

## SECTRA 3 D HUMAN BODY VISUALIZATION TABLE USE IN BRAIN ABSCESS DIAGNOSTICS IN A CHILD: A CASE REPORT

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### Summary

Brain abscess in children is a rare and particularly severe complication of acute otitis media/Chronic suppurative otitis media (CSOM). Presenting a child with brain abscess, which was developed as a pre-surgical complication of CSOM with cholesteatoma. Visualization of the abscess on a 3-D Sectra Visualization table was performed.

An 8-year-old child who often suffered from untreated runny ear was admitted in a critical state. The history and clinical and laboratory data suggested severe chronic inflammation of the right middle ear. The examination did not reveal signs of meningeal irritation, increased intracranial pressure, excitation, sensory disorders, or focal symptoms.

Surgical treatment was performed as a radical mastoidectomy with the removal of a cholesteatoma. After a three-day uneventful postoperative period, the patient worsened. A CT scan visualized a brain abscess in the right temporal lobe. A craniotomy was performed by opening the brain abscess, with an aspiration of pus, and lavage of the cavity. After surgical and conservative treatment, the child was discharged clinically healthy on the fourteenth day. Processing the image check-ups on a Sectra 3-D visualization table helped determine the size and localization of the abscess and the choice of surgical access.

**Keywords:** brain abscess, chronic suppurative otitis media, child

### Introduction

Brain abscess is a focal infection, developing in the cerebral parenchyma as a complication of meningitis, otitis media, mastoiditis, sinusitis, and dental infections[1].

Predisposing factors:

1. Pulmonary arteriovenous malformation
2. Congenital cyanotic malformation
3. Immunodeficiency conditions.

Abscess development occurs in a 4-step process. The initial phase is characterized as an area of

inflammation that is poorly limited by the functional cerebral parenchyma. The next phases lead to the formation of a capsule surrounding the central necrotic zone. It takes more than 14 days for a capsule to form [2]. The annual frequency of bacterial brain abscesses in the general population is 0.3 - 1.3 per 100 000 population. New data on abscesses in childhood are presented with a frequency of 0.5 per 100 000 children. Despite the low frequency, they represent a diagnostic and therapeutic problem for otorhinolaryngologists and neurosurgeons.

A brain abscess, caused by CSOM with cholesteatoma, is diagnosed as stage IV of cholesteatoma development [3]. In recent years, there has been a decrease in the frequency attributed to the treatment of inflammatory diseases with high-class cephalosporins and the use of image diagnostics CT scan and MRI.

About 25% of brain abscesses in children occur between 4 and 7 years of age [4]. Sectra visualization table facilitates determining the size of an abscess, its location relative to the skull bones, and the choice of the appropriate surgical approach.

### **Case presentation**

We present an 8-year old child with a brain abscess, which had developed as a preoperative complication from CSOM with cholesteatoma.

The child was admitted to the emergency ward of the ENT Clinic in a general critical condition, with pain in the right half of the head, no vomiting, with high fever and leakage of odorous discharge from the right ear. Skin and mucosa were pale.

The history included odorous discharge from the right ear, headache, and temperature of up to 40° C. His right ear had been unwell since early childhood. A systemic treatment had not been given. The child lived in poor living conditions without health care and poor nutrition, all predisposing factors for a weak immune response [5].

ENT examination revealed pale skin and mucus membranes, external auditory meatus filled with odorous ear discharge, and pars flaccida perforation.

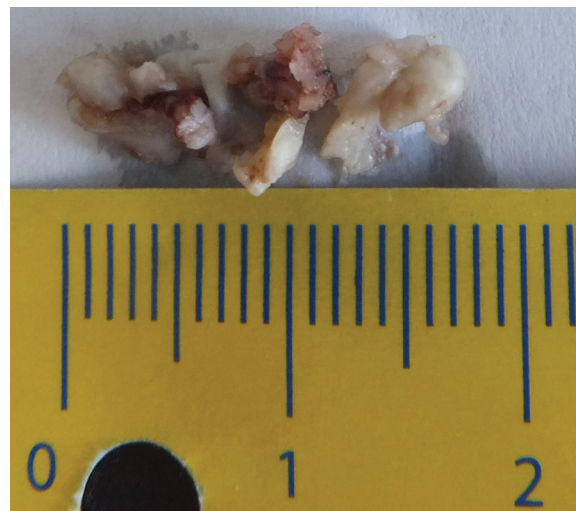
Paraclinical tests showed severe leukocytosis ( $22.2 \cdot 10^9 / l$ ) and anemic syndrome (Hb.97g/l), CRP- 256 mg/l and Schuler roentgenography visualized mastoid air cells.

A microbiological test revealed Gram-negative bacilli- *Fusobacterium* species, isolated from the purulent discharge from the abscess cavity. Literature data relate such findings to frontal lobe primary focus: frontal or ethmoidal sinusitis [1].

A pediatrician and an infectologist saw the child. There were no findings suggestive of a meningeal syndrome. Stiff neck, intracranial hypertension syndrome, and syndrome of focal neurologic signs were missing. No pathological changes in the other organs and systems were found.

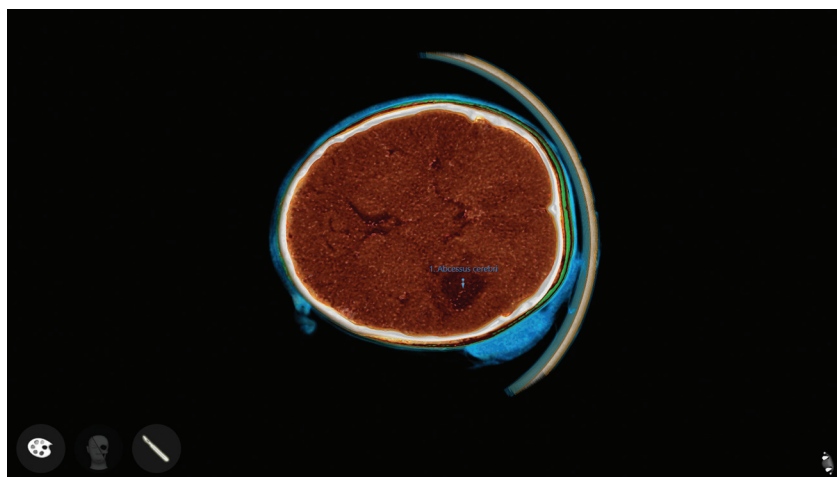
The medication given included Medaxone 2x500 mg, Gentamicin 2x30mg, Ceftazidime 2x1.0 g, Metronidazole x500 mg, Immunovenin 4 amp/24 h, Sol. NaCl 0.9% 500 ml i.v., glucose 5% 250 ml. i.v., Mannitol 10% 150 ml i.v.

Radical mastoidectomy was performed with removal of cholesteatoma, measuring 1.8x0.9cm.

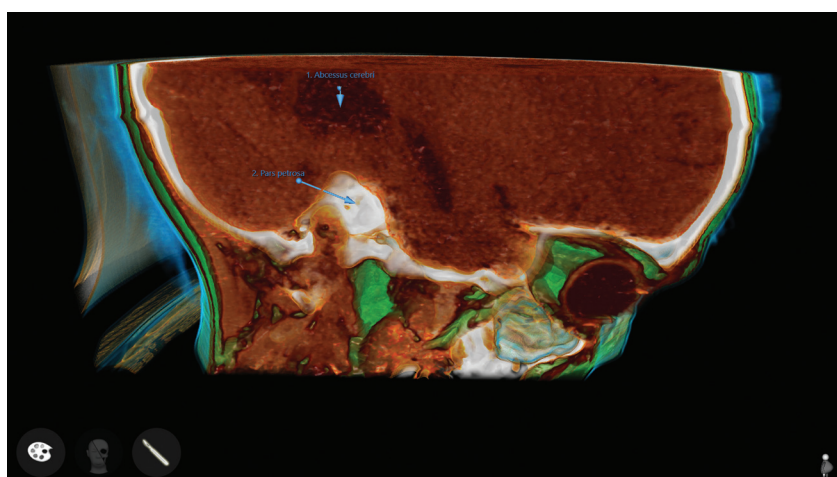


**Figure 1.** Macroscopic view of cholesteatoma

After this intervention, the general condition improved over three days: there was no headache, and there was a small odourless mucus discharge from the ear. On the fourth day, his condition worsened; there were stupor and a rise of temperature to 38°C. A CT scan of the mastoids and the central nervous system revealed a brain abscess in the right temporal lobe of the cerebrum. The child was admitted to a neurosurgery clinic for craniotomy for surgical removing the abscess, followed by aspiration of the pus and lavage.



**Figure 2.** Images of Sectra



**Figure 3.** Images of Sectra

After the surgical treatment of the middle ear and the brain's temporal lobe in combination with medication treatment, the child was discharged clinically healthy. On otoscopy, no discharge from the ear was found. A control CT scan with contrast material found no pathological shadowing in the cerebral parenchyma at the abscess. A status localis otoscopy did not find ear discharge.

For educational and experimental purposes, the image finding of the brain abscess was visualized and analyzed on a SECTRA3 D visualization table. Such visualization allows for:

1. Obtaining a detailed image of the pathological processes, localized in the central nervous system.
2. Accurate measuring of the dimension of the abscess can be made and its location to the skull bones.

3. The 3D image can be observed in a real-time situation by an interdisciplinary team: an otorhinolaryngologist, a neurosurgeon, an infectious diseases specialist, and a pediatrician.

4. The visualization with Sectra Visualization Table facilitates the choice of an appropriate surgical approach.

## Discussion

The classic triad of headache, fever, syndrome of focal neurological signs in children occurs in 9% - 28% of the cases [4]. It is appropriate to include brain abscess in the differential diagnostic plan in the presence of an inflammatory process in the middle ear, presenting with headache and purulent discharge.

The timely diagnosis of the brain abscess is a guarantee of a good outcome after appropriate treatment.

## **Conclusions**

In the presence of inflammation in the middle ear and severe general condition in a child, the diagnosis 'brain abscess' should also be considered.

CT scan and MRI should be used to visualize the inflammatory process in the middle ear and the central nervous system.

The results can be processed with a SECTRA 3 D visualization table.

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