may be required in selected patients. The clinician must be aware of the differential diagnosis of chronic otorrhea so that biopsies can be obtained whenever a neoplasm is suspected.

REFERENCES