Original Article

Acute Mastoiditis in Children

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ABSTRACT

Objective: To evaluate our experience in medically treating acute mastoiditis in children and to compare these results to surgical results in order to draw conclusions which may improve our management.

Setting: Al Sabah University Teaching Hospital, Kuwait City, Kuwait.

Patient and methods: A retrospective clinical study was conducted on 15 cases of acute mastoiditis in children to determine the course of their management in the last three years. All 15 cases were identified when the children were between 47 days and 11 years of age. Personal, radiological, microbiological, and surgical data including follow-up results, were collected and analyzed.

Results: Intravenous antibiotics combined by myringotomy, with or without the insertion of ventilation tubes, are as appropriate as intravenous antibiotics with mastoidectomy for the initial management of acute mastoiditis in the absence of sub-periosteal abscess or intracranial extension.

Conclusion: No significant differences were observed between the cure and failure rates for children treated surgically by myringotomy with or without insertion of tympanostomy tube and children managed more aggressively with mastoidectomy.

KEY WORDS: fever, mastoidectomy, mastoiditis, Otalgia, otorrhea

INTRODUCTION

Mastoiditis is an infection of the posterior process of temporal bone (mastoid air cells), which is usually accompanied by otitis media. Mastoiditis is the most common complication of otitis media[1]. The disease may evolve with either acute or chronic manifestations, which are distinctly different in bacterial etiology and management requirements[1]. The incidence of both forms of infection decreased rapidly after approximately 1950 due to the onset of the antibiotic era, as well as marked improvement in medical care and early placement of tympanostomy tubes[1,2].

This decrease in incidence resulted in the rarity of recent publications in the literature about the condition. House[3] reported a 50% reduction in admission for acute otitis media and an 80% reduction in the number of mastoidectomies performed after the introduction of sulfonamides compounds.

Although a few comprehensive studies on acute mastoiditis in the post-antibiotic era have been reported[4,5], this is the first such review to examine this disease in Kuwait.

PATIENT AND METHODS

A total of 15 cases were identified, aged 47 days to 11 years. On admission, medical history was taken and complete blood count (CBC), microbiological and radiological data was collected. In addition, all children (100%) were treated initially with intravenous broad-spectrum antibiotic therapy. Four patients (27%) received only medical treatment, while 11 children (73%) were treated with both medications and surgical intervention. The study, therefore, covers three methods of treatment:

Group 1: Medical Therapy. The four children in this group received intravenous broad-spectrum antibiotics as the sole treatment.

Group 2: Conservative Surgery. This group was comprised of four children. Their treatment consisted of myringotomy in one child and myringotomy with insertion of tympanostomy tubes in three children. Two of these four children also had incision and drainage of post-auricular swelling. One child had a recurrence at 35 days and was treated successfully with intravenous antibiotics.

Group 3: Aggressive Surgery. This group comprised of seven children, six of whom underwent cortical mastoidectomy. One child had a modified radical mastoidectomy for eradication of cholesteatoma. One patient, who had a cortical mastoidectomy, had a recurrence after 76 days. This recurrence was managed by myringotomy and ventilation tube insertion.

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RESULTS

This study included 15 patients aged from 47 days to 11 years, (9 males and 6 females). The causes of hospitalization for acute mastoiditis in children were pain in 13 (87%), fever in 8 (53%), otorrhoea in 4 (27%), vomiting in 2 patients (13%), poor feeling in 3 patients (20%) and coryza in 5 patients (33%).

Since all 15 patients were examined under a microscope, the findings were post auricular swelling in 15 patients (100%), dull tympanic membrane in 6 patients (40%), and perforated tympanic membrane in 4 patients (27%). Tympanic membranes were not visualized in 2 patients (13%). Postero-superior quadrant of external canal was sagging in 2 patients and attic perforation (cholesteatoma) was seen in one patient (7%) (Table 1).

Of the 15 children, 10 had associated illnesses including anemia in five children, two pre-term deliveries, one child had renal failure and two children had Down Syndrome.

In a review of the laboratory data, we found the white blood cells (WBC) varied from 8,900 to 21,000 / mm^3. Four children did not have significant elevations of the WBC (less than 11,000), two children had mildly elevated WBC of 11,100-15,000 / mm^3, and five children had moderate elevated WBC of 16,000-20,000 / mm^3. Only four children had WBC greater than 20,000 / mm^3.

Cultures were obtained in 15 children. Organisms were grown in nine cases while no growth was noted in six children. *Streptococcus pyogenes* and *staphylcoccus aureus* were the most common bacteria identified. In one child with cholesteatoma, *Escherichia coli* was isolated. Culture results are shown in Fig 1.

Plain mastoid radiography was performed in all 15 cases; three of these cases were reported as abnormal. All three had follow up computed tomography scans which showed cholesteatoma in one case, soft tissue mass in the middle ear with erosion of Tegmen Tympani and ossicles in the second case. The CT results are shown in Fig. 2. The third CT was reported as normal. The cure rate in Group 1 was 100%, in Group 2 was 75%, while Group 3 had a cure rate of 86%.

DISCUSSION

Acute mastoiditis is a serious complication of otitis media. Its clinical entity is represented by the combined symptoms of otalgia, fever, and post–auricular swelling[6]. Middle ear inflammation and effusion may pass through the eustachian tube blockage or may occur in the aditus-ad antrum, where a so-called aditus block is created. The pressure generated by the purulent secretions within the mastoid, or the antrum in the case of young infants, is relieved by egress through the cribriform area or the tymponomastoid fissure. The sulcus is obliterated and the auricle is subsequently pushed down and out. The periosteum in this area is easily separated, and when mucopus extends to this region, a subperiosteal absess develops[7].

Table 1
Percentage of signs and symptoms related to acute mastoiditis.

Symptoms	N(%)	Signs	N (%)
Pain	13 (87)	Dull TM	6 (40)
Fever	8 (53)	Perforated TM	4 (27)
Otorrhoea	4 (27)	Post auricular swelling	15 (100)
Vomiting	2 (13)	T.M not visualized	2 (13)
Poor feeling	3 (20)	P.S. Sagging	2 (13)
Coryza	5 (33)	Attic perforation. (Cholesteatoma)	1 (7)

* T.M. = Tympanic membrane
* P.S. = Posterio-superior quadrant

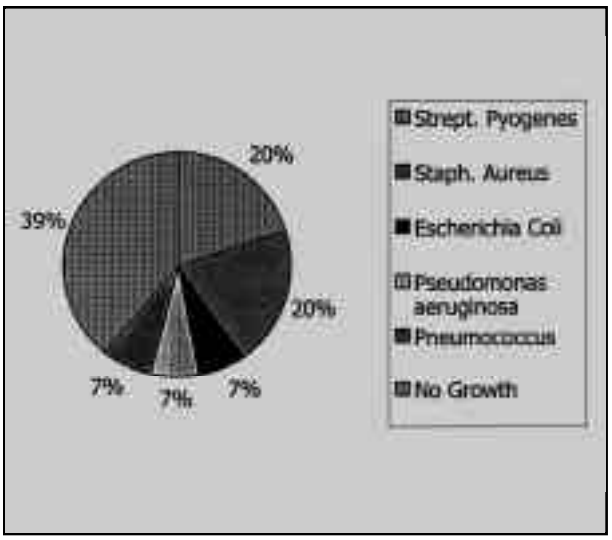

Fig. 1: Culture results

Fig. 2: Soft tissue mass in the middle ear

A diagnosis of acute mastoiditis requires (1) recent evidence of acute otitis media, usually within the preceding four weeks; and (2) the presence of postauricular inflammation.

In the pre-antibiotic era, acute mastoiditis was treated with a cortical mastoidectomy[3]. More recently, however, a conservative approach of using intravenous antibiotics and a drainage procedure such as a myringotomy or myringotomy with insertion of tympanostomy tubes has been found to be equally effective. Hawkins et al.,[8] noted a 57% resolution with this conservative approach.

Ogle and Lauer[5] reported that almost half of their patients were cured with antibiotics alone and 63% of their patients were cured with a combination of antibiotics and myringotomy.

Recent papers have documented an increased incidence in younger children, especially in children aged under 2 years, but in the pre-antibiotic era, acute mastioditis was a disorder of older children and adults[4,5]. Harley and Sdarlis explained that the fact that acute mastoiditis has become a disease of younger children could simply be explained by the fact that young children are being enrolled into day-care centers which are a known risk factor for recurrent acute otitis media[9]. The peak incidence for acute otitis media is between 6 months and 3 years[10]. This study showed that only 45% of the children had a prior diagnosis of otitis media.

Prodromal symptoms varied in duration, up to six weeks. Other than actual post-auricular inflammation and tenderness, persistent ear pain and fever are the two symptoms most likely to correlate with acute mastoiditis. Bluestone and Klein[11] asserted that any child with a fever of unknown origin should be investigated with mastoid radiographs, even in the absence of signs of otitis media.

Plain radiographs are not helpful in the decision process. A normal finding of plain films was misleading in 32% of the children in one study[6]. Consequently, acute mastoiditis is a clinical diagnosis in most instances, although so-called masked mastoiditis may represent an exception.

Computed tomography scans of the temporal bone and central nervous system should be obtained to identify not only the acute mastoiditis but also intratemporal complications, such as sigmoid sinus thrombosis or an intracranial complication[12].

CONCLUSION

Acute mastoiditis is a disease that affects mainly infants and young children and may be the first evidence of ear disease in young children. Persistent ear pain and fever are the two most common symptoms of acute mastoiditis. Conservative treatment with intravenous antibiotics and myringotomy or myringotomy with tube insertion is the appropriate initial management in children who do not exhibit any signs of intratemporal or intracranial complication of acute mastoiditis.

Cholesteatoma may present as acute mastoiditis in older children and, as such, close post-treatment follow-up care is warranted, even when the child responds readily to conservative therapy.

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