Unilateral Attico Antral Ear Disease with Bilateral Intracranial Complications

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Abstract A 12 year old female patient, who had attico antral type of ear disease on right side, was brought to tertiary care centre for the management of fever, vomiting and headache. Patient had unilateral attico antral type of ear disease with bilateral intracranial complication. Along with the right attico antral type of ear disease and right lateral sinus thrombosis, patient had brain abscess in the left occipital lobe. Brain abscess was drained first and later mastoidectomy was done to eradicate the source of infection and to prevent further complications due to ear disease. Patient recovered well and patient was free from any problem during follow up period of 6 months. Bilateral intra cranial complications occurring simultaneously in a patient with a unilateral attico antral type of ear disease is not reported in the literature.

Keywords Unilateral · Bilateral · Intra cranial complication · Attico antral

Introduction

The proximity of the middle ear cleft and mastoid air cells to the intra temporal and intracranial compartments places structures located in these areas at increased risk of

infectious complications [1]. In the preantibiotic era, intracranial complications secondary to ear disease occurred in 2.3–6.4% of cases. With the introduction of antibiotics, sophisticated imaging techniques and more refined surgical techniques, intracranial complication rates have been reduced to 0.04–0.15% [2].

Despite the advent of antibiotics and advancement in our knowledge and skills in managing otitis media, serious complications still exist. These infections still are major challenges with respect to diagnosis and management [3]. They can be lethal if they are not identified and treated properly [1].

Bilateral intracranial complications occurring simultaneously in a patient with unilateral attico antral type of ear disease is not reported in the literature. Here a case of attico antral type of ear disease with lateral sinus thrombosis on the right side and occipital lobe abscess on the left side is reported along with the review of literature.

Case Report

A 12 year old female patient, who had continuous right ear discharge for the past 5 years, was referred from a primary care centre for the management of fever, vomiting and headache which she had for the past 15 days. Patient was treated with antibiotics. She had no relief from her symptoms. Hence she was referred to tertiary care centre.

On examination patient was febrile. Mucopurulent foul smelling scanty ear discharge was present in the right ear canal. Deeper part of the ear canal was filled with granulations and tympanic membrane was not visualized. Tenderness was present over the right mastoid region. Left ear was normal. Tuning fork test showed conductive deafness on the right side. Nose and throat examination was normal.

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Fig. 1 CT scan with contrast showing (arrow) *delta sign* on the right side

CT scan showed soft tissue mass in the right middle ear. CT with contrast showed *delta sign* on the right side, suggesting lateral sinus thrombosis (Fig. 1). MRV showed obstruction to flow in the right lateral sinus (Fig. 2). MRI showed a thrombus in the right lateral sinus (Fig. 3). It also showed an abscess in the left occipital region (Fig. 4). Ear pus culture showed *pseudomonas* and *proteus* organisms.

Patient had septic focus in right ear and had intracranial complication on both the sides. First patient underwent burr hole and aspiration of the brain abscess. One week later, after stabilizing patient's general conditions, mastoid exploration was done under general anesthesia. Right

Fig. 3 MRI scan showing (arrow) thrombus in the right lateral sinus

Fig. 4 MRI scan showing (arrow) an abscess in the left occipital region

Fig. 2 MRV scan showing obstruction to flow in the right lateral sinus

middle ear and mastoid were filled with granulation and cholesteatoma. Sinus plate was eroded and sinus wall was covered with granulations. Except for stapes foot plate all the ossicles were eroded. Sinus was aspirated with a needle and there was no return of blood or pus. Sinus wall was not opened and only granulations over the sinus wall were removed. As there was extensive cholesteatoma, radical mastoidectomy was done. Post operative period was uneventful.

Intravenous antibiotics were continued for 3 weeks. Repeat MRI was done at the end of 3 weeks and it showed

resolved abscess. At the first month of follow up, patient had recovered completely and mastoid cavity was free from discharge. At the sixth month of follow up otoscopic examination showed well epithelialised mastoid cavity.

Discussion

Lateral sinus thrombosis is a well known complication of otitis media that comprises 17–19% of intracranial complications [1]. It is generally considered the third or fourth most complication among all intracranial complications of chronic otitis media [4].

There are many reports of multiple intracranial complications and concurrent intracranial complications and extra cranial complications of chronic otitis media. But all the reported cases had complications on the same side as the diseased ear [2, 4–6].

In the present case patient had attico antral type of ear disease with lateral sinus thrombosis on the right side and brain abscess in the left occipital lobe. Patient had bilateral intracranial complications due to unilateral attico antral ear disease.

Lateral sinus thrombosis usually develops as a complication of chronic otitis media caused by the direct dissemination of the infection through the neighboring eroded bone [7]. In the present case there was an erosion of the sinus plate by cholesteatoma and sinus wall was covered with granulations. A concise definition of clinical picture of lateral sinus thrombosis secondary to chronic otitis media remains elusive because of variability in patient presentations, presence of concurrent complications, or preadmission treatments. Some patients have life threatening septicemia at diagnosis, where as in others, lateral sinus thrombosis is relatively asymptomatic and detected only during imaging studies [4].

Clinical features vary according to the stage of the disease. The most frequent presenting symptoms were headache, otalgia, fever, otorrhoea and vomiting and pain in the neck [8–11]. In the present case patient had otorrhoea, headache, fever and vomiting. Before coming to our hospital patient had received antibiotic treatment at primary healthcare centre. Previous antibiotics therapy may mask typical symptoms that can alert the physician to the diagnosis [4].

The presence of lateral sinus thrombosis mandates further investigation for additional intra cranial complication [9]. Concomitant complications that are commonly encountered among patients with lateral sinus thrombosis are meningitis, intracranial abscesses and internal jugular vein thrombosis [12]. In a study by Kaplan et al. [12] 12 of the 13 patients (92.3%) had concomitant complications. In a study by Manolidis et al. [13] 5 of the 12 patients (42%)

had concomitant complications. Syms et al. [9] reported 2 cases of lateral sinus thrombosis that developed second intracranial complication after mastoidectomy surgery. In all these reported cases complications were present on the same side as the diseased ear. But in the present case patient had attico antral ear disease with lateral sinus thrombosis on the right side and brain abscess on the left side.

In lateral sinus thrombosis, ear pus cultures characteristically yields mixed flora. Most common organisms that were isolated in the previous studies includes bacteroids, staphylococcus, enterobacteriaceae, proteus and pseudomonas species [4, 7, 9, 14]. In the present case, ear swab culture showed pseudomonas and proteus organisms.

Radiological evaluation is crucial for establishing the diagnosis and planning of management [4]. MRI is more sensitive than CT in detecting the thrombus. MRV shows blood flow, sinus obstruction and subsequent reversal of flow [15]. MRI with gadolinium is more sensitive and specific than contrast CT in diagnosing early cerebritis [16, 17]. MRI is the investigation of choice, and should be performed in conjunction with CT, there by fully evaluating associated otological and cerebral pathology [15]. CT scan gives valuable information about bony erosion of the mastoid, and can help in determining the cause of the abscess and the most appropriate treatment options [1].

In the present case MRV showed obstruction in the right lateral sinus. MRI showed thrombus in the right lateral sinus and features suggestive of mastoid infection. An abscess was present in the left occipital region.

In the present case, along with lateral sinus thrombosis patient had brain abscess. Patient first underwent aspiration of brain abscess and later mastoidectomy was done. The high mortality rates associated with the intracranial complications of otitis media, particularly brain abscesses are undoubtedly the reason why definitive surgical intervention is advocated [2].

Therapy of lateral sinus thrombosis consists of administration of antibiotics and surgery [12]. Immediate initiation of broad spectrum antibiotics that cover gram positives, gram negatives, and anaerobes is necessary because of the severity of the infection and its polymicrobial nature. [1].

Mastoidectomy with incision of the lateral sinus, removal of the clot and local packing are considered standard care [12]. However, some reports have shown that the prognosis was not improved by exploring the sinus or by removing the thrombus. Removal of surrounding granulation tissue and inflammation around the sinus is sufficient for effective treatment [1, 4, 8, 18].

After surgical intervention, patient should remain on IV antibiotics for at least 2 weeks and at the end of antibiotics

therapy repeat MRI scans should be performed to rule out the development of secondary intracranial complication such as brain abscess [1].

In the present case, perisinus infection was removed completely and sinus obstruction was confirmed by aspiration with a needle. Sinus wall was not opened and only granulations over the sinus wall were removed. Intravenous antibiotics were given for 3 weeks. Post operative MRI scans did not show any features suggestive of intracranial complications.

Most authors agree that there is no place for anticoagulants in the management of lateral sinus thrombosis [10, 12, 14]. Systemic anticoagulation is not necessary unless the clot is shown to involve the sagittal sinus, or signs of intracranial pressure despite medical management [1]. Anticoagulants were not used in the present case.

Brain abscess is the second most intracranial complication of otitis media after meningitis. The temporal lobe and cerebellum are the two locations for otogenic brain abscess [19]. Middle ear or mastoid infections can spread to the cerebellum or temporal lobe through bone or meninges, or by bacterial seeding through valveless emissary or sinus veins that drain these regions, with or without the development of extradural or subdural infections or thrombosis of the transverse sinus [17, 20]. Otogenic brain abscess are located on the same side as the diseased ear [19]. They are usually located adjacent to the temporal bone [5]. The development of abscess in one hemisphere following infection in the contralateral mastoid can presumably occur from hematogenous spread of organisms [17, 20]. Culture from these abscess are often sterile [19].

In the present case, abscess was located in the left occipital region. This suggests that abscess is due hematogenous spread of organisms. Culture from this abscess was sterile.

Once the diagnosis of brain abscess is made, surgical intervention is required. Drainage of the brain abscess should be performed within 24 h of presentation, if the patient is stable. Abscess is drained either through an open craniotomy with drainage or excision, or by stereotactic aspiration through a burr hole. Stereotactic aspiration in most cases of brain abscess is considered the treatment of choice except in those that are very superficial or large [17, 21].

In the present case abscess was drained through a burr hole and repeat MRI scan showed complete resolution of the abscess.

In the presence of chronic otitis media with cholesteatoma, a mastoidectomy is required to eradicate the source of infection. The most important time to perform mastoidectomy is controversial. It has been conventional teaching that a mastoidectomy is performed in a delayed

manner after patient recovers from the abscess and neurosurgical drainage [1].

There are conflicting reports in the literature on how to prioritize the treatment of patients with brain abscess secondary to otologic disease. Some authors recommend that intracranial surgery should be done first and otologic surgery should be scheduled several days to several weeks later [19].

Murthy et al. [22] suggested that first neurosurgical drainage and later ear operation should be done. Hafidh Mackey et al. [2] stated that treatment of ear disease be performed at the same time as drainage of the brain abscess. The necessity for a second operation can be avoided, and the infected ear can be eliminated as a source of intracranial sepsis, thus preventing further seeding of organisms to the brain [2]. Kurien et al. [23] proposed that, craniotomy with concurrent mastoidectomy is not only safe, but also removes the source of infection at the same time the complication is being treated, thus avoiding reinfection while the patient is awaiting the ear surgery. In addition, the treatment is completed in single, shorter stay, which is economical for the patient [23].

Current recommendations, however, are to perform a mastoidectomy at the time of abscess drainage to remove the infectious focus, assuming the patient is stable enough to tolerate this additional surgery [1].

In the present case, patient underwent drainage of brain abscess. After stabilizing the general condition of patient, canal wall mastoidectomy was done to remove the septic foci from the right ear. Repeat MRI scans showed resolved brain abscess.

Conclusion

Lateral sinus thrombosis can present with multiple complications. Associated intracranial complications are difficult to diagnose, due to the overlap of clinical picture with lateral sinus thrombosis. Previous antibiotics therapies can change the presentation of intracranial complications. CT scan and MRI imaging studies with contrast are essential for accurate diagnosis and treatment plans. After draining the brain abscess, depending on the patient general condition, mastoidectomy should be planned as early as possible.

Present case shows that, if there is no pus on aspiration of the sinus, sinus wall need not be opened to remove the thrombus. Intracranial abscess drainage and conservative surgical intervention, including early mastoidectomy and eradication of all perisinus infection, is effective in the management of lateral sinus thrombosis with intracranial complications.

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