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Review Article

Chronic Mastoiditis, Risk Factors and Management

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Abstract

Background: The inflammation of a part of the temporal bone referred to as the mastoid air cells is mastoiditis. The mastoid air cells are septations of bone lined epithelial tissue that are continuous with the cavity of the middle ear. Definitely, it is an inflammation inside the mastoid process of the mucosal lining of the mastoid antrum and mastoid air cell system.

Aim: In this review, we will look into epidemiology, risk factors, symptoms and management of chronic mastoiditis.

Conclusion: The most common symptoms reported were irritability, fussiness, lethargy, fever, ear pulling, and ear pain. In certain cases, if mastoiditis is left untreated, life-threatening sequelae, including meningitis, intracranial abscess, and venous sinus thrombosis, can be controlled by antibiotic therapy and surgery.

Keywords: *Mastoiditis; Chronic Mastoiditis; Management of Chronic Mastoiditis*

Introduction

The inflammation of a part of the temporal bone referred to as the mastoid air cells is mastoiditis. The mastoid air cells are septations of bone lined epithelial tissue that are continuous with the cavity of the middle ear. Definitely, it is an inflammation inside the mastoid process of the mucosal lining of the mastoid antrum and mastoid air cell system [1]. It can be acute in its appearance and development and requires hospitalization and immediate surgical intervention [2].

Mastoiditis is typically caused by acute otitis media (middle ear infection) that has not been treated and used to be a leading cause of infant mortality. As children are more vulnerable to middle ear infections, relative to adults, they are at increased risk of developing mastoiditis [3]. Furthermost patients are less than 2 years old and have a median age of 12 months. Mastoiditis is, however, a disease of the very young. It can occur in individuals of any age.

Chronic mastoiditis is normally caused by chronic suppurative otitis media (CSOM); it is rarely the result of acute mastoiditis treatment failure [4]. In the form of perforation, CSOM is chronic inflammation of the middle ear or mastoid cavity with everlasting deviations to the tympanic membrane. 'Chronic otitis media (without effusion),' chronic mastoiditis and chronic mastoiditis of the tympanum are synonyms [5].

Uncommon cases of acute mastoiditis grow into chronic ones; bone destruction is associated with two forms of mastoiditis: acute coalescent mastoiditis and osteitis with chronic mastoiditis. Acute coalescent mastoiditis generally follows a severe bout of acute otitis media [6].

Acute mastoiditis involves the formation of pus and only occurs in cellular mastoids. It can spread through the periosteum and cause periostitis, which can destroy bones (acute coalescence mastoiditis). The infection can also progress beyond the mastoid air cells through adjacent bones or through emissary veins and may present as a subperiosteal abscess or an intracranial complication [7]. Chronic mastoiditis is a slow granulation penetration of the acellular bone accompanied by hyperemic bone decalcification [7]. The aim of this review is looking into epidemiology, risk factors, symptoms and management of chronic mastoiditis.

Epidemiology

Pediatric mastoid disease is always life-threatening and has become quite rare in developed countries today, but due to low socio-economic conditions and lack of adequate health facilities, the incidence is still high in rural areas of underdeveloped and developing countries [8]. While mastoiditis can occur at any age, most patients are younger than 2 years of age and have a median age of 12 months. In the pre-antibiotic period, acute mastoiditis was complicated and often associated with serious intracranial complications in 20% of cases of acute otitis media [3].

The occurrence of acute otitis media surgical mastoiditis in the United States is stated to be 0.004% [9]. In developing countries and very young children, some fear that untreated otitis media raises the risk of acute mastoiditis and is the cause of higher incidences [10,11].

The occurrence has decreased significantly with the advent of antibiotics, mastoidectomy and PCV-7 in 2008. 0.002% of children with acute otitis media progress to acute coalescent mastoiditis after antibiotics and pneumococcal vaccination (PCV-7) with a mortality rate of less than 0.01 per 100000 populations [12,13]. The authors estimated that the yearly occurrence of acute mastoiditis in children below 2 years of age fell from 11.0 per 100,000 population in 2001 to 4.5 per 100,000 population in 2003, the year after PCV7 was implemented. By 2008, however, the occurrence had increased again, to 12.0 per 100,000 population. In line with this, Halgrimson and colleagues proposed that the existence of pneumococcal serotypes other than PCV7 and an increase in pneumococcal antibiotic resistance could have contributed to an increase in the occurrence of acute mastoiditis [14].

The research by Marom., *et al*. looked at compensation claims from a national controlled health care plan to evaluate otitis media-related health care visits in children aged 6 years or younger, discovery that between 2008 and 2011, rates of mastoiditis declined from 61 per 100,000 child-years to 37 per 100,000 child-years [15].

A research by Tawfik., *et al*. showed that the use of the 13-valent pneumococcal vaccine (PCV13) may have had a defensive impact against mastoiditis in young people in this age group, observing a decrease in US hospitalization rates for mastoiditis in children aged 0 - 2 years between 2009 and 2012 [16]. However, the report, which examined the yearly rate of hospitalization for pediatric mastoiditis following the implementation of PCV7 and PCV13, didn't even notice an overall decrease in hospitalization rates for acute mastoiditis in patients below the age of 21 years between 2000 and 2012 [16].

Causes and risk factors

A middle ear infection that has been left untreated is the furthermost communal reason of mastoiditis. Without treatment, it may spread to your inner ear, attacking the sacs of the mastoid bone. This may start to disintegrate the mastoid bone [3]. Acute otitis media (AOM) risk factors are those of mastoiditis which contain primary congenital or acquired immune imperfections and anatomical anomalies such as cholesteatoma. However, side stream smoke, day-care attendance, and supine feeding location are the most common influencing variables [17].

As mastoiditis is a secondary AOM complication, the same set of risk factors are shared between the two transferrable processes. Patients with immune deficiencies, functional or anatomic asplenia, and chronic heart or lung disease are at risk of severe mastoiditis [18].

The most prevalent causes of acute mastoiditis also include *S. hyopneumoniae, S. pyogenes*, as well as *S. aureus* (including methicillin-resistant strains). *P. aeruginosa* and other Gram-negative bacteria, not typeable H, are fewer common etiologies. Influenzae, and resident oropharyngeal anaerobes. *Mycobacterium tuberculosis* is a rare cause of mastoiditis, but when the disease is diagnosed in individuals who live or have lived in TB endemic areas of the world, it should be treated as a possibility [18]. Most specifically, *P. aeruginosa* causes chronic mastoiditis. Other Gram-negative bacilli, S. have other pathogens to recognize when the infection is viewed as a chronic phase. Anaerobes and aureus [19].

Clinical presentation and symptoms

Mastoiditis symptoms are alike to those of AOM. Children are the most affected age group under 2 years with irritability, lethargy, fussiness, fever, ear pain and ear pulling. Older adults usually grumble of fever, severe ear pain and headache. Physical examination in show postauricular erythema, tenderness, warmth, and fluctuance with protrusion of the auricle [3]. Infants typically exhibit non-specific symptoms, including anorexia, diarrhea, or irritability. Drainage from the ear happens in more extreme situations, often manifested as a brown discharge on the pillowcase after awakening [20,21].

Complications

The development of unfussy acute mastoiditis may result in overwhelming consequences reliant on site of infection, bacteria may travel to brain or externally to the periphery [3]. Mastoiditis may also evolve to cerebral abscess, osteomyelitis and hydrocephaly, central venous thrombosis, meningitis, labyrinthitis and subdural empyema [22]. Progressive illness may result in chronic infection with bacteremia and distal septic emboli. An unusual but classical condition known as Gradenigo's Syndrome is identified with petrositis combined with otitis media, ipsilateral medial rectal palsy, eye ache and potential extra cranial nerve anomalies [19].

Management

Most cases of mastoiditis are conceivable applicants for operation and all cases need antibiotic therapy [18]. While antibiotics are the centre piece of mastoiditis treatment, an 8.5% complication rate has been shown to result from antibiotics alone. Depending on the seriousness of the infection, additional treatments, including myringotomy, placement of the tympanostomy tube, and mastoidectomy, may be indicated [3].

The initial antibiotic therapy should be administered parenterally. The classic period of treatment is a minimum of 3 weeks. Based on the particular reaction, antimicrobial resistance and probability of compliance, some patients achieve oral antibiotic treatment [18].

The first-line objective scientific option antibiotic for management of acute mastoiditis is usually a drug of the penicillin or cephalosporin family, including such ceftriaxone. When culture findings become accessible, care can be changed to more precise antibiotics for the elimination of aerobic and anaerobic bacteria that have been rescued [23].

If the preliminary symptoms are severe, coverage with vancomycin against methicillin-resistant *S. aureus* and highly resistant *S. pneumonia* strains is used [18]. Chronic mastoiditis is managed by improved penicillin in amalgamation with a β-lactamase inhibitor, as ampicillin plus sulbactam or piperacillin plus tazobactam in amalgamation with gentamicin. This amalgamation offers coverage against, *P. aeruginosa*, and other Gram-negative bacilli and anaerobes [19]. If the disease does not clear up through antibiotic therapy, surgery may be needed. Surgery can require the removal of part of your mastoid bone to clear the infection.

Conclusion

Mastoiditis is the inflammation of a portion of the temporal bone referred to as the mastoid air cells. The most common is a middle ear infection that has been left untreated. The most common symptoms reported were fussiness, irritability, lethargy, ear pulling, fever, ear pain. If mastoiditis left without treatment, it can may lead to life-threatening situations as intracranial abscess, meningitis and venous sinus thrombosis. Antibiotics can be used as management as well as surgical intervention if needed.

Bibliography

1. Diseases of ear nose and throat by PL Dhingra and Shruti Dhingra. Published by Elsevier.
2. Berry WS. "Otitis, Sinusitis, and Mastoiditis: Ear or Facial Pain Following a Common Cold". *Introduction to Clinical Infectious Diseases* (2018): 37-51.
3. Sahi D., *et al.* "Mastoiditis" (2020).
4. Brook I. "Role of methicillin-resistant Staphylococcus aureus in head and neck infections". *The Journal of Laryngology and Otology* 123 (2009): 1301-1307.
5. Acuin J. "Chronic suppurative otitis media". *BMJ Clinical Evidence* (2007): 0507.
6. Myer CM. "The diagnosis and management of mastoiditis in children". *Pediatric Annals* 20 (1991): 622-626.
7. Kumar AS. "A Clinical Study on the Management of Chronic Mastoiditis and Mastoid Abscess - A Hospital-based Study". *International Journal of Scientific Study* 6.1 (2018): 174-177.
8. Patar Mukul., *et al*. "A Hospital Based Study On Clinical Indications, Presentations And Operative Finding Of Mastoidectomy In Children". *International Journal of Scientific Research* 8.10 (2019).
9. Nussinovitch M., *et al*. "Acute mastoiditis in children: epidemiologic, clinical, microbiologic, and therapeutic aspects over past years". *Clinical Pediatrics* 43.3 (2004): 261-267.
10. Psarommatis IM., *et al*. "Algorithmic management of pediatric acute mastoiditis". *International Journal of Pediatric Otorhinolaryngology* 76.6 (2012): 791-796.
11. Palma S., *et al*. "Mastoiditis in adults: a 19-year retrospective study". *European Archives of Oto-Rhino-Laryngology* (2013).
12. Schilder AG., *et al*. "Otitis media". *Nature Reviews Disease Primers* 2 (2016): 16063.
13. Atkinson H., *et al*. "Acute otitis media". *Postgraduate Medical Journal* 127.4 (2015): 386-390.
14. Halgrimson WR., *et al*. "Incidence of acute mastoiditis in Colorado children in the pneumococcal conjugate vaccine era". *The Pediatric Infectious Disease Journal* 33.5 (2014): 453-457.
15. Marom T., *et al*. "Trends in otitis media-related health care use in the United States, 2001-2011". *The Journal of the American Medical Association* 168.1 (2014): 68-75.
16. Tawfik KO., *et al*. "Pediatric acute mastoiditis in the era of pneumococcal vaccination". *Laryngoscope* (2017).
17. Bajaj Lalit., *et al*. "Berman's Pediatric Decision Making E-Book: Expert Consult-Online and Print". Elsevier Health Sciences (2011).
18. Berry WS. "Otitis, Sinusitis, and Mastoiditis: Ear or Facial Pain Following a Common Cold". *Introduction to Clinical Infectious Diseases* (2018): 37-51.

19. Lewis K., *et al*. "In: Feigin R, Cherry J, editors. "Textbook of pediatric infectious diseases". 4th edition. Philadelphia: W.B. Saunders Company 212-217.

20. Young Tesfa. "Mastoiditis". eMedicine (2005).

21. "What to Do About Ear infections". (2008).

22. Pham Luu-Ly., *et al*. "Otitis, Sinusitis and Related Conditions". *Infectious Diseases* (2017): 236-242.

23. Brook I. "The role of anaerobic bacteria in acute and chronic mastoiditis". *Anaerobe* 11.5 (2005): 252-257.

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