Complications of acute media otitis (AMO)

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Learning objectives

Acute media otitis is defined as inflammation involving the middle ear, is the most commonly occurring infection in the first 5 years of life (mainly 6 months-3 years).

Streptococcus pneumonia (35%), Haemophilus influenza (25%) , M. catarrahalis (13%) and S. pyogenes (4%) account the most of bacterial cases.

More than 90% of young children have suffered one. Usually, this condition is diagnosed clinically and treated with antibiotics, with a short course. However, complications occur in a small proportion of this patients (18%).

Computed Tomography (CT) is an important tool to determining the type of therapy. Magnetic Resonance (MR) is particularly useful when it is suspected intracranial complications.
Background

Acute media otitis is defined as inflammation involving the middle ear, is the most commonly occurring infection in the first 5 years of life (mainly 6 months-3 years).

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Clinically, acute media otitis manifests with fever, otalgia and otorrhea but nonspecific symptoms of irritability are also common in young children. CT shows increased attenuation of the middle ear, but we do not usually need CT to evaluate it.

INTRATEMPORAL COMPLICATIONS:

1.- MASTOIDITIS:

Acute mastoiditis results from obstruction of the mastoid antrum . Children with this disease have retroauricular pain, erythema and swelling. CT demonstrates middle ear fluid and opacification of the mastoid air cell, without osseus resorption or periostitis (incipient mastoiditis). Acute mastoiditis usually resolves with antibiotics. (Fig 1).

When mastoid inflammation increases, the suppuration under pressure causses ischemia and osteolysis. The pneumatic cells coalesce into larger cavities with empyema. CT image shows erosion of the mastoid septa or walls.(Fig 2)

This osteoclastic activity goes in all directions, giving intratemporal and intracranial complications. If the infection spread laterally, may produce a subperioseal abscess and if the inflammation spread medially may causing petrositis.

2.- PETROUS APICITIS:

Petrosus apicitis o Petrositis. Another complication of acute mastoiditis result of the medial extension of acute otitis media into pneumatized petrous apex. Obstruction of drainage of this area may result in formation of a purulent abscess. Clinically present with an acute febrile illness and some or all of the symptoms of the classic Gradenoig triad (ear pain, palsy of the sixth cranial nerve, and facial pain). CT demonstrates opacification of air cells in the early stage and bone destruction later. MR imaging findings of petrous apicitis are high intensity on T2-weighted images, low signal intensity on T1-weighted
images, and contrast enhancement. May be associated enhancement of the adjacent dura mater and cranial nerves due to meningitis.

3.- SUBPERIOSTEAL ABSCESS:

Subperiosteal abscess. Osteolysis of the outer mastoid cortical bone results in an abscess that can extend to postauricular side. (Fig 3 y 4)

4.- BEZOLD ABSCESS:

Bezold abscess: Osteolysis occurs in the internal mastoid cortex, over the sigmoid sinus and formation of a perisinus and epidural abscess.

5.- Labyrinthitis, facial nerve paralysis and hearing loss can be seen by complication of acute media otitis. Clinically, labyrinthitis develops vertigo, nystagmo and hearing loss. MR imaging show an anormal labyrinthitis enhancement.

INTRACRANIAL COMPLICATIONS:

Epidural and brain abscess: Is the most common intracranial complication. Result from spread by contiguity in coalescent mastoiditis. Usually occur on posterior fossa. Brain abscess in CT show a poorly defined pattern of mass effect and low attenuation in the affected area. (Fig 5 y 6)

Subdural empyema: Subdural empyema is more common associated with sinusitis than otitis media. Usually develops in the interhemispheric fissure or in the tentorium cerebelli. CT shows widening of the extracerebral space with compression of the adjacent sulci. This is an important complication that requires soon drainage by surgery.

Dural venous thrombophlebitis: commonly result from an extradural abscess and may lead to sigmoid sinus thrombosis. The thrombus can spread to jugular vein or to dural sinuses, through emissary veins to the subcutaneous tissue. Can be asyntomatic or present as signs intracranial hypertension. The classic finding of sinus thrombosis on unenhanced CT images is a hyperattenuating thrombus in the occluded sinus. However, variability in the degree of thrombus attenuation makes this sign insensitive; hyperattenuation is present in only 25% of sinus thrombosis cases. MR imaging of venous thrombosis consist in absence of normal flow void on spin-echo images and absence of flow-related enhancement on gradient-echo MR images. (Fig 5 y 6)

Meningitis: It is a prevalent complication in this kind of patients.

Other intracranial complications like carotid artery involvement, encephalitis and hydrocephalus are less common.
Images for this section:

Fig. 1

CT shows opacification of the middle ear and mastoid cells (incipient mastoiditis)

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Fig. 2

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Fig. 3

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Fig 3.- CT demonstrates osteolysis of the outer mastoid cortical bone with increased of retroauricular soft tissue.
Fig. 4

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Fig. 5

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Fig. 6

The same patient. MRI with high signal on left sigmoid sinus on T2-weighted image and absence of flow on 2D phase contrast MR venography (venous thrombosis). Ring enhancement with gadolinium in left cerebellar parenchyma with restriction in diffusion-weighted image.

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Imaging findings OR Procedure details

A 1.5 tesla MRI is used to perform exams. Protocol included systematically a sagittal T1 and T2 spin echo acquisition completed according the results by gradient echo, sagittal and axial T1 post gadolinium injection and Phase-contrast acquisition.
Conclusion

Intratemporal and intracranial complications of acute otitis media (AOM) can be very important event and leave neurological sequelae in young children.

MDCT is a useful tool in the diagnosis of complications of acute otitis media, providing a detailed picture of the mastoid region by allowing the existence of coalescence within mastoiditis, and the possible extension to nearby structures and detect possible intracranial complications.

However, MRI can be useful in the characterization of intracranial complications such as venous thrombosis or meningitis.
References

