INTRACRANIAL COMPLICATIONS OF CHRONIC OTITIS MEDIA

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TABLE 149.1 **COMPLICATIONS OTITIS MEDIA**

- **Intratemporal (extracranial)**
  - **Mastoiditis**
    - Acute
    - Coalescent
    - Chronic
    - "Masked"
    - Associated with subperiosteal abscess
    - Associated with deep neck abscess (Bezold abscess)
  - **Petrositis**
  - **Labyrinthitis**
    - Serous or toxic
    - Suppurative
      - Otogenic
      - Meningogenic
  - **Facial paralysis**
  - **Labyrinthine fistula**
- **Intracranial**
  - **Extradural granulation tissue or abscess**
  - **Sigmoid sinus thrombophlebitis**
    - Occluding
    - Nonoccluding
  - **Brain abscess**
  - **Otitic hydrocephalus**
  - **Meningitis**
  - **Subdural abscess**

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PATHOPHYSIOLOGY

- Bacterial infections involving the middle ear cleft.
- Infection can spread via direct extension, via venous structures, or hematogenously.
- Risk factors can be complex and interrelated, but are primarily associated with (a) exposure to pathogens, (b) local anatomy, and (c) host response.

(C) HOST RESPONSE

- Production of tissue edema and granulation tissue.
- Obstruction of the drainage and aeration.
- Creates an environment conducive to the growth of anaerobic organisms and the destruction of bone.

TABLE 149.2 BACTERIOLOGY OF OM (PATHOGENS LISTED IN ORDER OF PREVALENCE) (6,7)

Chronic otorrhea with or without cholesteatoma
- Mixed aerobic (also occasionally including *S. pneumonia*) and anaerobic organisms
  - Foul-smelling ears (especially with cholesteatoma) may grow 5–11 organisms, always mixed aerobic and anaerobic
- *Pseudomonas aeruginosa* (most common aerobe)
- *Staphylococcus aureus* and *Staphylococcus epidermidis*
- Other aerobic organisms including *Proteus* sp., *Klebsiella* sp., *Escherichia coli*
- Various anaerobic organisms including *Bacteroides fragilis*

Intracranial abscesses (brain and subdural) of otogenic origin (mixed cultures)
- *Streptococcus* sp.
- *Staphylococcus* sp.
- *Proteus* sp.
- Anaerobic organisms (*Peptococcus*, *Peptostreptococcus*, *Bacteroides fragilis*)

Bacterial meningitis in children
- *Streptococcus pneumonia*
- *Haemophilus influenzae*, type B
- *Neisseria meningitidis*

(A) EXPOSURE TO PATHOGENS

Multiple organisms are found in 57% of chronically draining ears with cholesteatoma, with an average of three different organisms.

Malodorous discharge is a significant early sign of complication.

Anaerobic organisms are a major cause of foul smelling discharge.

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(B) LOCAL ANATOMY -1

- Eustachian tube function:
  - The mucosal edema resulting from OM itself impairs eustachian tube function and inhibits resolution of the infection.
- Integrity of bone over the facial nerve or dura, influence access of the infection and its products to neurovascular structures and the intracranial space.

(B) LOCAL ANATOMY -2

- Numerous venous channels traverse the bone between the mastoid and middle ear and the dural venous sinuses, sometimes associated with arachnoid granulations.
  - Inflammation adjacent to these veins and venules can promote thrombosis.
  - Thrombi and infection can then propagate to the dural venous sinuses and subarachnoid space.
- Cholesteatoma often results in patterns of bone destruction exposing the dura or facial nerve to the infectious process.
- Prior surgery can result in areas of entrapped squamous epithelium or deficient areas of bone that act as sources of infection and routes for the infection to spread.

TABLE 149.4 EARLY SIGNS AND SYMPTOMS OF COMPLICATIONS

Impending complication

- Persistence of acute infection for 2 weeks or more
- Recurrence of symptoms within 2 weeks after initial resolution
- Acute exacerbation of chronic infection, especially if foul-smelling
- Foul-smelling discharge during treatment
- *Haemophilus influenza* type B or anaerobes

Complication (associated complication)

- Fever associated with a chronic perforation (intracranial infection or extracranial cellulitis)
- Pinna displaced inferolaterally and/or edema of the posterosuperior ear canal wall skin (subperiosteal abscess)
- Retro-orbital pain (petrositis)
- Vertigo in a patient with an infected ear (labyrinthitis or labyrinthine fistula)
- Facial paralysis ipsilateral to an infected ear (facial paralysis) AOM or COM with cholesteatoma
- Headache and lethargy (intracranial complication of any sort)
- Meningismus (meningitis or subdural abscess)
- Focal neurologic signs or seizure (brain abscess)
- Global neurologic signs (subdural abscess or meningitis)

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Intracranial complications of otitis media: 15 years of experience in 33 patients

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OBJECTIVES: Complications in the central nervous system (CNS) from acute otitis media (AOM) and chronic otitis media (COM) are becoming fewer, although they still represent a challenge for early recognition, adequate treatment, and satisfactory results. This retrospective study analyzed clinical data and therapeutic options in 33 patients with intracranial involvement resulting from otitis media. Important clinical features of intracranial complications and the sequence of the most efficient therapeutic maneuvers are discussed.

METHODS: Charts of six patients with AOM and 27 patients with COM associated with CNS complications were analyzed for clinical presentation, imaging, and therapeutic approach.

RESULTS: Ages ranged from 6 months to 79 years, with no gender predilection. Persistent fever, headache, and purulent otorrhea were the main symptoms. *Proteus mirabilis*, *Enterococcus*, and *Pseudomonas aeruginosa* were the most common microorganisms in COM, and *Pneumococcus* and *Haemophilus* were the most common microorganisms in AOM. Nineteen patients (58%) presented with more than 1 CNS complication, resulting in a total of 56 complications, including 26 cases of otogenic brain abscess, 21 cases of meningitis, 5 cases of lateral sinus thromboses, two cases of subdural empyemas, 1 case of epidural empyema, and 1 case of meningocele. Surgical interventions included craniotomy and drainage of the abscess (n = 17), open mastoidectomy with abscess drained through the mastoid (n = 10), open mastoidectomy alone (n = 8), and closed mastoidectomy (n = 2). Twelve patients who underwent craniotomy had subsequent mastoidectomy for recurrent abscess.

At the 6-month, 66% of patients presented without sequelae, 24% presented with sequelae, and 9% died.

CONCLUSION: Early identification and prompt clinical and surgical intervention with mandatory drainage of the middle ear (primary disease), was essential for better outcome. (Otolaryngol Head Neck Surg 2005;132:37-42.)

Despite great advances in the treatment of all forms of infectious otitis media, complications still occur. Of all forms, intracranial complications (ICC) represent the most life-threatening conditions, requiring immediate and precise therapeutic intervention. Meningitis, otogenic brain abscess, and lateral sinus thrombosis, among others, can be present during the course of either acute otitis media (AOM) or chronic otitis media (COM). This study retrospectively analyzed clinical data and therapeutic options in 33 patients with intracranial involvement resulting from otitis media. Important clinical features of ICC and the sequence of most efficient therapeutic maneuvers are discussed.

Table 1. Otological diagnosis in 33 patients with intracranial complications

Otological diagnosis	N	%
Chronic otitis media with cholesteatoma (CCOM)	26	79
Chronic otitis media without cholesteatoma (NCCOM)	1	3
Acute otitis media (AOM)	6	18
Total	33	100

Table 2. Intracranial complications in 33 patients, for a total of 56 different neurological diagnoses (58% of patients had more than one complication)

Intracranial complications	N	%
Otogenic brain abscess	26	46
Meningitis	21	37
Lateral sinus thrombosis	5	9
Subdural empyema	2	4
Meningocele	1	2
Epidural empyema	1	2
Total	56	100

Table 3. Intratemporal complications associated with intracranial complications (9 cases, 27%, total = 33 patients)

Intratemporal complications	N	%
Facial palsy	4	45
Mastoiditis	3	33
Labirinthine fistula	2	22
Total	9	100

Table 4. Audiometric study in 21 patients

Audiometric study	N	%
Conductive hearing loss	14	67
Anacousis	5	24
Mixed hearing loss	2	9
Total	21	100

Table 5. Bacterial culture for aerobic microorganism in 33 patients

Bacterial culture	AOM	COM	Total	%
Negative culture	3	14	17	51
Proteus mirabilis	0	6	6	18
Enterococcus	0	2	2	6
*Pseudomonas**	0	2	2	6
Pneumococcus	1	1	2	6
Not performed†	1	1	2	6
Haemophilus	1	0	1	3
*Staphylococcus**	0	1	1	3
Streptococcus viridans	0	1	1	3
Total	6	28	34	102*

AOM, acute otitis media; *COM*, chronic otitis media.

*One patient grew 2 different types of bacteria.

†Patient died before any procedure.

The previous use of antibiotics might be an explanation for the low sensitivity of bacterial culture.

Table 6. Otological surgical intervention in 33 patients

Otological surgical intervention	AOM	CCOM	NCCOM	Total	%
Open mastoidectomy with abscess drainage through the mastoid	0	12	0	12	37
Open mastoidectomy without abscess drainage	0	11	0	11	33
Closed mastoidectomy	1	1	1	3	9
Nonotological surgery intervention	5	2	0	7	21
Total	6	26	1	33	100

AOM, acute otitis media; *CCOM*, chronic otitis media with cholesteatoma; *NCCOM*, chronic otitis media without cholesteatoma.

- Otological surgical intervention was performed in 26 patients
- Open mastoidectomy: 23, for reconstruction of the conductive system
- Closed mastoidectomy with tympanoplasty: 3, for NCCOM, to restrict cholesteatoma to the middle ear, and for cases of AOM with poor evolution despite adequate medical tx.

- Seven patients did not have surgical intervention
- Four patients with AOM presented good resolution with clinical therapy
- Three cases (1 with AOM and 2 with CCOM) arrived at the emergency room in poor clinical condition, died after a few hours, and all presented with otogenic brain abscess.

Table 8. Outcome in patients with intracranial complications of otitis media

Outcome	AOM	COM	Total	%
With neurological sequelae	3	5	8	24
Without neurological sequelae	2	20	22	67
Death	1	2	3	9
Total	6	27	33	100

AOM, acute otitis media; *COM*, chronic otitis media.

- 8 (24%) showed permanent neurological sequelae.
  - 2 patients with paralysis of the sixth cranial nerve (1 of them presenting a trembling hand)
  - 3 patients with hemiparesis
  - 1 patient with dysarthria
  - 1 patient with cortical atrophy
- All 8 cases presented with otogenic brain abscess as the intracranial complication, 1 in association with meningitis and 1 in association with lateral sinus thrombosis.

DISCUSSION

- ICCs have an incidence of 0.13% to 1.97%.
- The largest series of complications came from underdeveloped countries and was most likely related to poor medical care, difficult access, and the cost of appropriate antibiotics.
- Young age, especially in the first and second decade of life.
- Male predominance? Not seen in our study.
- Studies comparing the incidence of ICC in COM and AOM, with proportions attaining 9.2:1. In our cases, the prevalence was 4:1, and chronic forms of otitis in our study presented with cholesteatoma in 96% of the cases.

DISCUSSION

- The presence of cholesteatoma is an important predisposing fact for ICC, and has an incidence rate ranging from 78% to 100% in cases of COM with complications.
- This fact could indicate that the rupture of the osseous barrier is the most important path for expansion of infection to the intracranial cavity.
- Natural preformed pathways (osseous dehiscence, venous channels) and thrombophlebitis are also possible mechanisms, especially in cases of acute involvement.

OUTCOME

- The presence of sequelae at the follow-up period was 24% in our cases, comparable with reports in the literature of 11.8% to 28%.
- The incidence of mortality was relevant in our study (9%) and in the literature we searched (7% to 18%).

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Complications of Chronic Suppurative Otitis Media and Their Management

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Objective: The objective of this is to determine the incidence of otogenic complications of chronic suppurative otitis media (CSOM) and its management. *Study Design:* The authors conducted a retrospective study. *Methods:* The study was conducted at the tertiary referral and teaching hospital. An analysis was made about the clinical and operative findings, surgical techniques and approaches, the overall management and recovery of the patients. The data were then compared with the relevant and available literature. *Results:* Of the 70 cases, 47 (67%) had a single complication, of which eight (11%) had intracranial and 39 (56%) had extracranial complications. Twenty-three (33%) had two or more complications. The commonly encountered intracranial complications were otitic meningitis, lateral sinus thrombosis, and cerebellar abscess, which were seen in 13 (19%), 10 (14%), and 6 (9%) cases, respectively. Among the extracranial complications, mastoid abscess, postauricular fistula, and facial palsy were encountered in 26 (37%), 17 (24%) and 10 (14%) patients, respectively. Surgeries were the main mode of treatment for these conditions. According to severity, we found four different types of the lateral sinus involvement. Three patients with otitic facial palsy failed to regain full facial function despite surgery. A total of nine patients with the diagnosis of otitic meningitis, lateral sinus thrombosis and interhemispheric abscess expired. It constituted the mortality rate of 13% in our study. *Conclusion:* CSOM complications, despite its reduced incidence, still pose a great challenge in developing countries as the disease present in the advanced stage leading to difficulty in management and consequently higher morbidity and mortality. *Key*

OTOGENIC COMPLICATIONS

Complication(s) per patient	Types of Complication								Total number of patients
VI	*MA, IJ*, ED, ME, CA, LS 1	*MA, BZ, IJ*, CA, LS, *PA** 1							2
V	*BZ, IJ*, PE, LS, *ST** 1‡								1
IV	*FP*, LS, PE, ME 1‡	*GR*, LS, CA, ME 1							2
III	PE, CA LS 1	ME, IHA LS 1‡	LS, *IJ, BZ* 2‡	ME, *BZ, MA* 1	*MA*, LS ED 1	*MA, ST** IHA 1‡	†*MA*, ME, *FP* 1		8
II	ME, *PN** 1	*MA*, *LU* 1	*LB*, *FP* 1	CA, PE 1	*MA*, *PP** 1	*MA*, ME 2‡	ME, ED 2‡	*MA*, *FP* 2	11
I	TA 1	CA 1	SA 1	*LB* 1	*GR* 1	LS 1‡	ME 4‡	*FP* 5	*PF* 17	*MA* 14	46

Total complications = 117 Total patient = 70

Arabic numerals within the box represent the number of the complication/s
Letters in *italics* represent extracranial complications; normal letters represent intracranial complications

BZ *Bezold's abscess* (5), CA Cerebellar abscess (6), ED Epidural abscess (4), FP *Facial palsy* (10), GR *Gradenigo's syndrome* (2), IHA Interhemispheric abscess (2), IJ *Internal jugular vein thrombosis* (5), LB *serous Labyrinthitis* (2), LS Lateral sinus thrombosis (11), LU *Luc's abscess* (1), MA *Mastoid abscess* (26), ME Meningitis (15), PE Perisinus abscess (4), PF *Postauricular fistula* (17), SA Subdural abscess (1), TA Temporal lobe abscess (1)

* Other complications: PA *paravertebral abscess* (1), PN *pneumonia* (1), PP *Pott's puffy tumor* (1), ST *Septicemia* (2)

N.B. Numbers within the parenthesis represents number of patients with that complication

†Coexistent tuberculous otitis media; ‡ 1 or at least 1 patient expired

Results

- Total 70 patients, 30 (43%) of the patients were16 years and less.
- The male to female ratio was 3:1.
- Clinical features:
  - otorrhea in 63 (90%)
  - fever in 27 (39%)
  - mastoid abscess in 26 (37%)
  - neck stiffness in 21 (30%)
  - postauricular fistula in 17 (24%)
  - vomiting in 15 (21%)
  - meningism in 14 (20%)
  - facial palsy in 10 (14%)
  - loss of equilibrium in 6 (9%)
  - seizures in 5 (7%).

- 39 (56%) had exclusive extracranial complications.
- 8 (11%) had only intracranial complications.
- 23 (33%) had both.

RESULTS

- Otitic meningitis was the most common intracranial complication, which was encountered in 14 (20%) patients.
- Lateral sinus thrombosis in 10 (14%).
- Cerebellar abscess in 6 (9%)
- Epidural abscess in 4 (6%)
- Perisinus abscess in 3 (4%)
- Interhemispheric abscess in 2 (3%)
- Temporal lobe abscess in one (1%)
- Subdural abscess in another one (1%) patient

RESULTS

- Cholesteatoma were encountered in the middle ear and the mastoid cavity in 31 (44%) patients.
- A combination of cholesteatoma and granulation tissue were
- seen in 22 (31%).
- Sixteen (23%) patients had exuberant granulation tissue alone.

- The overall mortality of the intracranial complications was seen in nine (13%) patients.

DISCUSSION

- Serious complications(both intra- and extra-cranial complications) are more common in the first 3 decades of life in our series as well as in others.
- Males seem to have a higher preponderance for otogenic complications compared with females.
- Otitic meningitis is the most common intracranial complication, which is often associated with other intracranial complications.

DISCUSSION

- The mortality rate from otitic meningitis in our series was 29%. It was similar to other study.
- Lateral sinus thrombosis in our series had a higher mortality rate compared with others. That was due to
  - late arrival of patients
  - lack of stronger intravenous antibiotic in peripheral hospitals and health centers

CONCLUSION

- Otogenic complications of CSOM still pose a great challenge to developing countries despite its declining incidence.
- This can be attributed to lack of public health awareness and inadequate healthcare delivery system.
- Early diagnosis and prompt surgical interventions are most important for the survival of these patients.

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INTRACRACRANIAL COMPLICATIONS

MENINGITIS

- Symptom/sign
  - headache, fever, n/v, photophobia, altered mental status (ranging from irritability to unconsciousness); nuchal rigidity, papilledema, Kernig sign, Brudzinski sign.
- Evaluation
  - Otoscopic exam: AOM, CSOM(chronic suppurative otitis media)
  - Lumbar puncture: confirm the clinical diagnosis and identify the causative organism
    - Elevated open pressure, high protein, low glucose, elevated WBC, cloudy
  - CT/MRI: before lumbar puncture
    - Avoid herniation and rule out intracranial abscess, subdural empyema, or cerebritis
    - Temporal bone CT: delineate bony architecture and reveal inner ear malformations, tegmen defects, and destructive lesions

MENINGITIS

- Management
  - IV antibiotics: third-generation cephalosporin and vancomycin
  - Surgery
    - Expose the diseased dura, remove excess dural granulation tissue, and inspect for dural defects or occult abscesses
    - Timing of the mastoid operation: by the patient's neurologic and physiologic condition(stable to undergo surgery)

EXTRADURAL (EPIDURAL) GRANULATION TISSUE OR ABSCESS

- Granulation tissue and abscess may form between the temporal bone and adjacent dura when acute coalescent infection or chronic otitis with or without cholesteatoma erode surrounding bone. Pockets of infection then expand along the face of the posterior or middle fossae.
- Symptom/sign
  - headache, fever, but are often clinically silent until large.
- Evaluation
  - Contrast-CT: erosion of the sigmoid plate or tegmen and, in cases of larger extradural abscesses, a rim enhancing lentiform epidural fluid collection.
  - Enhanced MRI: better for small intracranial suppurative lesions
    - Crescentic fluid collection that is mildly hyperintense relative to CSF on T1-weighted images and isointense to CSF on T2-weighted images

EXTRADURAL (EPIDURAL) GRANULATION TISSUE OR ABSCESS

- Management
  - Surgery
    - The mastoidectomy should be extended to allow for careful inspection of the dura of the middle and posterior fossae
    - Bone overlying abnormal dura should be removed until normal dura is encountered
    - Granulation tissue may be carefully removed with a blunt elevator, scraping parallel to the plane of the dura. A portion of granulation tissue may be left behind to avoid dural penetration and CSF contamination

BRAIN ABSCESS

- Cholesteatoma is the cause of most cases.
- The infection is typically polymicrobial with a relatively high proportion of anaerobes.
- Venous thrombophlebitis allows bacteria to spread from the mastoid to the brain parenchyma.

BRAIN ABSCESS

- Evaluation
  - CT and MRI with gadolinium: a hypointense center with a hyperintense capsule about a formed abscess
  - MRI: additional precision in identifying extraparenchymal (intraventricular or subarachnoid) spread
  - Diffusion-weighted: use for abscess surveillance and to distinguish abscesses from ring enhancing malignancies
  - Repeat scanning should be considered in 2 to 3 week intervals if the index of suspicion remains high
- Management
  - Immediate broad-spectrum parenteral antimicrobial therapy and neurosurgical consultation
  - If surgical treatment of the brain abscess is recommended it takes priority over management of the otologic disease.

SUBDURAL EMPYEMA

- Purulent infection that has formed between the dura and the pia-arachnoid membranes.
- The subdural space may be seeded via venous channels or infection in adjacent bone or brain.
- Rarest complication of OM.
- Symptom/sign:
  - Mass effect and the close proximity to the cerebral cortex, symptoms progress rapidly.
  - Severe headache, marked focal neurologic deficits, seizures, and loss of consciousness. Meningeal signs.

SUBDURAL EMPYEMA

- Evaluation
  - Contrast CT: detect larger lesions as hypodense extracerebral collections with an enhancing medial border
  - Contrast-enhanced MRI: more sensitive and may readily demarcate the enhancing rim and extension of infection
  - Lumbar puncture: may precipitate herniation, should be avoided if the lesion is detected by imaging first.
- Management
  - Neurosurgical emergency.
  - Emergent drainage and parenteral antibiotics.
  - Treatment of the associated ear disease is accomplished after neurologic stabilization.

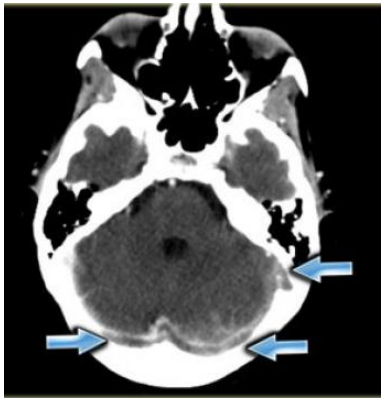
SIGMOID SINUS THROMBOPHLEBITIS

- Sinus thrombophlebitis may develop when overlying coalescent infection, granulation tissue, or cholesteatoma incites sinus wall inflammation
- The sigmoid sinus is most susceptible because of its prominent location adjacent to the mastoid air cells
- Retrograde thrombosis of cerebral veins and sinuses may result in dangerous degrees of intracranial hypertension, brain abscess, infarct, and death.
- The thrombus may propagate to the internal jugular vein and jugular bulb, generating septic emboli and/ or a jugular foramen syndrome.

SIGMOID SINUS THROMBOPHLEBITIS

- Symptom/sign:
  - Untreated COM: rapid onset of prominent otologic symptoms (otorrhea, otalgia, postauricular pain/erythema), severe headache, torticollis, and the classic high-spiking "picket fence" fever of sepsis with leukocytosis
  - Treated COM: mild symptoms with headache and unilateral neck pain, but fevers may be low grade and leukocytosis may be absent
  - The symptom duration is longer(often more than 2 weeks) and neurologic symptoms are more prevalent, including diplopia from CN VI palsy and symptoms of intracranial hypertension (headache, nausea, neck stiffness, photophobia, dizziness/ataxia)

SIGMOID SINUS THROMBOPHLEBITIS



- Evaluation
  - Otoscopic exam: AOM, effusion, retraction, or signs of COM
  - Head and temporal bone CT, with contrast: associated pathology in the mastoid and perisinus enhancement. The enhancement of the triangular sinus wall around nonenhandng intraluminal thrombus produces the pathognomonic "delta sign" in up to one-third of cases.
  - MRI with MRV/MRA: sensitive in detecting sigmoid sinus thrombosis and delineates the extent of the thrombus and the integrity of collateral circulation while also identifying other intracranial complications

SIGMOID SINUS THROMBOPHLEBITIS

- Management
  - Broad-spectrum antibiotics combined with surgery
  - Wide myringotomy is performed or a pressure equalization tube is placed.
  - Mastoidectomy is performed to expose the inflamed sinus wall and diseased dura and to remove excess granulation tissue. Subperiosteal and epidural abscesses can be treated concomitantly.
  - The bone over the sinus and surrounding dura may be removed and the sinus may be carefully aspirated to detect free blood flow
  - Venotomy may be performed for the evacuation of infected thrombus or intraluminal abscess
  - Ligation of the IJ may be considered in the presence of septic emboli.

SIGMOID SINUS THROMBOPHLEBITIS

- Management
  - Recanalization has been observed in patients receiving a range of treatments, from nonsurgical medical management, mastoidectomy; and venotomy with or without thrombectomy.
  - Use of anticoagulation to prevent thrombus propagation is also a matter of debate
    - Should be considered in patients with imaging evidence of thrombus progression or extension to additional sinuses, neurologic changes, embolic events, or persistent fevers despite surgical intervention.
    - The risk of bleeding can be significant particularly in the pediatric population.
  - Thrombolytics are not recommended as they may dislodge septic emboli in infected vessel walls.

OTITIC HYDROCEPHALUS

- Definition: increased intracranial pressure without ventricular dilatation, meningitis, or intracranial abscess in patients with acute or chronic middle ear infection.
- Symptom/sign:
  - Headache, nausea and vomiting, papilledema, and diplopia from ipsilateral abducens nerve (cranial nerve VI) palsy.
- Etiology: hypothesized to be diminished CSF reasorption by arachnoid granulations secondary to thrombosis in a dominant lateral dural venous sinus.

OTITIC HYDROCEPHALUS

- Evaluation
  - MRI with MRV: lateral sinus thrombosis with total occlusion
  - Lumbar puncture is deemed safe based on central imaging. opening pressure will be elevated, but CSF studies will reveal normal biochemistry and cytology.
  - Patients should undergo neuro-ophthalmologic examination.
- Management
  - Mastoidectomy: exposure of all diseased dura to normal dura, and removal of excess extradural granulation tissue.
  - Medically lowering intracranial hypertension and careful monitoring for reductions in visual fields and visual acuity.
    - Corticosteroids, acetazolamide, mannitol, furosemide, and/or repeat lumbar puncture.

OTITIC HYDROCEPHALUS

- As resolution of symptoms is observed in patients even in the setting of persistent lateral sinus thrombosis, recovery from otitic hydrocephalus is purported to be secondary to development of compensatory collateral venous drainage.
- Thus, management often extends for months beyond the initial surgical approach to the sinus and ventriculoperitoneal shunts may be necessary to reduce intracranial hypertension on a long-term basis.
- Failure of these measures to reverse progressive visual deterioration necessitates fenestration of the optic nerve sheath.

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THANK YOU FOR YOUR ATTENTION