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Immunogenetic and Modern Clinical Diagnostics in Improving Early Diagnosis of Complicated Forms of Chronic Suppurative Otitis Media

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Abstract: Acute otitis media is an inflammation of the middle ear of viral or bacterial origin, usually accompanied by upper respiratory tract infections. Clinically, it manifests as earache and deterioration of the patient's general condition (fever, nausea, vomiting, diarrhea). Diagnosis is made on the basis of otoscopic examination. Antibiotics and painkillers are prescribed.

Keywords: Clinical manifestations, Diagnostics, Treatment, Prevention, Acute otitis media.

INTRODUCTION

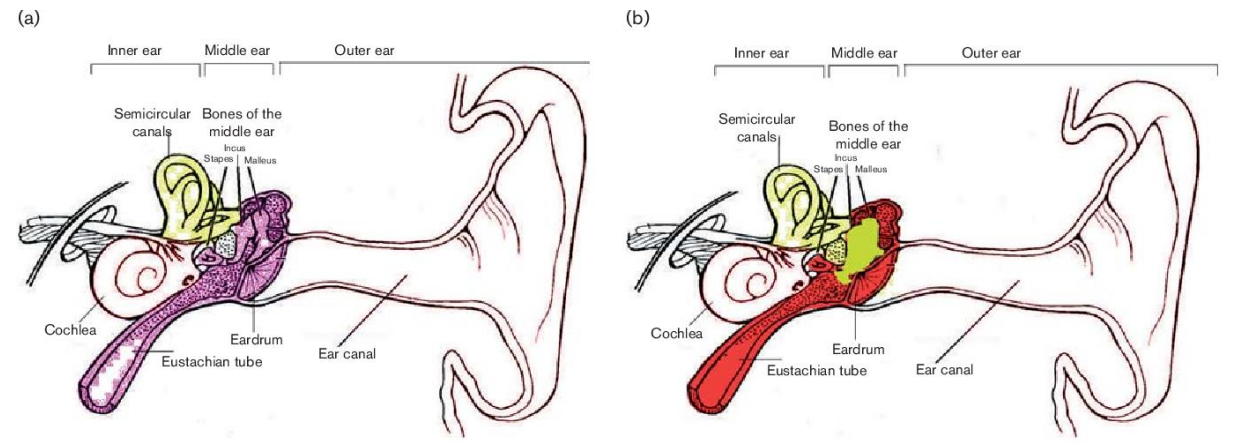
Acute otitis media can occur at any age, but its appearance is most typical between the ages of 3 months and 3 years. At this age, the Eustachian tube is structurally and functionally immature: it is located at a more horizontal angle, and the angle of the tensor veli palatini muscle and the cartilage of the Eustachian tube make the opening mechanism less efficient.

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 atypical Haemophilus influenzae; Less common pathogens include group A beta-hemolytic streptococci and S. aureus. In patients over 14 years of age, S. pneumoniae, group A beta-hemolytic streptococci, and S. aureus are more common, followed by H. influenzae.

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 an area with limited resources or high air pollution, bottle feeding (instead of breastfeeding), and attending daycare.

RESEARCH METHODS AND APPROACHES

Complications of acute otitis media rarely develop. In rare cases, bacterial infection of the middle ear spreads to nearby structures, resulting in acute mastoiditis, petrositis, or labyrinthitis. Intracranial spread is very rare; meningitis may then develop. Brain abscess, subdural empyema, epidural abscess, lateral sinus thrombosis, or otitis media hydrocephalus. Even with adequate antibacterial therapy, the recovery period for these complications is very long, especially if the patient is immunocompromised.



Signs and symptoms of acute otitis media

The disease usually begins with earache and hearing loss. Children may be irritable and have trouble sleeping at night. Fever, nausea, vomiting, and diarrhea are common in young children. Otoscopy may reveal a bulging, erythematous tympanic membrane with vague symptoms and altered light reflexes. Air insufflation (pneumatic otoscopy) shows poor mobility of the eardrum. Spontaneous perforation of the tympanic membrane causes serous-bloody or purulent otorrhea, which usually resolves quickly.

With the development of intracranial complications, fever, focal neurological symptoms, and confusion appear. Facial nerve paresis and dizziness indicate involvement of the fallopian tubes or labyrinth in the inflammatory process.

The diagnosis of acute otitis media is usually based on the clinical presentation of acute onset (within 48 hours) of pain, bulging eardrum, and, especially in children, the presence of middle ear effusion seen on pneumatic otoscopy. Culture is usually not performed unless fluid is obtained during myringotomy.

Treatment of acute otitis media

a. Analgesics

b. Sometimes antibiotic therapy

c. Myringotomy is rarely performed

RESEARCH RESULTS

Pain medications should be used as needed, including in children who are not yet verbal and who have behavioral manifestations of pain (e.g., ear tugging or rubbing, excessive crying, restlessness). Oral analgesics such as acetaminophen or ibuprofen are usually effective; doses for children are based on body weight. A wide range of over-the-counter and prescription topical medications are available. Although not well-studied, some topical medications provide short-term relief, probably for no more than 20 to 30 minutes. Topical medications should not be used if the eardrum is perforated.

Most cases (80%) resolve spontaneously; however, antibiotics are often prescribed in the United States ([1]; see Table of Antibiotics for Otitis Media). Antibiotics provide faster symptom relief (although rates are similar after 1–2 weeks) and may reduce the risk of residual hearing loss and labyrinthine or intracranial sequelae. However, with the recent emergence of resistant organisms, pediatric organizations strongly recommend that antibiotics be used only in certain groups of children, such as:

Younger or more seriously ill patients - see the table of guidelines for the use of antibiotics in children with acute otitis media.

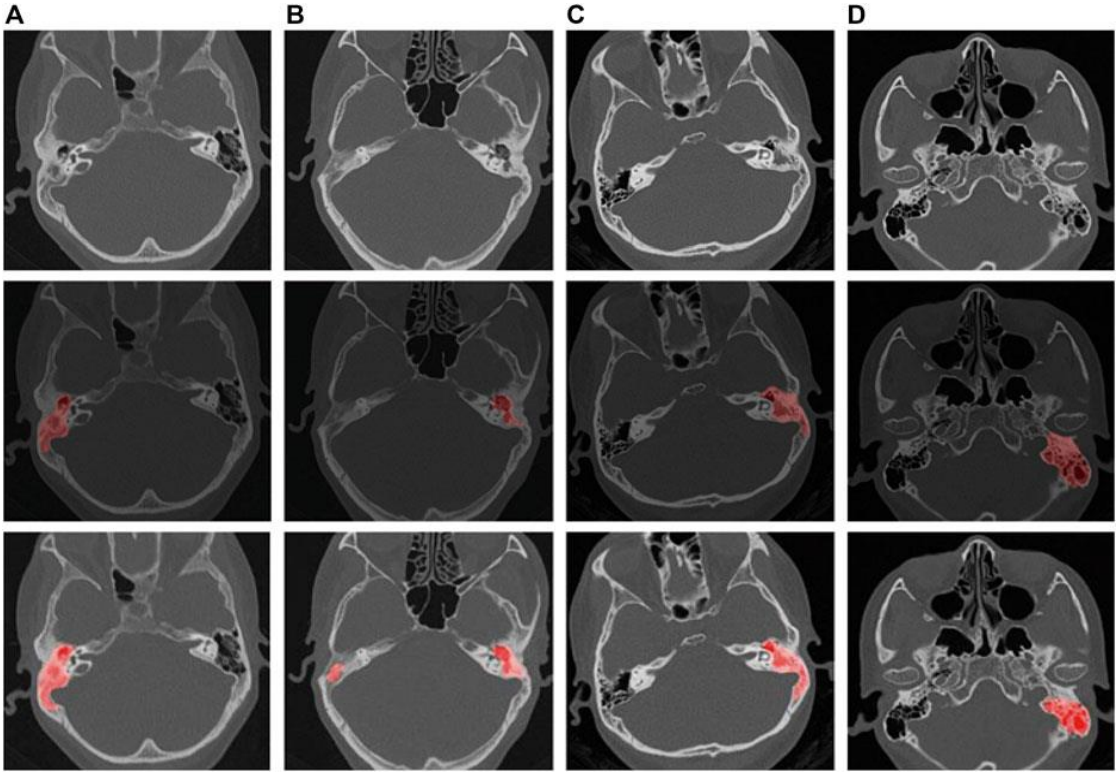
Patients with acute otitis media (e.g., ≥ 4 episodes in 6 months)

In other patients, with adequate follow-up, observation with antibiotics for 48–72 hours may be safe only if there is no improvement; if further treatment 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.

In adults, topical intranasal vasoconstrictors such as phenylephrine or oxymetazoline may improve Eustachian tube function, but the effectiveness of these drugs has not been clearly demonstrated. To avoid addiction, this drug should be prescribed for a course of no more than 3 days. Systemic decongestants (eg, pseudoephedrine 30 to 60 mg orally every 6 hours as needed) can help relieve nasal and paranasal sinus congestion or pressure. If allergies are present, patients are prescribed antihistamines (chlorpheniramine 4 mg every 4 to 6 hours for 7 to 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, your doctor may perform a myringotomy. Tympanometry is used to monitor the movement of the eardrum; the patient's hearing, appearance, and movement of the eardrum are monitored until the condition is fully normal. If patients with acute otitis media develop facial nerve paralysis or dysfunction, they should be referred promptly to a specialist for myringotomy and placement of a tympanostomy tube.



Prevention of acute otitis media

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

Recurrent acute otitis media and recurrent serous otitis media can be prevented by placing a tympanostomy tube.

Antihistamines and decongestants are not recommended for children; Oral or nasal decongestants may be helpful in adults; Antihistamines are indicated for adults with allergic etiology.

Serous otitis media - middle ear effusion, acute otitis media occurs without infection due to complete loss of the middle ear fluid or blockage of the Eustachian tube. Patients complain of hearing loss and a

feeling of pressure and stuffiness 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 within 1-3 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. When the Eustachian tube is blocked, a relative negative pressure occurs in the middle ear, which sometimes leads to the accumulation of fluid. In such conditions, there is a risk of hearing loss.

Serous otitis media is a common complication of acute otitis media or upper respiratory tract infection in children (often detected during a routine ear examination) and can persist for weeks to months. Eustachian tube obstruction can also be secondary to the following pathological conditions:

The discharge may be sterile, but often it contains pathogenic bacteria. Rarely, spontaneous leakage of cerebrospinal fluid (CSF) due to lateral erosion of the skull may present as otitis media with effusion.

Signs and symptoms of serous otitis media

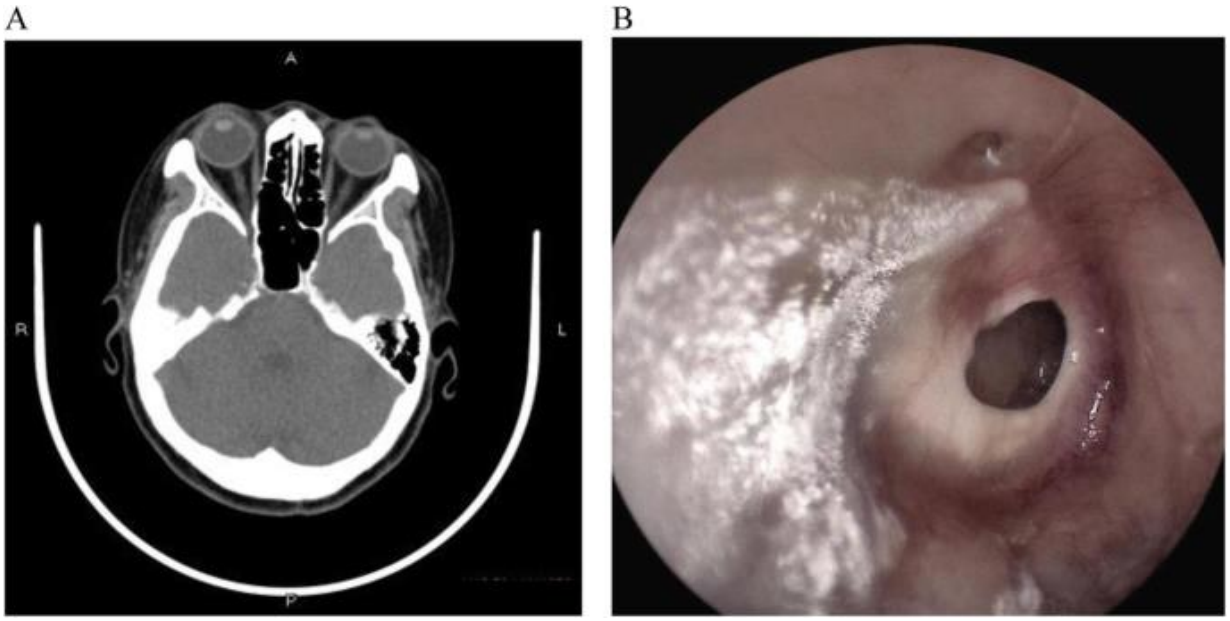
Patients may not experience any symptoms, but in some cases, patients themselves or their relatives note hearing loss. Patients may experience a feeling of fullness and pressure in the ears or a "clicking" sensation in the ear when swallowing. Earache is rare.

Possible changes in the eardrum include: color change (yellowish or gray), altered light reflex, mild to moderate retraction, and improved recognition. The eardrum may be immobile during air aspiration. Fluid levels or air bubbles may be visible through the eardrum.

Nasopharynx examination

The diagnosis of serous otitis media is made on the basis of clinical presentation and the results of pneumatic otoscopy. Pneumatic otoscopy uses an insufflator attached to the head of an otoscope to move the eardrum; fluid in the middle ear, perforation, or tympanosclerosis inhibits this movement. Tympanometry (measurement of the mobility of the eardrum) may be performed to confirm the presence of a middle ear effusion.

If the effusion persists for more than 8 weeks, adults and adolescents should undergo a nasopharyngeal examination to rule out malignant or benign tumors. Malignancy of the nasopharynx should be suspected, especially in patients with unilateral serous otitis media. If malignancy is suspected, imaging studies should be performed.

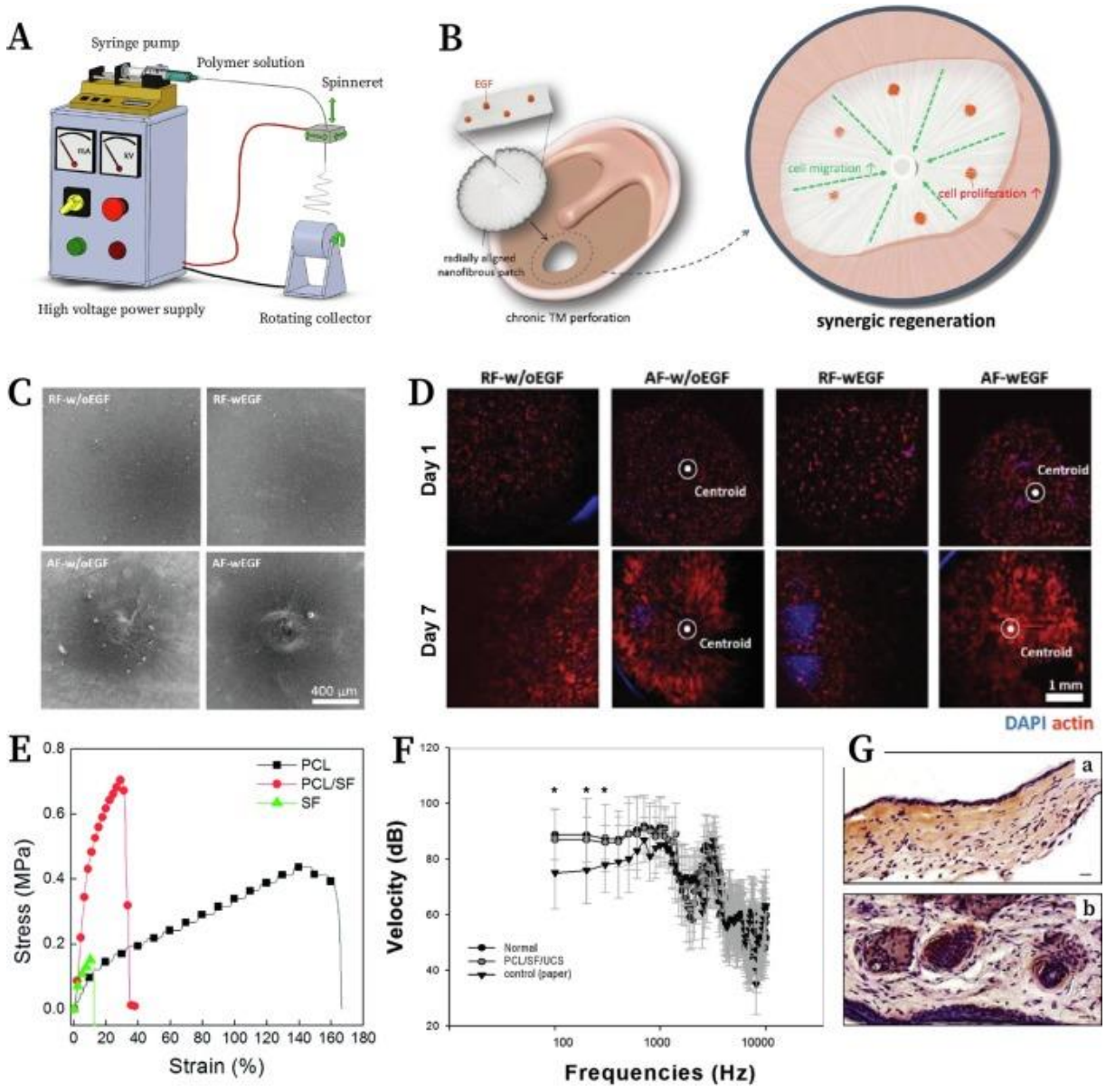


Treatment of serous otitis media

In general, all patients are advised to remain under observation. Antibiotics and decongestants are not effective. If there is a clear allergic component, antihistamines and nasal corticosteroids may be helpful.

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 can provide ventilation of the middle ear and temporarily improve Eustachian tube patency, regardless of the cause of the disease. . Tympanostomy tubes may be placed in cases of permanent conductive hearing loss caused by an accumulation of fluid in the middle ear that has not been drained. Tympanostomy tubes help prevent recurrence of acute otitis media and serous otitis media.

Sometimes, the Politzer or Valsalva maneuver is used to temporarily ventilate the middle ear. To perform the Valsalva maneuver, patients close their mouths and forcefully blow air through a pinched nostril (puffing the ear). Politzer ear inflation is performed using a special syringe (air pump), through which the doctor blows air into one of the patient's nostrils, pinching the other while the patient swallows air. This allows air to enter the Eustachian tube and the middle ear. Neither of these procedures should be performed if the patient has rhinorrhea or an acute respiratory viral infection. Patients may be instructed to gently pinch the nostrils and swallow (called autoinflation). This maneuver can be repeated several times during the day to ventilate the middle ear.



In persistently recurring secretory otitis media, correction of the underlying nasopharyngeal disease may be required. Nasopharyngeal angiofibroma should be ruled out in children, especially in adolescent boys; nasopharyngeal carcinoma should be ruled out in adults. Children may undergo adenoidectomy, including removal of the central lymphoid mass, as well as lymphoid bundles in the torus of the eustachian tube and in the fossa of Rosenmüller. 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.

CONCLUSION

Young children with long-term hearing loss due to chronic serous otitis media may require appropriate therapy to ensure normal speech development. Balloon dilation of the Eustachian tube has been used as an alternative to tympanostomy tube placement (1). While the patient is under general anesthesia, the technician inserts a balloon into the Eustachian tube and dilates it for a few seconds before removing the balloon. This procedure is an option for patients with recurrent serous otitis media and those who do not wish to have a tympanostomy tube inserted. Caution should be exercised in some patients with mild symptoms of Eustachian tube dysfunction (e.g., a feeling of fullness, pressure, or ringing in the ear) as this procedure may induce a patent Eustachian tube; symptoms include a feeling of stuffiness and autophony (patients hear their own breathing), which can be distressing to patients.

Because changes in ambient pressure can cause painful barotrauma, diving and air travel should be avoided or delayed as much as possible. If air travel cannot be avoided, young children may benefit from chewing food or drinking (e.g., from a bottle). Older children and adults may benefit from the Valsalva maneuver or the Politzer airway (as the plane descends, close your nose and mouth and try to blow air slowly into your nose; this maneuver forces air through the blocked Eustachian tube).

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. Treatment requires complete cleaning of the ear canal, careful removal of granulation tissue, and topical administration of corticosteroids and antibiotics. In severe cases, surgical intervention and systemic antibacterial therapy are indicated.

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