Luc's abscess as a rare complication of otitis media: a case report

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Abstract

Luc's abscess, a subperiosteal pus collection beneath the temporal muscle, is an extracranial complication of otitis media. Treatment including antibiotic therapy and abscess drainage often results in clinical improvement. Awareness of this rare complication is needed to get a prompt diagnosis and early treatment.

We describe a case of a 5-year-old boy with fever, otorrhea and a left-sided preauricular swelling. Temporal CT revealed a bilateral opacification of the mastoid bones and Luc's abscess. Unlike other case reports, abscess drainage was unsuccessful. Treatment with intravenous antibiotics and myringotomy with grummet insertion resulted in full recovery.

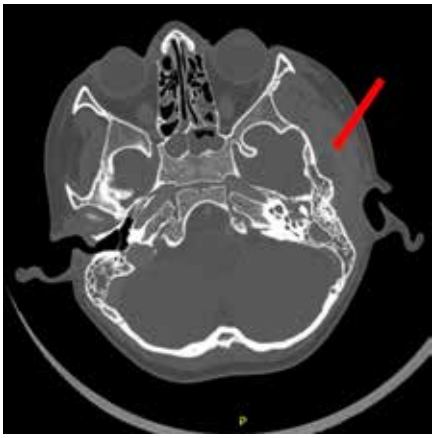
Case presentation

A 5-year-old boy presented to the pediatric department with fever for 2 weeks, otalgia for 1 week and a preauricular facial swelling since several hours. The maximum temperature was 39,0°C. Because of fever and cough, his general practitioner prescribed amoxicillin (50 mg/kg/d) for 4 days. One week later, left-sided otalgia developed. This was diagnosed as a left-sided acute otitis media, which was treated symptomatically by his primary care physician with analgesics and antipyretics. On the day of presentation in the pediatric department, his parents noticed a preauricular and temporal facial swelling. There was no history of trauma. His past medical history was unremarkable and his immunization status was up to date.

Physical examination revealed pharyngeal inflammation, left-sided otitis media, painful swelling in the left temporo-zygomatic region with mild erythema, left auricular protrusion and lymphadenopathy in the posterior cervical triangle (Figure 1). Facial nerve function was intact.

Figure 1: Our patient on the day of admission. Note the left preauricular and temporal swelling (red arrow).

Figure 2: The Luc's abscess is seen as an extracranially purulent collection of 2 cm lateral to the left temporal bone (red arrow). There are no signs of bone destruction. Note the severe edema of the surrounding tissue.

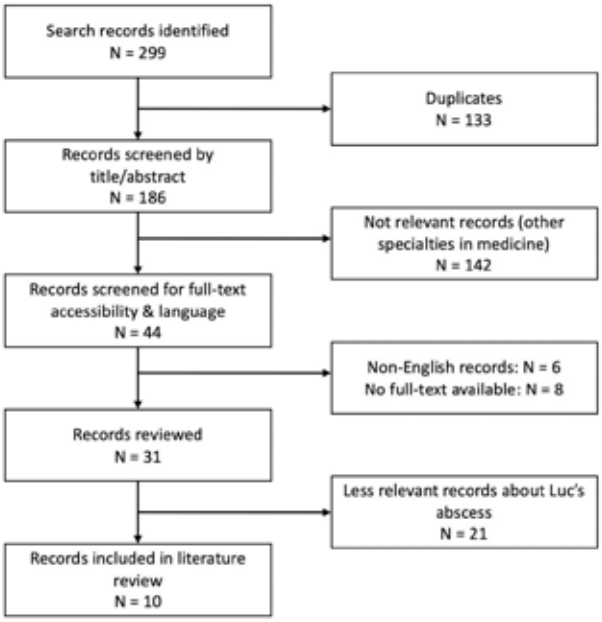


Laboratory data showed an elevated C-reactive protein of 67 mg/L (normal value: < 10 mg/L) without leukocytosis. A throat swab was taken for pharyngitis and was positive for *Streptococcus pyogenes*. Blood cultures were negative after 5 days.

Computed tomography (CT) of the brain and temporal bones showed a bilateral mastoid opacification, consistent with bilateral mastoiditis. There was no radiologic evidence of bone destruction. An extracranial purulent collection of 2 cm was noted lateral to the left temporal bone. There was a diffuse inflammatory process of the surrounding tissues in the supra-auricular region (Figure 2).

After initial laboratory and imaging studies, a diagnosis of a *Streptococcus pyogenes* pharyngitis and bilateral mastoid opacification complicated by Luc's abscess was made. After admission, the otorhinolaryngologist was consulted. Later that day, the patient underwent a bilateral myringotomy with grommet insertion. Surgical drainage of the extracranial temporal abscess was unsuccessful due to severe inflammation and edema of the surrounding soft tissues.

Figure 3: Flow chart of record screening for the literature review.



After the procedure, intravenous amoxicillin/clavulanic acid was started at a dose of 100 mg/kg per day for 7 days. Topical ciprofloxacin otic drops were given for 10 days.

Clinical improvement was noted after initiation of therapy. No fever was documented since the beginning of the hospitalization. The left temporal facial swelling slowly decreased. An audiogram revealed no hearing loss.

Repeat laboratory testing after 3 days of hospitalization showed a decrease in C-reactive protein from 67 mg/L to 40 mg/L.

After 7 days of intravenous antibiotic therapy, the patient was discharged with good clinical and biochemical improvement. Only mild preauricular swelling remained. A high dose of amoxicillin/clavulanic acid (80 mg/kg per day) was continued orally for another 3 weeks.

The child was seen for follow-up 1 week after discharge and after completion of antibiotic treatment. The preauricular swelling had significantly decreased and he no longer complained of otalgia. Because of this positive clinical evolution, imaging was not repeated.

Methods literature review

A literature search on Luc's abscess was performed using PubMed, Scopus and Cochrane Library. The following search terms were used: Luc abscess; zygomatic abscess; temporozygomatic abscess. A flow chart showing the steps of record screening is shown in Figure 3. All included records are case reports with (systematic) literature reviews.

Discussion

Otitis media is a very common disease in the pediatric population. The incidence of complications of otitis media has decreased over the years due to the widespread use of antibiotics (1, 2). However, clinicians should be aware of possible life-threatening intra- and extracranial complications. Intracranial complications include epidural abscess, subdural empyema, meningitis, encephalitis, cerebral abscess, lateral sinus thrombosis and petrous apicitis. Extracranial complications include mastoiditis, facial nerve palsy, labyrinthitis and subperiosteal abscesses, such as Luc's abscess, Bezold's abscess (a rare deep neck abscess), and zygomatic abscess (1, 3).

In 1913, Henri Luc described a subperiosteal collection under the temporal muscle of otic origin without intraosseous suppuration. Associated characteristic symptoms were transient otorrhea, supra-auricular and temporal swelling, mastoid tenderness and low-grade fever. In his article, he described a case of a 9-year-old girl with a subperiosteal abscess in whom he performed an abscess drainage and mastoidectomy. Unfortunately, he did not find any pus after opening the mastoid antrum. To raise awareness of this entity and to avoid unnecessary mastoidectomies in the future, he suggested that mastoidectomy should not be performed in the absence of clinical signs of mastoiditis, such as persistent otorrhea, retroauricular swelling, mastoid tenderness region and high fever (4).

The spread of microorganisms is thought to follow preexisting anatomical pathways. Microorganisms spread from the middle ear to the subperiosteal plane of the superior wall of the auditory meatus and to the lateral subperiosteal plane of the temporal bone to form a subperiosteal pus collection and accumulate deep beneath the temporal muscle (1, 4, 5). Since the literature suggests that most patients also have radiologic signs of mastoiditis, another possible route is through the cortex of the mastoid bone to the zygomatic root area (3, 6).

80.9% of reported cases of Luc's abscess have been in the pediatric population (3). Luc's abscess has also been reported in older people with underlying risk factors, such as drug use, diabetes, cholesteatoma and inappropriate use of antibiotics (1, 3, 7). In most cases, no risk factors have been identified (1-3).

In the original article, Henri Luc described that the subperiosteal temporal abscess was not associated with mastoid involvement (4). Since then, several case reports of patients with Luc's abscess associated with mastoiditis have been published (3, 5). A systematic review of Luc's abscess reported that almost all patients (95,2%; 20/21) had signs of mastoiditis on CT scan, with 42,8% (9/21) having clear evidence of bone erosion (3). In our patient bilateral opacification of the mastoid bones was diagnosed on CT scan, suggesting the presence of bilateral mastoiditis, but no bone destruction was seen.

Because Luc's abscess is relatively unknown, its diagnosis is often delayed. However, a timely diagnosis is necessary to initiate early treatment and to prevent the development of other complications (8).

The characteristic symptoms of Luc's abscess can help to raise the suspicion of the diagnosis (1, 3). Clinical features of Luc's abscess include otalgia, fever, temporo-zygomatic swelling, external auditory meatus swelling, facial swelling (anterior, superior or posterior to the auricle), malaise and ipsilateral cervical lymphadenopathy. Other clinical findings may include trismus, mastoiditis, septic arthritis of the temporomandibular joint or cholesteatoma (1-3, 5). In our case, the atypical preauricular swelling raised suspicion of a Luc's abscess,, which prompted a CT-scan.

A temporal CT scan is necessary to confirm the diagnosis, assess the extent of the abscess and mastoid involvement, and to exclude other intra- and extracranial complications of otitis media (9). Radiologic evaluation helps in determining the management of the disease (10). In our case, the CT scan revealed a bilateral mastoid bone opacification and a Luc's abscess with diffuse edema of the surrounding soft tissues (Figure 2). This led to a myringotomy with grummet insertion and an attempt to drain the abscess. Because of the diffuse edema of the surrounding tissues seen on the CT scan, only a limited number of attempts were made to drain the abscess.

Both aerobic and anaerobic bacteria have been found in cultures of Luc's abscesses, most commonly *Streptococcus pyogenes*, *Fusobacterium necrophorum*, *Klebsiella ozaenae*, and *Streptococcus constellatus*. Because of the wide variety of microorganisms, broad-spectrum antibiotics should be used until the causative organism is known from culture. In some cases, the causative microorganism remains unknown (5, 8). Because no culture was taken during myringotomy and abscess drainage in our case, the causative

organism of the Luc's abscess in our patient is unknown. Therefore, treatment with broad-spectrum antibiotics (amoxicillin/clavulanic acid) was warranted in our case.

In general, subperiosteal abscesses are most commonly treated with antibiotics, drainage of the subperiosteal abscess and grommet insertion. This less invasive treatment is found to be an effective alternative to mastoidectomy (3). Mastoidectomy should be considered when the radiological diagnosis of mastoiditis is in doubt, when there is damage to the mastoid bone, and when there is no clinical resolution after 48 hours of conservative treatment (9). In our patient, treatment consisted only of antibiotics and myringotomy with grummet insertion. Because of a good clinical and biochemical improvement, subsequent surgery was not necessary. Further research is needed to evaluate the benefits and risks of not draining the subperiosteal abscess.

Conclusion

Luc's abscess is a rare extracranial complication of otitis media. Its typical clinical features should raise suspicion. Diagnosis is made radiologically with a temporal CT. Conservative treatment with antibiotics, abscess drainage and myringotomy with grummet insertion is often successful. Physician awareness is necessary for early diagnosis and prompt treatment to prevent the development of other complications.

Conflict of interest

The authors have no conflict of interest to declare.

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Informed consent

Parental written informed consent was obtained. Any identifying information of the patient was removed from the manuscript.

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