

Original Article

Retroauricular Abscess in Adults

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OBJECTIVES: To describe the clinical course and outcome of a group of adults who presented with a subperiosteal abscess (SPA)

MATERIALS and METHODS: A retrospective chart review of patients with SPA.

RESULTS: Between 2001 and 2015, 7 such patients—5 men and 2 women—were identified. Their age ranged from 18 to 62 years. Six of them suffered from chronic otitis media (COM) and presented with signs and symptoms of otalgia, pain, and swelling around the mastoid. Five of the patients underwent a previous mastoidectomy for cholesteatoma (4- canal wall down and 1 had canal wall up). One of the non-operated patients had cholesteatoma and the other one had chronic suppurative otitis media without cholesteatoma. One patient developed peripheral facial nerve palsy that resolved after surgery, otherwise, no other intratemporal or intracranial complications were observed. Management included a canal wall down mastoidectomy, abscess drainage, and parenteral wide-spectrum antibiotics. One patient suffered cardiovascular and respiratory comorbidities, requiring the delay of surgery for 6 days. This patient underwent incision and drainage of the abscess before surgery. Pathogens were recognized in 4 of the patients and included *Streptococcus pneumoniae*, *Candida albicans*, *Staphylococcus aureus*, and *Corynebacterium*.

CONCLUSION: SPA in adults is rare but may be seen in cases of neglected COM, whether previously operated or not. Comorbidities in older population group may require postponing surgery, so immediate incision and drainage may be warranted, as well as post-surgical intensive care.

KEYWORDS: Adult, mastoiditis, retroauricular abscess, postauricular abscess, cholesteatoma

INTRODUCTION

The formation of an abscess in the retroauricular region is an uncommon finding and is usually associated with middle ear infection ^[1]. This finding usually represents a subperiosteal abscess (SPA), originating from the mastoid cavity ^[2].

SPA may be regarded as a complication or, alternatively, as an advanced form of acute mastoiditis and is seen almost solely in the pediatric population. Formation of the SPA is the result of an uninterrupted passageway between the middle ear and the mastoid cavity. An infection can spread to the mastoid cortex through the tympanomastoid suture, or along vascular channels in the cribiform area. While SPA is seen in infants with complicated acute otitis media with acute mastoiditis, when it is encountered in older children (over 6 years of age) the clinician should suspect underlying chronic otitis media (COM) with cholesteatoma ^[2].

Cases of SPA in adults are mentioned in the modern medical literature, not as separate entity but as a complication of acute or COM ^[3–6]. In recent years, we have encountered several cases of adults with SPA. The purpose of this report is to describe in detail, their clinical findings, management, and outcome.

MATERIALS AND METHODS

We retrospectively reviewed the charts of all adult patients (aged 16 years or older) diagnosed with an otogenic retroauricular abscess and admitted to the Soroka University Medical Center, Beer Sheva, Israel from 2001 to 2015. Data was extracted from computerized medical files and included the physician's referral letter to the emergency room, past medical history, the findings on physical examination, the surgical findings, and outcome. The study was approved by Soroka University Medical Center, Beer Sheva, Israel.

RESULTS

The patient's data are summarized in Table 1. There were 5 men and 2 women between the ages of 18 and 62 years. Five patients had previously undergone mastoidectomy surgery for COM with cholesteatoma (1 canal wall up and the rest canal wall down). One

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patient had known COM with cholesteatoma in a remote geographical area, was followed up locally and was not operated. Three of the patients had additional comorbidities, including diabetes mellitus, arterial hypertension ischemic heart disease chronic obstructive pulmonary disease, smoking and intravenous drug abuse

The most common presenting symptoms were pain and swelling in the mastoid area. On physical examination a tender-fluctuating mass in the retroauricular region was observed. Patient 2 presented with a peripheral facial nerve weakness, which resolved after surgery. Incision and drainage before surgery was performed in 5 of the patients, 1 in a community clinic before admission and 1 patient (patient 1) underwent consecutive incision and drainage, once each day, before surgery. Surgery was delayed in this patient owing to his general state. Cultures from the abscess showed no growth in 4 patients, 1 culture was positive for *Corynebacterium*, 1 for *Streptococcus pneumoniae*, and another for *Candida albicans*. Six of the patients underwent an audiogram which showed maximal conductive hearing loss. Patient 2 underwent immediate surgery without performing an audiogram.

All patients underwent a canal wall down mastoidectomy (CWDM) with abscess drainage and parenteral wide-spectrum antibiotics for 5 to 14 days. Patient 1 suffered cardiovascular and respiratory comorbidities, which required the delay of surgery for 7 days.

Before surgery all patients underwent post-contrast head computed tomography (CT) and high-resolution CT of the temporal bone scans for ruling out intracranial complications as well as cortex erosion and intralabyrinthine fistula. Except for demonstration of the clinically evident soft tissue swelling and abscess, 3 patients showed slight defects in the tegmen. Figure 1 demonstrated a post-contrast head CT.

Intraoperative findings: In all the 4 cases of previous CWDM the abscess had formed slightly posterior to the mastoid cavity. In patient 7 the mastoid cavity was open and clear from infection. In patients 3, 4, and 6 the mastoid cavity was infected with cholesteatoma and granulations. Defects in the cortical bone were seen in 3 patients, only



Figure 1. An axial head CT with contrast of a patient with a subperiosteal abscess on the right, several years after a mastoidectomy for cholesteatoma (patient 6). Notice the soft tissue swelling with abscess and the incomplete mastoid cortex, due to a previous mastoidectomy. The right sigmoid sinus fills normally with contrast material.
CT: computed tomography.

one of them previously operated (patient 6). In the other 4 cases that were revised, the abscess developed in the soft tissues from infection in the posterior cavity, without new erosion in the mastoid cortex. All patients did not undergo any type of hearing reconstruction during surgery.

Six of the patients continue post-operative follow-up in our outpatient clinic (3 to 14 years), with well healed mastoid cavities with no recidivism. There was no significant change in hearing after the surgery. On follow-up visit, all patients were offered bone anchored hearing implants, but had declined.

MAIN POINTS

- A SPA in adults usually represents an otogenic complication of chronic otitis media.
- As with SPA seen in children, secondary to acute mastoiditis –bacterial culture, and imaging with post-contrast CT of the head to rule out intracranial complication, are required prior to surgery.
- Management principles for SPA in adults are like those of children over the age of 6: Cholesteatoma should be suspected and mastoidectomy should be planned immediately.
- The type of mastoidectomy suitable for SPA depends on extent of disease, whether there was previous surgery and on the preference of the surgeon.
- Presurgical needle aspiration and incision with drainage of the abscess may be necessary for immediate care.

DISCUSSION

We report a series of adults that developed an abscess in the retroauricular area as a complication of COM with cholesteatoma, usually in patients with previous mastoid surgery. This finding appears as SPA, although in patients with previous surgery the periosteal layer may have been violated and even used in reconstruction.

A handful of publications address the entity of SPA in adults. In a case series on mastoiditis, children and adults with intracranial and extracranial complications of acute and COM from the 1980s were reviewed^[3]. From a total 102 patients, 33 developed SPA. However, it was not apparent whether any of them were adults. In a study from Finland 160 adults were admitted for “severe acute otitis media” and acute mastoiditis. Twenty of them had COM. However, the specific characteristics of this subgroup; whether they had cholesteatoma, were they previously operated and specific outcome is not men-

Table 1. Patients' data

Patient number	1	2	3	4	5	6	7
Age and gender	62 M	39 M	52 M	58 F	23 F	26 M	18 M
Medical background	COPD, IHD, and IVDA	HT, DM, and smoker	IHD, HT, and smoker	None	None	None	None
Otologic history	COM with cholesteatoma	New diagnosis of COM	CWDM 20 YA cholesteatoma	CWDM 20 YA cholesteatoma	CWUM 6 YA cholesteatoma	CWDM 2 YA cholesteatoma	CWDM 5 YA cholesteatoma
Main complaint	Pain and swelling in the ear for a period of 3 weeks	Pain and swelling in the mastoid area	Headache, otalgia, and vertigo	Fever, headache, and pain around ear and mastoid area	Headache, and pain and swelling of ear	Pain and swelling around the mastoid	Pain and swelling around the mastoid
Presentation	ORAA draining ear	ORAA draining ear	ORAA, stenotic meatus	ORAA draining ear	ORAA draining ear	ORAA	ORAA draining ear
AB treatment before admission	-	P.O ciprofloxacin	P.O cefuroxime	P.O fluconazole	P.O amoxicillin and clavulanic acid	-	P.O amoxicillin and clavulanic acid and topical ciprofloxacin
Fever during hospitalization	-	38.4 °C	-	37.9 °C	-	-	-
WBC	N	17,700	N	N	N	N	N
Hearing status of affected ear at presentation	Dead ear	Moderate mixed hearing loss	Dead ear	Moderate mixed hearing loss	Moderate mixed hearing loss	Conductive hearing loss	Maximal conductive
Primary treatment	I&D + AB	I&D + AB	I&D + AB	AB	I&D + AB	I&D + AB	I&D + AB
Surgery	CWDM	CWDM	Revision CWDM	Revision CWDM	Revision CWDM	Revision CWDM	Revision CWDM
Timing of surgery*	7	2	1	1	2	4	4
Intraoperative findings	Tegmen defect cholesteatoma filling the posterior attic middle ear and mastoid cavity	No cholesteatoma	Cholesteatoma filling the posterior attic middle ear and mastoid space	Small Tegmen defect. Cholesteatoma within the attic	Tegmen defect Cholesteatoma filling the posterior attic middle ear and mastoid space	Cholesteatoma filling mastoid space	Normal mastoid cavity. Cholesteatoma discovered behind cavity
AB (I.V)	levofloxacin	ciprofloxacin clindamycin	amoxicillin clavulanic acid	ceftriaxone ciprofloxacin	ciprofloxacin	cefazoline ceftriaxone	ciprofloxacin
Cultures: middle ear SPA	-	<i>Streptococcus pneumoniae</i>	-	<i>Candida albicans</i>	-	<i>Staphylococcus aureus</i>	<i>Corynebacterium</i>
Admission	15 days	10 days	5 days	8 days	9 days	12 days	15 days
Follow-up	2 years	12 years	16 years	-	7 years	2 years	7 years

* days after admission. AB: antibiotics; COM: chronic otitis media; COPD: chronic obstructive pulmonary disease; CWDM: canal wall down mastoidectomy; CWUM: canal wall up mastoidectomy; DM: diabetes mellitus; F: female; HT: essential hypertension; I&D: incision and drainage; IHD: ischemic heart disease; I.V: intravenous; IVDA: intravenous drug abuse; M: male; N: normal; ORAA: otogenic retroauricular abscess in adult; YA: years ago.

tioned [4]. Palma et al. [5] reviewed 62 adults with acute mastoiditis. Nineteen of them suffered from COM, among them 5 had cholesteatoma. Interestingly, only half of them presented with the classic features of acute mastoiditis in children and none developed SPA. Patients with COM showed a slow growing inflammatory process, usually with no retroauricular swelling.

A study from Pakistan analyzed 44 patients with COM, most of them with cholesteatoma [6]. SPA was the most common complication however no details are provided on clinical characteristics, management, and outcome.

The presentation of pain, retroauricular swelling and tenderness was observed in our series of adults with SPA, which was similar to that described in children and contrary to that described by Palma et al. [5].

Our management principles regarding SPA in adults were based on our experience and on the medical literature: (1) acute mastoiditis with SPA, which is seen in infants, as well; (2) SPA occurring in older children with COM with cholesteatoma. The standard treatment of acute mastoiditis with SPA has been performing a cortical mastoidectomy surgery, with insertion of a ventilation tube into the tympanic membrane and parenteral wide-spectrum antibiotics [2]. In the

second situation the patients require addressing not only the acute infection but also the management of the cholesteatoma. Accordingly, a canal wall up mastoidectomy (CWUM) or CWDM is required, as well as long-term follow-up.

In our case series, all 7 patients had COM. Interestingly, 2 of them were not operated previously (patient 1 and 2). Patient 1 presented with a neglected infected cholesteatoma, presenting in a similar manner to cases seen in older children. Patient 2 was diabetic (child onset, type 1) and had undiagnosed COM without cholesteatoma. In addition, the patient presented with a collection of pus involving the squama and anterior occipital part of the skull, rather than an encapsulated abscess, seen in the other cases. No known relationship had been found between otogenic abscess and diabetes in the literature, but this underlining disease could, potentially, contribute to this atypical clinical picture.

Five of the patients underwent previous surgery (4 CWDM and 1 CWUM) and most of them lacked appropriate follow-up. The reasons for this could be due to the failure of the health care system, or non-compliance of the patient. Patient 5 underwent a CWUM with recidivism of cholesteatoma, in which, at the end of surgery the periotome is preserved and sutured, so the abscess was a SPA, extending from pus in the mastoid cavity. The expected mechanism would be spread of infection from recidivism of attic cholesteatoma through the drilled mastoid cavity and cortex.

Patients 3, 4, 6, and 7 had undergone CWDM 5 to 20 years previously. We are taught and we teach that a radical mastoid cavity, which is formed after drilling down the posterior canal wall, is safer, in regard to recidivism of cholesteatoma, than CWUM, especially if the follow-up is poor [7]. A well healed CWDM cavity usually requires occasional toilette under a microscope, however even if this is not performed and debris accumulate formation of an abscess is rather unlikely. In patient 3 there was stenosis of the meatoplasty, probably causing accumulation of keratinizing squamous epithelia that became infected. However, if an abscess is formed in the mastoid cavity, the infection may extend posteriorly, under the subcutaneous tissue and retroauricular muscles, to present behind the auricle as a fluctuating mass. However, it is more difficult to explain the pathophysiology of abscess formation in the other cases after CWDM, in which the meatoplasty was adequate. In patients 6 and 7 the meatus was sufficient, but the mastoid cavity was full of infected debris and the abscess was formed between the debris and the retroauricular subcutaneous tissue, without drainage into the meatus. Patient 6 was rather perplexing, as the patient was under regular follow-up and a month before presentation had, what seemed to be, a well healed, dry mastoid cavity. Evidently, the patient developed recidivism, posterior to the normal looking lining of the mastoid.

Surgical Approach for Managing SPA

What would be the preferred surgical approach for adult patients with SPA? As developing a SPA is a complication of otitis media, the aim of surgery should be to provide, in top priority, a safe ear. The appropriate surgical approach would depend whether previous surgery was performed, the type of procedure previously performed and, of course on the surgeon's experience and preference. For ex-

ample, a previous CWDM would dictate revision of the cavity and drainage of the abscess. When the patient underwent a previous CWUM, as in patient 5, it would be reasonable to revise into a CWDM. Depending on the aeration of the mastoid, location, and the extent of cholesteatoma, some surgeons might even consider performing a revision CWUM.

In cases with no previous surgery, a reasonable approach would be to perform CWUM, given that there is good vision, no erosion of the posterior bony canal, and that the mastoid cavity is well-developed. Our approach, however, in patients 1 and 2 who had no previous ear surgery, was to perform CWDM, as the mastoids were not well-developed, and we aimed to ensure maximal action is taken, to achieve a safe ear.

In the last decade much attention has been given to obliteration techniques of the mastoid, after either performing a combined approach CWUM [8] or after CWDM with reconstructing the external ear canal [9,10]. The mastoid cavity is obliterated, either with autologous bone pate or with ceramic granules, such as BonAlive [11]. These patients are then followed up with MRI. Interestingly, recidivism rates, according to the literature with obliteration are quite low. The presence of a solid bony barrier and obliteration of the mastoid with bone pate, closing off the epitympanum and mastoid from the middle ear cavity may lower the incidence of new retractions of the tympanic cavity and prevent a recurrence of cholesteatoma [10]. Obliteration of the mastoid cavity during mastoidectomy has been adopted in our department in the recent years but was not used at the time of surgeries or revisions presented. From experience in revisions of previous obliterated mastoid cavities, when necessary, the obliterated mastoid is drilled, with ease through the bone pate or ceramic granules, and the surgeon can proceed with removal of the cholesteatoma. It is logical that abscess formation in the cases cholesteatoma recidivisms (patient 3, 4, and 6) may have presented differently or even been prevented in an obliterated mastoid.

Recidivism of cholesteatoma, whether caused by recurrence or residual disease is common after surgery for cholesteatoma. For this reason, a second look surgery 6 to 18 months after the first surgery was once recommended for patients that underwent CWUM. Non-EPI diffusion weight MRI has replaced the second look surgery in the last 2 decades [11]. Patients after CWDM have a lower rate of recidivism of cholesteatoma and, ideally, are followed up on a regular basis for removal of wax to prevent local infection and for ruling out cholesteatoma [12].

The reason for development of SPA in patients 3, 4, 6, and 7 was a previous cholesteatoma not managed sufficiently, together with unsatisfactory follow-up. Patient 6 was an exception, as he was followed up well, yet had developed SPA (Figure 1). During surgery, the cholesteatoma was found in the posterior part of the mastoid cavity, lined with normal looking epithelia, resembling a "double bottom" of a suitcase.

CONCLUSION

SPA is rare in adults and is usually associated with cholesteatoma that had become infected. Although patients that undergo CWDM for cholesteatoma are at low risk for recidivism of cholesteatoma, the risk still exists, and SPA is a possible complication.

SPA in adults should be managed, while treating the underlining COM, following the principles of surgery for creating a dry, safe ear. Similar to all other patients after cholesteatoma removal, adults require a meticulous follow-up.

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