

PETROUS APICITIS/GRADENIGO'S SYNDROME

INDICATIONS AND PATIENT SELECTION

An aerated petrous apex may become infected as an extension of mastoiditis and otitis media and be disposed to associated intracranial complications, including epidural abscess, abducens palsy, and trigeminal irritation, among others. The classic triad described by Gradenigo in 1904 and 1907 included suppurative otitis media, abducens paralysis, and deep facial or retrobulbar pain secondary to trigeminal involvement, although only 42% (24 of 57) of the patients in his series had the complete triad (Fig. 120-10).^[51] Petrositis can be associated with involvement of cranial nerves V and VI. As noted by Gradenigo, abducens palsy occurs in a minority of cases of petrous apicitis, but symptoms vary, and rarely this may be the only manifestation.^[52] The syndrome may occur in conjunction with other intracranial complications, and hence possible additional pathologies such as meningitis and lateral sinus thrombophlebitis should be thoroughly evaluated concurrently.

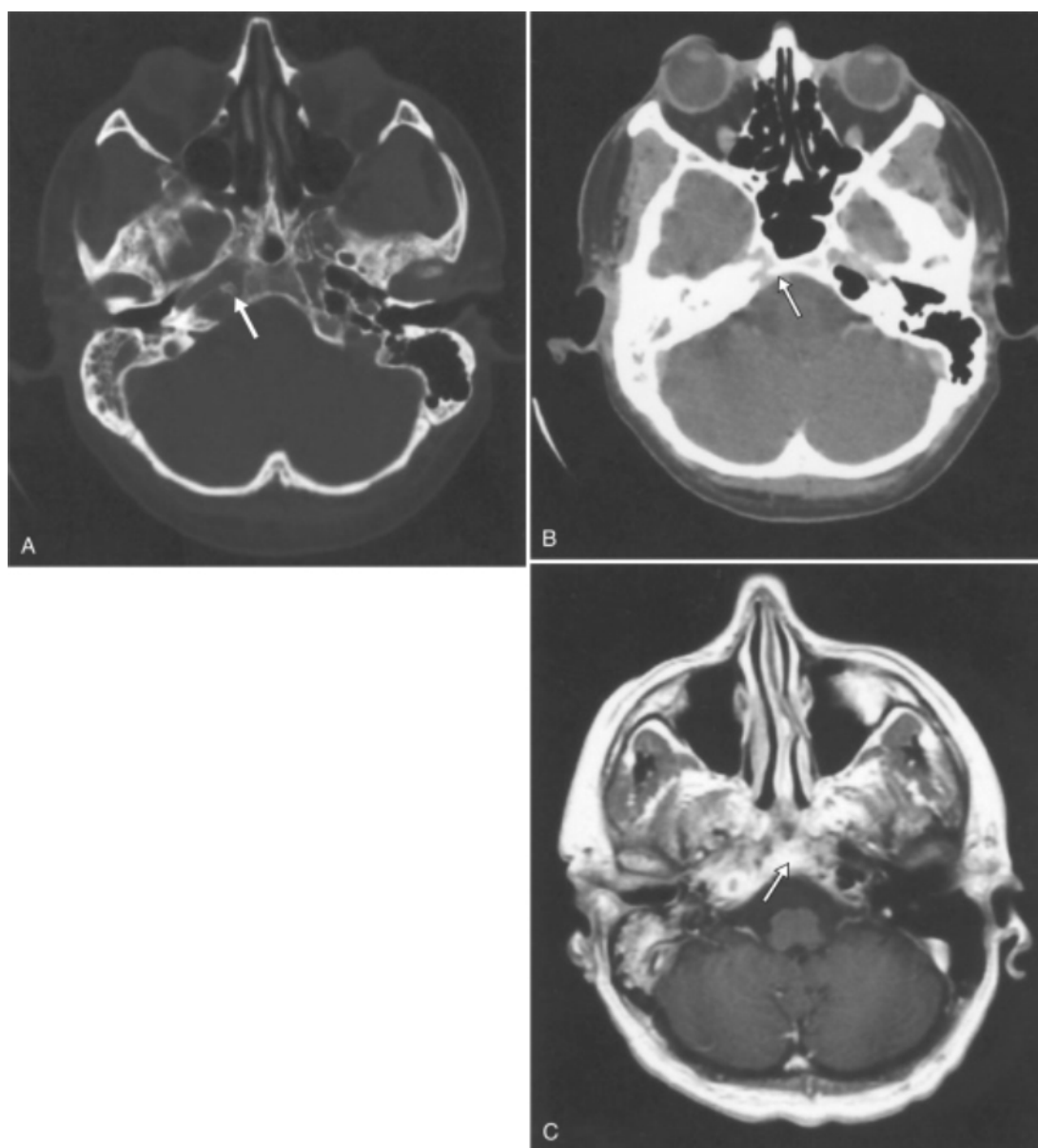


Figure 120-10 Gradenigo's syndrome. **A**, Axial computed tomography scan in a patient with right-sided otalgia, otorrhea, and abducens palsy. The right mastoid and petrous apex are opacified, and there is erosion of bone along the medial aspect of the petrous apex (*arrow*). **B**, Soft tissue cuts reveal meningeal enhancement in this region (*arrow*). **C**, Axial T1-weighted magnetic resonance image with gadolinium enhancement reveals an abscess involving the petrous apex (*arrow*).

Petrous apicitis can occur secondary to acute otitis media and as a complication of chronic ear disease. Pneumatized petrous apices generally communicate with mastoid air cells, thereby providing a route of spread for infection, and some authors report that even nonpneumatized or sclerotic petrous apices may become inflamed.^[53] Anatomic studies have also demonstrated venules forming conduits from the cavernous to the inferior petrosal sinus or jugular bulb.^[54] Inflammation of the petrous apex can irritate the abducens, which travels under the petroclinoid ligament in Dorello's canal.^[55] Similarly, the trigeminal (gasserian) ganglion or branches can become involved and result in pain throughout the affected distribution.

Both CT and MRI have important roles in diagnosing petrositis.^[56] CT with contrast enhancement can show bony erosion, fluid-filled opacification, and possibly abscess formation, but the contralateral petrous apices cannot be assumed to be equivalently anatomically aerated for comparison. MRI can distinguish between marrow, CSF, and purulence.

SURGICAL TECHNIQUE

If a trial of intravenous antibiotics does not lead to the resolution of petrositis or if imaging shows areas of necrotic bone, surgical management is indicated. One recent case report detailed resolution of Gradenigo's syndrome without surgery in both a 6-year-old child in whom the condition developed after acute otitis media and a 70-year-old with a history of chronic ear disease.^[57] Another report noted one case in three resolving with antibiotics, but the other two patients required surgery.^[58]

The petrous apex has been described as the least surgically accessible portion of the temporal bone.^[59] Mastoidectomy and tympanostomy tube placement may be sufficient to allow drainage of the petrous apex air cell tracts.^[60] Surgical approaches to an inflamed petrous apex depend on the patient's hearing status and temporal bone anatomy and on the surgeon's training and include the infralabyrinthine, transcanal infracochlear, transsphenoidal, translabyrinthine or subtotal petrosectomy, and middle fossa approaches (discussed in Chapter 102).^[61,62]

POSTOPERATIVE CARE/COMPLICATIONS

Complications of mastoidectomy and postoperative care are described in Chapter 115. Additional surveillance is necessary in a patient with intracranial complications, including monitoring for CSF otorrhea/rhinorrhea, cerebral edema, seizures, and pneumocephalus. Monitoring in an intensive care unit with imaging within 24 hours after surgical intervention is warranted. Prolonged bed rest and possible neurologic impairment leave patients predisposed to pulmonary emboli, and prophylaxis may be warranted. A multidisciplinary team that includes neurosurgery and infectious disease consultants is recommended. Long-term intravenous antibiotics may be indicated (with a peripherally inserted central catheter) for all intracranial complications of otitis media.

The otolaryngologist must be alert to the possible development of intracranial complications of otitis media and, when suspected, must remain aware that more than one such complication will often occur simultaneously. For any patient with otorrhea, temporal bone imaging should be considered. Early and effective treatment of acute otitis media with antibiotics has made the development of subsequent complications more subtle and less fulminant. Temporal bone imaging should be done on an urgent basis and should include brain imaging if otitis is accompanied by headache, fever, mental status changes, visual complaints, or other signs or symptoms that may indicate a disease process involving more than just the middle ear. Ambiguous or inconclusive findings on contrast-enhanced CT should be followed by MRI, and a low threshold for admission and further workup should be maintained until the possibility of intracranial complications can be confidently excluded.

PEARLS

- Patients often have more than one intracranial complication.
- When evaluating for the possibility of intracranial complications of otitis media, MRI provides better detail of intracranial structures than CT.
- Hearing should be monitored closely after meningitis with consideration given to early cochlear implantation if hearing loss is accompanied by radiologic evidence of labyrinthitis ossificans.
- Some complications (i.e., empyema) may progress very rapidly, and emergency surgical intervention is warranted.

PITFALLS

- Classic signs of meningitis (Kernig's sign, Brudzinski's sign) are not very sensitive and may be absent in a patient with otitic meningitis.

- Temporal bone imaging may miss an intracranial abscess; suspicion should prompt dedicated brain CT or MRI with contrast enhancement.
- Intracranial complications may occur several weeks after treatment of an acute ear infection; thus, if there is a history of recent acute otitis media, the possibility of intracranial involvement should not be dismissed on the basis of a normal otoscopic examination.
- In patients with radiologic evidence of severely elevated intracranial pressure, lumbar puncture may result in cerebral herniation; particularly in patients with otitic hydrocephalus, this procedure should be performed with great care, preferably in the operating room.

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