Is it acute mastoiditis +/-periostitis/osteitis?

**Symptoms:** Otalgia/ headache/fever

**Signs**
1. Protrusion of the pinna, loss of post-auricular sulcus (95-100%)
2. Post-auricular swelling (80-95%), erythema, mass or fluctuance
3. Otoscopy (uni or bilateral findings) – Posterior/superior canal swelling +/-bulging/ erythematous tympanic membrane +/- purulent discharge (30%) or normal otoscopy
4. Pyrexia (81%); less common if antibiotics

Admit + Baseline investigations
1. FBC, U&E, CRP
2. Blood cultures (if pyrexia)
3. Ear swab if discharge present

Medical management
1. IV Ceftriaxone OD + IV Metronidazole TDS (or as per local guideline) If penicillin allergy discuss with Microbiology
2. Microbiology advice for: antibiotic sensitivities/if deteriorating/ treatment duration /de-escalation from IV to PO therapy
3. Consider topical treatment: e.g. topical ear antibiotic drops e.g. Ciprofloxacin 2 drops TDS
4. 4 hourly vital signs and review by nursing staff, and regular observations by the medical team

Indications for imaging
1. Clinical findings suggesting extracranial complications (postauricular abscess, neck mass, CN deficits, retro-orbital pain, vertigo, nystagmus)
2. Clinical findings suggesting intracranial complications - persistent headache OR pyrexia (meningeal signs, CN deficits, focal neurology, altered consciousness)
3. Severe illness or toxic appearance, persistent pain/malaise or AOM not responding to antibiotics
4. Failure to improve after 24hrs IV antibiotics

Contrast enhanced CT petrous bones and brain
NB: presence of opaque air cells in the mastoid antrum does not warrant urgent intervention in the absence of other signs * see note 4 for details on imaging findings

Subperiosteal abscess

Continue medical management
If failure to improve after 24 hours consider surgical intervention +/- contrast enhanced MRI petrous bones

Surgical management
Myringotomy/ grommet + cortical mastoidectomy
NB: Send pus /tissue samples for microbiology and histology

Other complications:
- Intracranial abscess: seek Neurosurgical opinion + cortical mastoidectomy
- Neck abscess: Incision and drainage of neck abscess + cortical mastoidectomy
- Venous sinus thrombosis: seek Haematology opinion regarding anticoagulation + cortical mastoidectomy
- CNVII palsy/Gradenigo’s syndrome: myringotomy/ grommet + cortical mastoidectomy

Outpatient

Admission

Medical Mx

Imaging

Surgical Mx

Swelling has resolved

No signs of complications

Pyrexia settled, eating and drinking, no parental concerns and patient established on oral antibiotics

Swelling has resolved

No signs of complications

Pyrexia settled, eating and drinking, no parental concerns and patient established on oral antibiotics

Definitions

1. **Acute mastoiditis**: acute infection and inflammation in mastoid
2. **Mastoiditis with periostitis**: infection spreads from the mastoid to the periosteum by emissary veins. An abscess is not present but the pinna pushed forward, loss of the post-auralic sulcus and erythematous or tender mastoid (also called incipient mastoiditis).
3. **Acute mastoid osteitis**: also called coalescent mastoiditis-thin bony septae between air cells are destroyed as the pressure of accumulating pus increases, abscess cavities form and pus dissect into adjacent areas, the most common being subperiosteal abscess. Other notable areas for abscesses to form: posterior belly of digastric (Citelli), sternocleidomastoid (Bezold) or temporalis muscle (Luc).
4. **Masked mastoiditis**: incompletely treated AOM after 10-14 days, may present with a persistent fever and otalgia but without other signs.

(Bluestone, 2002)

Notes

1. The incidence of mastoiditis has remained stable despite decrease in prescriptions for AOM, with no difference noted in prior antibiotic use between those developing subperiosteal abscess or not (Ho, 2008)
2. Differential diagnosis includes lymphadenopathy, periauricular cellulitis, perichondritis, mumps, tumour. Rarely Granulomatosis with polyangiitis, cholesteatoma, leukaemia and histiocytosis hence the need for tissue for histology at surgery (Kontorinis, 2012)
3. The bacterial species implicated most often are Strep. Pneumoniae, Strep. Pyogenes, Staph. Aureus. P. Aeruginosa is common if recent recurrent AOM or recent antibiotic use and especially where a perforation is present, or in non acute presentations (Luntz, 2001)
4. Imaging findings: Fluid in middle ear and mastoid, loss of definition of the bony septae (coalescence), destruction or irregularity of mastoid cortex, periosteal thickening and abscess formation. NB opacification of antrum /air cells without coalescence does not indicate acute mastoiditis or mastoid osteitis when present as an isolated finding.
5. Immunological evaluation may be warranted in children with recurrent episodes of AOM leading to mastoiditis

References

5. Kontorinis, Psarommatis, Karabinos, Ilidromitis, Tsakanikos, J Laryngol Otol, 2012;126(3):244