

# Abscess formation in the temporomandibular joint as a complication of otitis media

R. P. TAKES, M.D., A. P. M. LANGEVELD, M.D., R. J. BAATENBURG DE JONG, M.D., PH.D.

## Abstract

A case of an eight-month-old girl with an abscess in the temporomandibular joint as a complication of acute otitis media is described. The complications of acute otitis media in general and the probable explanation for the development of this complication are discussed.

**Key words:** Otitis media; Temporomandibular joint; Abscess

## Introduction

Since the introduction of antibiotics, the incidence of complications of middle-ear infections has been greatly reduced. In a recent series, complication rates of less than 0.5 per cent were reported.<sup>1</sup> The complications can be divided in extra- and intra-cranial (Table I). In the case of direct extension, the infection spreads through several well-known pathways to surrounding structures, within the temporal bone or outside it, either intra-cranially or extra-cranially. There are, however, less well-known routes of spread, leading to unusual localizations of the infection. In this report we present a child with a very unusual localization of an abscess due to spread of an acute otitis media (AOM) into the temporomandibular joint (TMJ). The probable explanation for the development of this complication is discussed.

## Case report

An eight-month-old girl with no medical history was referred to us from another hospital with a complicated course of acute otitis media with suspected mastoiditis. Some days before presentation she had developed a left-sided acute otitis media (AOM). She was initially treated with paracentesis and subsequent treatment with oral antibiotics (amoxicillin). Despite this treatment she developed a high fever with temperature rising above 40°C and a leucocyte count of 19 800. Subsequently, a non-fluctuating swelling over the mastoid appeared. She was then admitted to the referring hospital and was treated with intravenous gentamicin and cefuroxime. However, this did not result in a clinical improvement and the patient was transferred to our hospital. Upon examination the external ear canal was filled with pus and the incision in the ear drum was still open. A fluctuating swelling was found around the left auricle with temporal extension and swelling of the left eyelid.

A nasendoscopy was performed to exclude an ethmoiditis but no pus was found in the middle meatus. After a retro-auricular incision was made a subperiosteal abscess was found and drained. The mastoid cortex was intact and upon opening the mastoid it appeared to contain no pus. A ventilation tube was placed in the ear drum and a drain

was left in the mastoid cavity. Microscopy of the pus revealed Gram negative rods. Post-operatively, the patient was treated with ceftazidime intravenously. Computed tomography (CT), performed shortly after the operation, showed subcutaneous swelling without signs of abscess formation (Figure 1).

After a few days the peri-auricular fluctuating swelling recurred and a re-exploration was performed. The mastoid was re-opened but again no pus was found. The middle ear contained a small amount of pus. However, more anteriorly under the zygoma and in the TMJ a significant amount of pus was found and drained. A drain was left for irrigation. No bacteria were found now on microscopic examination. Magnetic resonance imaging (MRI) showed reactive changes around the left auricle (Figure 2). No intracranial abnormalities or signs of sigmoid sinus thrombosis were seen.

In the cultures no growth of bacteria was found, probably due to the prolonged treatment with antibiotics. Based on the finding of Gram negative rods, the most probable organism must have been *Pseudomonas aeruginosa*. The treatment with antibiotics (ceftazidime) was continued and two weeks after the re-exploration the patient was transferred back to the referring hospital. The patient recovered completely.

## Discussion

Complications of middle-ear infections have become rare events and the complication of our patient in particular

TABLE I  
COMPLICATIONS OF OTITIS MEDIA

Extracranial	Intracranial
Mastoiditis	Meningitis
Subperiosteal abscess	Extradural abscess
Petrositis	Subdural abscess
Bezold's abscess	Encephalitis
Facial nerve paralysis	Brain abscess
Labyrinthitis	Otitic hydrocephalus
Sensorineural hearing loss	Sigmoid or lateral sinus thrombosis

From the Department of Otorhinolaryngology and Head and Neck Surgery, Leiden University Medical Center, The Netherlands.  
Accepted for publication: 6 January 2000.

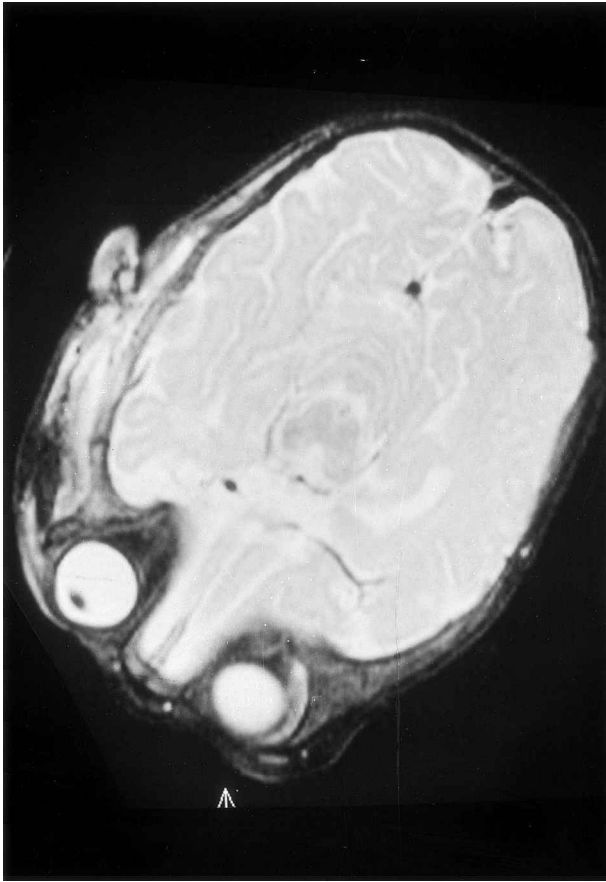


FIG. 1

Axial contrast-enhanced CT image showing subcutaneous swelling in the temporal and zygomatic region.

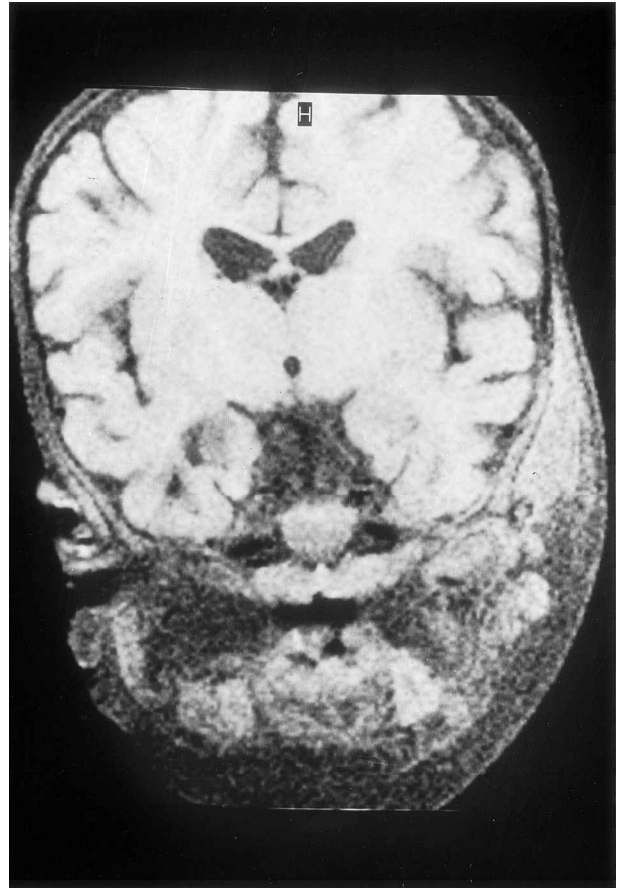


FIG. 2

Coronal, T1-weighted, contrast-enhanced MRI image showing subcutaneous, reactive changes in the temporal region and around the auricle.

seems to be even rarer. Generally, the possible routes of spread of infection are direct extension or haematogenous dissemination. Most complications of (acute) middle-ear infections will be by direct spread with bone being one of the most important anatomical barriers. Particularly in children, these bony barriers are not fully developed and therefore less solid, resulting in a higher chance of complications.

Complications of middle-ear infections can be divided in intra-cranial and extra-cranial complications (Table I). In a series of 100 patients with intracranial complications of ear infections, 76 had meningitis. Much less common were subdural effusion, empyema or brain abscesses (14) and lateral sinus thrombosis (five).<sup>2</sup> The figures in a recent study of 113 children with complications of AOM by Goldstein *et al.*<sup>3</sup> were somewhat different. Of 16 children with intracranial complications (six children with multiple diagnoses), seven had hydrocephalus, seven an epidural abscess, five sigmoid sinus thrombosis, two meningitis and one a temporal lobe abscess.

Extracranial complications often consist of subperiosteal abscesses usually resulting from mastoiditis and bone destruction. They occur most commonly over the mastoid cortex, particularly at Macewen's triangle. Seldomly it extends to the upper neck when the medial surface of the mastoid tip is penetrated (Bezold's abscess) or to the root of the zygoma.<sup>4</sup> In the study carried out by Kangsanarak *et al.* of chronic and acute suppurative otitis media, the most common extra-cranial complications were facial nerve paralysis, subperiosteal abscess and labyrinthitis.<sup>1</sup> In the series of 100 children with intratemporal complica-

tions of acute otitis media described by Goldstein *et al.*,<sup>72</sup> had mastoiditis, 22 had facial nerve paralysis and three labyrinthitis.<sup>3</sup>

The TMJ is anatomically very closely related to the ear and it may not seem improbable that infections from the middle ear spread to this location. However, abscesses in the TMJ due to underlying middle-ear infections have, to our knowledge, not been described before. Although haematogenous spread from the sinus to joints is possible, this seems highly improbable in the case of our patient. No signs of sinus thrombosis were found on MRI and no other metastatic infectious lesions were apparent. In this case, the abscess in the TMJ was therefore probably due to direct extension. The question, however, is how to explain this spread of an otitis media without involvement of the mastoid.

Recently in a paper by Knappe and Gregor<sup>5</sup> a case of Luc's abscess was described in a 15-year-old girl with an underlying cholesteatoma. They mentioned that several cases of this subperiosteal temporal abscess had been described by Luc in 1900. It was suggested by him that the route of spread of the infection was submucosally to the subperiosteal space in the external ear canal, via anatomical pathways such as the incisura of Rivinus. It may be that the route of spread in the case of our patient is analogous to the spread described by Luc. However, a literature search did not reveal the description of a similar case of extension of a middle-ear infection to the TMJ.

### Summary

An otitis media can give rise to subperiosteal abscesses without involvement of the mastoid. As has been

suggested by other authors, these abscesses probably develop through infectious spread via the subperiosteal space in the external ear canal. Besides the more common abscesses subperiostally in the temporal area, abscesses can also be located under the zygoma and even in the TMJ as was illustrated by this case.

### References

- 1 Kangsanarak J, Fooanant S, Ruckphaopunt K, Navacharoen N, Teotrakul S. Extracranial and intracranial complications as suppurative otitis media, report of 102 cases. *J Laryngol Otol* 1993;**107**:999–1004
- 2 Gower D, McGuiert WF. Intracranial complications of acute and chronic infectious ear disease: a problem still with us. *Laryngoscope* 1983;**93**:1028–33
- 3 Goldstein NA, Casselbrant ML, Bluestone CD, Kurs-Lasky M. Intratemporal complications of acute otitis media in infants and children. *Otolaryngol Head Neck Surg* 1998;**119**:444–54
- 4 Moisa II, Danziger E, Brauer RJ. Subperiosteal and Bezold's abscesses complicating cholesteatoma: A case report. *Otolaryngol Head Neck Surg* 1987;**97**:399–402
- 5 Knappe MV, Gregor RT. Luc's abscess – a rare complication of middle-ear infection. *J Laryngol Otol* 1997;**111**:461–4

Address for correspondence:

Robert P. Takes,  
Department of Otolaryngology and Head and Neck Surgery,  
Leiden University Medical Centre,  
Albinusdreef 2,  
P. O. Box 9600,  
2300 RC Leiden,  
The Netherlands.

Fax: +31-71-5248124

---

R. P. takes responsibility for the integrity of the content of the paper.

Competing interests: None declared

---