

Case Report: Otogenic Lateral Sinus Thrombosis

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Abstract

The availability of effective antibiotic therapy has tremendously reduced the incidence of otogenic lateral sinus thrombosis (OLST) and changed its clinical presentation to a subtle one. The nature of predisposing otogenic disease has also changed from acute otitis media to chronic suppurative otitis media (CSOM). The prevalence of CSOM is still high in low-income economies. With such a high prevalence of CSOM, a good clinical acumen is required to identify and manage OLST. We present a case of chronic suppurative otitis media (CSOM) complicated by OLST.

Keywords: chronic suppurative otitis media; otogenic lateral sinus thrombosis; effective antibiotic therapy

Introduction

The availability of effective antibiotic therapy has tremendously reduced the incidence of otogenic lateral sinus thrombosis (OLST) and shifted the nature of its predisposing otogenic disease from acute to chronic. (1,2) Chronic suppurative otitis media (CSOM) is prevalent in low-income economies. A Ugandan slummy suburb study of CSOM found a prevalence of 13.2% while a Tanzanian survey found a prevalence of 6%. (3,4) with such a high prevalence of CSOM, predisposition to OLST is still high despite the availability of effective antibiotic therapy.

The proximity of the middle ear cleft to the anterolateral wall of the posterior cranial fossa predisposes the lateral sinus to otogenic infections. The infection of the lateral sinus occurs by either contiguous spread or a thrombophlebitic phenomenon. (2)

Recent literature shows a 6% incidence of OLST among intracranial complications of otitis media. With the advent of effective antibiotic therapy and surgical interventions, its mortality has reduced to 0 - 40%. (1,2,5) OLST has a male preponderance and presents with fever, headache, nausea, vomiting, and otologic symptoms. (2,6,7)

Contrast-enhanced computed tomography (CECT) and magnetic resonance imaging venography scans of the brain have become diagnostic modalities of choice for OLST. Surgical exploration of the mastoid cavity with or without opening of the sigmoid sinus wall is the mainstay of management. (1,2,6) Anticoagulants are not often used in the management of OLST since recanalization of the sinus occurs after surgical evacuation of the middle ear and mastoid cavities. (1,2)

We present a case of a nine-year-old who reported to the ENT ward of Mulago National Referral Hospital with CSOM complicated by OLST, chronic mastoiditis, and a post-auricular and scalp abscess.

Case Presentation

A nine-year-old girl with a history of otorrhea since toddlerhood presented with a fever, headache, otalgia, hard of hearing, and a scalp and right post-auricular abscess. Significantly from history, she had had severe acute edematous malnutrition at 18 months and pulmonary tuberculosis at 3 years. These were treated successfully.

She was admitted, had an incision and drainage of the abscesses, and was initiated on a course of broad-spectrum intravenous antibiotics and antipyretics. On the fifth day of admission, a picket fence pattern of fever was observed. The fever was associated with episodes of projectile vomiting, worsening headache, and neck pain. Direct ophthalmoscopy revealed papilledema. There were no signs of meningism.

Otomicroscopy with aural toilet revealed a foul-smelling pus discharge, an attic cholesteatoma, and a near-total tympanic membrane perforation on the right. The left ear had a small mildly discharging marginal anteroinferior tympanic membrane perforation. The inspection of the nose, sinuses, oral cavity, and throat was normal.

A CECT scan of the brain and temporal bone showed opacification of the mastoid air cells and middle ear cavities bilaterally. There was marked erosion of the right ossicular chain with an associated cortical breakthrough at the sigmoid sinus plate. The right sigmoid sinus had an "empty delta" sign with multiple air pockets around it. (Fig. 1)

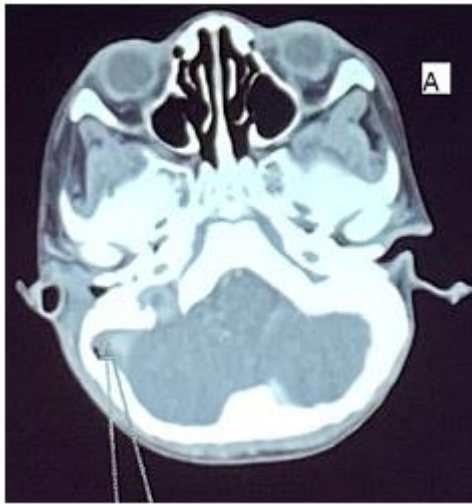


Fig. 1: Pre-Operative CECT scan shows an "empty delta" sign at the right sigmoid sinus.

A pus swab of the right ear yielded a polymicrobial growth of gram-positive cocci and gram-negative rods. *Escherichia coli* grew markedly

on the agar plates. The swab tested negative for *Mycobacterium tuberculosis spp.* A complete blood count revealed a neutrophilic leucocytosis with thrombocytopenia.

With a diagnosis of OLST with a perisinus epidural abscess secondary to an atticointral type of CSOM, the patient had mastoid exploration under general anesthesia. Intraoperatively, a canal wall down (CWD) mastoidectomy with a wide meatoplasty was performed. Granulation tissue and cholesteatoma were evacuated from the mastoid and middle ear cavities. The sinus plate was found deficient and the perisinus abscess was drained. The perisinus slough and debris were evacuated but the sigmoid sinus wall was left intact. The mastoid and middle ear cavities were rinsed with an antibiotic solution. An antibiotic-impregnated pack was left in the mastoid and middle ear cavities.

There was a great improvement for all symptoms and signs on the first postoperative (post-op) day. The patient was kept on a ten-day course of intravenous antibiotics and she steadily improved. Topical antibiotic ear drops were applied to the pack twice daily. The patient was discharged on a ten-day course of oral antibiotics. Under otomicroscopy, the pack was changed on days 14 and 21 and removed on day 28. A day 42 post-op follow up CECT scan of the brain (Fig. 2) showed a normal right sigmoid sinus with no concurrent intracranial complications.

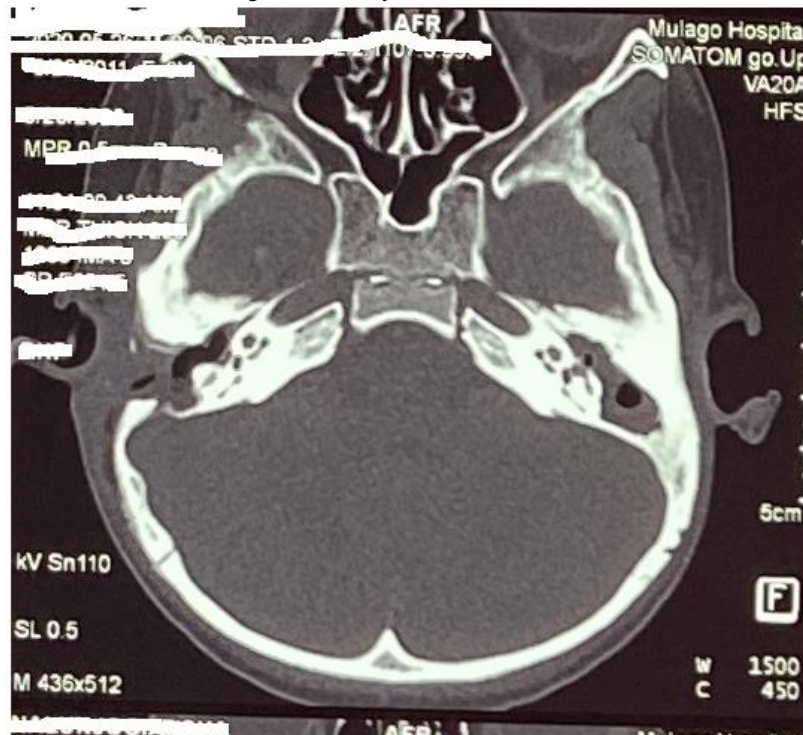


Fig. 2: Day 42 post-operative CECT scan shows a normal right sigmoid sinus.

Discussion

The availability of effective antibiotic therapy has tremendously reduced the incidence of OLST and changed its clinical presentation to a subtle one. Therefore, maintenance of a good clinical acumen is key to timely diagnosis and favorable outcomes in the management of OLST.

OLST has a male preponderance in low socioeconomic status and complicates CSOM. (1,2,8) the low socioeconomic status of our patient not only led to the development of severe acute edematous malnutrition and pulmonary tuberculosis during her toddlerhood but also led to the development of complicated chronic ear disease.

OLST varies in presentation, being mild and only noticeable on imaging in some cases and extremely severe in others. The occurrence of other intracranial and/or extracranial complications of CSOM with OLST lead to the variations in the clinical presentation of the patient. (2,6)

The clinical features of our patient were picket fence fever, headache, neck pain, projectile vomiting, papilledema, otalgia, and otorrhea. Due to the administration of pre-admission antibiotics, the picket fence pattern of fever has become less frequent with only about ten percent of the patients exhibiting the pattern in the antibiotic era. (1,2,6) Despite the incision and drainage, broad-spectrum intravenous antibiotics and antipyretics, our patient exhibited the picket fence pattern of fever because she had formed an epidural perisinus abscess and a septic

thrombus. The fever only subsided postoperatively after a CWD mastoidectomy and drainage of the perisinus abscess.

The presence of projectile vomiting with headache depicts an elevation of intracranial pressure (ICP) for which papilledema is pathognomonic. The formation of a thrombus in the lateral sinus adjacent to the mastoid occludes venous drainage of the cranium and results in an elevation of ICP. (2)

Syms et al found concurrent intracranial complications in all their cases of OLST. (7) Similarly, our patient had an epidural perisinus abscess that was occurring with OLST.

A CECT scan of the patient's brain and temporal bone revealed an "empty delta" sign at the right lateral sinus with a perisinus abscess. (Fig. 1) In the order of preference, Magnetic Resonance Imaging venography and CECT scans of the brain are the modalities of choice in diagnosing OLST. The high specificity and sensitivity of imaging have become superior to the intraoperative detection of OLST. (2) A follow-up CECT scan done at six weeks revealed the radiological resolution of the thrombus and no other intracranial complications. (Fig. 2)

The ancillary investigations for OLST include full blood counts, microbiology studies of pus swabs, blood cultures, and coagulation profiles. (6) Our patient had a neutrophilic leucocytosis due to a postauricular, scalp and perisinus abscesses and thrombocytopenia due to the consumption of platelets by the vascular thrombus.

Our patient's culture plate had a polymicrobial growth with predominant *Escherichia coli* isolates. A bacteriology and susceptibility study of CSOM at our department found *Escherichia coli* isolates and polymicrobial growth on culture plates of 9.4% and 67% of the patients respectively. (9) This indicates that *Escherichia coli* is one of the common causative microbial agents of CSOM in our setting. It is probably due to the frequent domestic use of unsafe water in the slummy suburbs where our patient was dwelling.

In Virchow's triad, endothelial injury is the factor that predisposes one to vascular thrombosis in OLST. Endothelial injury results from either the pressure exerted on the sinus wall by a perisinus abscess or contiguous or thrombophlebitic spread of infection to the sinus wall. (8) Evacuation of pus, slough, and debris from the posterior cranial fossa and mastoid and middle ear cavities should eliminate injury to the sinus wall and reverse the thrombotic phenomenon.

Our patient was managed with a CWD mastoidectomy, cholesteatoma evacuation, and perisinus abscess drainage with a twenty day's course of antibiotics and a 28-day antibiotic-impregnated pack of the middle ear and mastoid cavities. Whereas some studies advocate for the opening of the sinus wall and evacuation of the clot till active bleeding from the sinus is established, like Syms et al and Christina et al we think that removal of the source of sinus wall endothelial injury should stop the thrombotic phenomenon. (1,7,8,10) Coupled with effective antibiotic therapy, eradication of the source of lateral sinus endothelial injury should foster spontaneous lateral sinus recanalization.

Conclusion

CSOM has been and still is prevalent in low-income economies. Extensive use of pre-admission antibiotics and occurrence with other

complications of CSOM causes varying presentations of OLST. A good clinical acumen aided with imaging studies is required in diagnosing OLST timely. Eradication of middle ear disease coupled with potent antibiotic use should foster spontaneous lateral sinus recanalization.

Abbreviations

Chronic suppurative otitis media (CSOM)

otogenic lateral sinus thrombosis (OLST)

Contrast-enhanced computed tomography (CECT)

Canal wall down (CWD)

Postoperative (post-op)

Intracranial pressure (ICP)

Conflict of interest: The authors declare no competing interests or conflict of interest.

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