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Diagnosis of the Origin of Acute Otitis and Modern Clinical Diagnostic Methods

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Abstract: The etiology of acute otitis media can be viral or bacterial. As a rule, the viral course of the disease is complicated by the addition of bacterial inflammation. In newborns, gram-negative bacilli of the small intestine, especially Escherichia coli and Staphylococcus aureus, cause acute otitis media. In older infants and children under 14 years of age, the most common pathogens are Streptococcus pneumoniae, Moraxella (Branhamella) catarrhalis, and non-typeable strains of Haemophilus influenzae; less common pathogens are group A beta-hemolytic streptococci and S. aureus. For patients older than 14 years of age, S. pneumoniae, group A beta-hemolytic streptococci and S. aureus, followed by H. influenzae.

Key points: Risk factors, Nasopharyngeal examination, Complications, Treatment, Clinical evaluation, Risk factors.

Risk factors

Smoking in the home is a significant risk factor for the development of acute otitis media. Other risk factors include a family history of otitis media, living in areas with limited resources or high air pollution, formula feeding (i.e., instead of breastfeeding), and attending daycare.

Complexities

Complications of acute otitis media rarely develop. In rare cases, bacterial inflammation of the middle ear spreads to nearby structures with the formation of mastoiditis, petrositis, and labyrinthitis. Intracranial complications are very rare, including meningitis, brain abscess, epidural abscess, and lateral sinus thrombosis. Even with adequate antibacterial treatment, the recovery period for these complications is very long, especially if the patient's immune system is weak.

Signs and symptoms of acute otitis media

Typically, the disease begins with earache and hearing loss. Children may be irritable and may not sleep at night. Fever, nausea, vomiting, and diarrhea are common in young children. Otoscopy may reveal a bulging, erythematous tympanic membrane (TM) with vague signs and altered light reflex. Air infusion (pneumatic otoscopy) demonstrates mobility of the eardrum. Spontaneous perforation of the PD results in purulent or serous-bloody otorrhea.

Clinical assessment

The diagnosis of acute otitis media is usually made clinically and is based on the acute onset of pain (within 48 hours), bulging of the tympanic membrane, and, especially in children, the presence of

middle ear effusion on pneumatic otoscopy. Except for fluid obtained during myringotomy, ear fluid culture is not usually performed.

It resolves spontaneously in 80% of cases, but in the United States, antibiotic therapy is often prescribed ([1]; see Table of Antibacterial Therapy for Acute Otitis Media). Antibiotics improve the course of the disease (although results are similar at 1 and 2 weeks of use) and prevent hearing loss, as well as labyrinthine and intracranial complications. However, because of the recent emergence of resistant organisms, pediatric organizations strongly recommend that antibiotics be given as the first line of treatment only in certain children (e.g., younger children or those with more severe illness—see Table of Antibiotics in Children with Acute Otitis Media). Antibiotics are not recommended for children with acute otitis media or recurrent acute otitis media (e.g., ≥ 4 exacerbations in 6 months).

In other patients, with appropriate follow-up, it may be safe to observe for 48 to 72 hours, with antibiotics only prescribed if there is no improvement; if follow-up is planned, antibiotics may be prescribed at the initial visit to save time and expense. The decision to observe should be discussed with the caregiver.

To relieve swelling in the pharyngeal opening of the auditory tube, adults are shown vasoconstrictors, for example, phenylephrine 0.25% 3 drops every 3 hours. To avoid addiction, this drug should be prescribed for a course of no more than 4 days. Systemic decongestants (pseudoephedrine 30 to 60 mg orally every 6 hours as needed) may also be useful. If patients have allergies, antihistamines are shown (chlorpheniramine 4 mg every 4-6 hours for 7-10 days).

It is not recommended to prescribe vasoconstrictors and antihistamines to children.

If the eardrum is bulging, especially if there is severe or persistent pain, fever, vomiting, or diarrhea, a specialist may perform a myringotomy. The patient's hearing, tympanometry, and vision and movement of the tympanic membrane are monitored until normal function is restored.

Treatment

Prevention of acute otitis media

Routine immunization of children against pneumococci (pneumococcal conjugate vaccine), Haemophilus influenzae (H. influenzae) type B, and influenza reduces the incidence of acute otitis media. Infants should not be bottle-fed; smoking in the room where the child is staying should also be limited to reduce the incidence. Prophylactic use of antibiotics is not recommended for recurrent acute otitis media in children.

Recurrent acute otitis media and recurrent secretory otitis media can be prevented by placing tympanostomy tubes.

Secretory otitis media develops against the background of untreated acute otitis media or with dysfunction of the auditory tube. Patients complain of hearing loss and a feeling of pressure and fullness in the ears. Diagnosis is made on the basis of tympanometry and otoscopic examination. Most cases resolve within 2-3 weeks. If no improvement is observed after 1 to 3 months, some form of myringotomy is indicated, usually by insertion of a tympanostomy tube. Antibiotics and decongestants are not effective.

Normally, ventilation of the middle ear occurs 3-4 times per minute during swallowing and opening of the Eustachian tube, and oxygen is absorbed by the vessels of the mucous membrane of the middle ear. If the auditory tube becomes blocked, a relative negative pressure is created in the middle ear, which can lead to fluid accumulation. In such conditions, there is a risk of hearing loss.

Secretory otitis media is common in childhood (due to the frequent occurrence of acute otitis media) and can last from several weeks to several months. In other cases, Eustachian tube obstruction may be secondary to inflammatory processes in the nasopharynx, allergies, hypertrophied adenoids or other obstructive lymphoid collections in the torus of the Eustachian tube

and the Rosenmüller fossa, or benign or malignant tumors. The discharge may be sterile, but more often it contains pathogenic bacteria.

Signs and symptoms of secretory otitis media

Patients may not experience any symptoms, but in some cases, patients themselves or their relatives notice hearing loss. There may be a feeling of fullness and pressure in the ears, or a "clicking" sensation in the ears when swallowing. Earache is rare.

Possible changes in the tympanic membrane (ET) include: discoloration (yellowish or gray), altered light reflex, mild to moderate retraction, and increased identification marks. The eardrum may be immobile when air is blown. A gas-liquid level or air bubbles may be visible through the eardrum.

Nasopharynx examination

The diagnosis of secretory otitis is made clinically by pneumatic otoscopy, in which an insufflator attached to the head of the otoscope moves the eardrum (this movement is obstructed by fluid in the middle ear, perforation, or tympanosclerosis). Tympanometry may be performed to confirm the presence of a middle ear effusion (i.e., if the eardrum is not moving sufficiently).

Adults and adolescents should undergo a nasopharyngeal examination to rule out benign or malignant tumors. Malignant tumors of the nasopharynx should be suspected, especially in cases of unilateral secretory otitis media. Imaging studies should be performed if a malignancy is suspected or confirmed on biopsy.

Treatment of secretory otitis media

Tracking

In the absence of positive dynamics, myringotomy with insertion of a tympanostomy tube is recommended.

Adenotomy is indicated for recurrent otitis media in children

Observation is usually indicated for all patients. Antibiotics and decongestants are not effective. Patients with overt allergic reactions may benefit from nasal corticosteroids and antihistamines.

If there is no improvement within 1 to 3 months, a myringotomy may be performed to aspirate the fluid and insert a tympanostomy tube, which allows ventilation of the middle ear and temporarily improves Eustachian tube patency, regardless of the underlying cause. In cases of permanent conductive hearing loss due to fluid accumulation in the middle ear, a tympanostomy tube may be inserted. Tympanostomy tubes help prevent recurrence of acute otitis media and secretory otitis media.

Sometimes, for temporary ventilation of the middle ear, blowing of the auditory tubes using the Politzer method or the Valsalva method is used. To perform the Valsalva maneuver, the patient is asked to inhale and exhale with maximum effort through the nostrils, which are pinched with fingers with the mouth closed. Politzer ear blowing is performed using a special syringe (air pump), through which the doctor blows air into one of the patient's nostrils, and the patient swallows air through the other. Thus, air enters the Eustachian tube and the middle ear. None of these procedures should be performed if the patient has rhinorrhea or an acute respiratory viral infection.

With persistent, secretory otitis media, correction of underlying pathologies of the nasopharynx may be required. In children, especially in adolescent boys, nasopharyngeal angiofibroma should be ruled out; in adults, nasopharyngeal carcinoma should be ruled out. Children may benefit from adenoidectomy, including removal of the central lymphoid mass, as well as lymphoid bundles in the torus of the Eustachian tube and Rosenmüllerian fossa. Antibiotics should be prescribed for bacterial rhinitis, sinusitis, and/or nasopharyngitis. Identified allergens should be eliminated from the patient's environment and immunotherapy should be considered. Young children with risk factors and long-term hearing loss due to long-term serous otitis media may require appropriate therapy to ensure normal speech development.

Chronic suppurative otitis media is characterized by persistent purulent discharge (more than 6 weeks), which subsequently leads to perforation of the eardrum. Clinically, this disease manifests itself as painless otorrhea with the development of conductive hearing loss. Complications include ear polyps, cholesteatoma, and other infections. Daily irrigation of the ear canal, careful removal of granulation tissue, and the use of topical corticosteroids and antibiotics are necessary. In severe cases, surgical intervention and systemic antibacterial therapy are indicated.

Chronic suppurative otitis media may be the result of acute otitis media, obstruction of the Eustachian tube, mechanical injury, thermal or chemical burns, or iatrogenic in origin (with bypassing the tympanic cavity). The high-risk group includes patients with craniofacial anomalies (eg, Down syndrome, cat-crying syndrome [Lejeune syndrome], cleft lip and/or palate, 22q11.2 deletion (also called velocardiofacial syndrome, Shprintzen syndrome, and DiGeorge syndrome).

Chronic suppurative otitis media can be exacerbated by water entering the middle ear through a perforated tympanic membrane (ET) after an upper respiratory tract infection or during bathing or swimming. Chronic exposure to air pollution and poor hygiene associated with living in a resource-poor society can also worsen symptoms. Infections are most often caused by gram-negative microorganisms (bacilli) or Staphylococcus aureus (Staphylococcus aureus), resulting in painless, purulent, and sometimes malodorous otorrhea. Prolonged chronic suppurative otitis media can lead to destructive changes in the middle ear (e.g., necrosis of the long process of the incus) or the formation of ear polyps (prolapse of granulation tissue into the ear canal through a perforation of the eardrum). In almost 100% of cases, the diagnosis of a polyp is a sign of the presence of a cholesteatoma.

Cholesteatoma consists of epithelial cells and forms in the middle ear cavity, mastoid process or epitympanum. Specific enzymes produced by cholesteatoma cells destroy bone tissue. Cholesteatoma is a good environment for bacteria and can lead to complications such as purulent labyrinthitis, facial nerve paresis and brain abscess.

Signs and symptoms of chronic purulent otitis media

Chronic purulent otitis media is usually manifested by conductive hearing loss and otorrhea. Pain syndrome is not typical and occurs only with osteitis of the temporal bone. There is perforation of the eardrum and the presence of discharge, as well as softening of the external auditory canal and the presence of granulation tissue in it.

A patient with cholesteatoma may present with fever, dizziness, and/or otalgia. White masses in the middle ear cavity protrude into the external auditory canal through a perforated eardrum.

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