# Intracranial epidural abscess

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Intracranial epidural abscess, less commonly called epidural empyema, refers to a pyogenic collection within the epidural space of the head.

# History

Intracranial epidural abscess was first described in 1760 by Sir Percivall Pott. Pott also documented the associated scalp swelling, the so-called Pott's puffy tumor.

# Epidemiology

Intracranial epidural abscess epidemiology

### **Risk Factors**

Epidural abscesses occur as a result of infections involving the spinal or cranial epidural space. Intracranial epidural abscesses (IEA) are complications of cranial surgery or trauma; they may also complicate otorhinolaryngological infections or other neck and thoracic procedures <sup>1)</sup>.

Acute frontal sinusitis can be a serious condition because of its potential life-threatening complications. These complications, including spread of infection to the frontal bone and intracranially, require prompt diagnosis and intervention to avoid morbidity and mortality <sup>2)</sup>.

Another significant cause is mastoiditis which accounts as the cause in approximately 20% of cases. Epidural abscesses can also occur as a result of trauma, epidural injections or anesthesia, open head or spinal trauma, neurosurgery or meningitis.

### **Clinical features**

Usually, the patient presents with headache that is either diffuse or localized to one side with scalp

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tenderness. Headache may be the only presenting symptom. The patient may have persistent fever that develops during or after treatment for sinus or middle ear infection. Purulent discharge from the ears or sinuses, periorbital swelling, and brawny edema of the scalp might accompany. Because the epidural abscess usually enlarges slowly, the following signs do not develop until the infection has reached the subdural space, resulting in subdural empyema, at which time the patient might present with neck stiffness, nausea, vomiting, lethargy, and hemiparesis. Seizures might very well be the first presenting symptom in some cases. Symptoms and signs of increased intracranial pressure (ICP) include nausea, vomiting, and papilledema. Rarely, when the epidural abscess develops near the petrous bone and involves the fifth and sixth cranial nerves, the patient may present with ipsilateral facial pain and weakness of the lateral rectus muscle (ie, the so-called Gradenigo syndrome). Many times, scalp cellulitis, sinusitis, or skull fracture may draw the attention of the physician to such an extent that the diagnosis of epidural abscess may be missed. One should consider the diagnosis of intracranial epidural abscess when a patient presents with unresolving frontal sinus symptoms. Also consider this diagnosis in patients with new neurologic symptoms after trauma or cranial surgery, even if months or years have elapsed since operation or trauma. Onset can be acute, especially in patients without any history of previous cranial neurosurgery. They often present with acute symptoms of encephalopathy and focal neurological deficits.

# Pathology

The most commonly isolated pathogens are Streptococcus pneumoniae, Haemophilus influenzae, Staphylococcus aureus and Staphylococcus epidermidis.

In more than two-thirds of cases, an epidural abscess is a complication of sinusitis. Seeding can be via direct invasion through the sinus walls or hematogenous seeding through retrograde valveless bridging veins.

# Diagnosis

### СТ

Less sensitive for the detection of epidural abscess compared to MRI. Features on CT include:

extra-axial location

isodense or hypodense to surrounding brain

biconvex shape

usually do not cross suture lines

may cross the midline

strong peripheral enhancement with contrast

#### **Contrast-enhanced MRI**

Diagnosis of epidural abscess or subdural empyema is by contrast-enhanced MRI or, if MRI is not available, by contrast-enhanced CT. Blood and surgical specimens are cultured aerobically and anaerobically.

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Characteristics on MRI include:

T1: hyperintense

T1 C+ (Gd): strong peripheral contrast enhancement

T2/FLAIR: isointense or hyperintense

PD: isointense or hyperintense

DWI: area of restricted diffusion

#### Lumbar puncture

Provides little useful information and may precipitate transtentorial herniation. If intracranial epidural abscess or subdural empyema is suspected (eg, based on symptom duration of several days, focal deficits, or risk factors) in patients with meningeal signs, lumbar puncture is contraindicated until neuroimaging excludes a mass lesion.

### Complications

Epidural abscess may extend into the subdural space to cause subdural empyema. Both epidural abscess and subdural empyema may progress to meningitis, cortical venous thrombosis, or brain abscess. Subdural empyema can rapidly spread to involve an entire cerebral hemisphere.

### Treatment

Intracranial epidural abscess treatment.

### **Case reports**

An 11-year-old child, presenting with a two-week-long history of an acute otitis badly treated. Admitted for headaches, fever, vomiting and left eyelid swelling. The preoperative CT scan revealed a left frontal epidural abscess associated to a sub-periosteal Abscess. The patient was operated on. A supraorbital incision through the eyebrows allowed the evacuation of the periorbital abscess and the cerebral empyema through a trephine hole. The patient received probabilistic intravenous antibiotic therapy with ceftriaxon, aminoglycoside and metronidazole. Then relay per os. Postoperative recovery was marked by disappearance of headaches at postoperative Day two and the periorbital edema at day six. The patient was discharged home at postoperative week four with oral antibiotic therapy. Three months postoperative months follow-up CT scan revealed a total radiological cleaning. Otogenic frontal abscess associated to orbital Abscess is extremely rare and should be considered in front of ophthalmological signs. The management is multidisciplinary, and the entry point treatment mustn't be forgotten <sup>3)</sup>.

### 2021

A pediatric patient with chronic hematopoiesis and thick double periosteal layers who developed an epidural pus collection after epidural hematoma evacuation. This article highlights the importance of detecting complications from epidural hematoma evacuation, including intracranial abscess and pus formation. Therefore, it is crucial to treat such cases meticulously <sup>4</sup>.

### 1996

A case of intracranial epidural abscess, 20 years after allograftic cranioplasty was presented. The abscess was caused by bacterial implantation after a minor stab wound of the scalp over the cranioplastic plate. It seemed quite rare that the intarcranial abscess occurred 20 years after an allograftic cranioplasty <sup>5</sup>.

### Database

o Cranial surgery

o Trauma

o Otorhinolaryngological infections

0 Neck or thoracic procedures

o Mastoiditis

o Meningitis.

#### o Headache

1)

Akhondi H, Baker MB. Epidural Abscess. 2022 Jan 19. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. PMID: 30571071.

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4)

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Morioka T, Fujiwara S, Akimoto T, Nishio S, Fukui M. Intracranial epidural abscess: late complication of allograft cranioplasty. Fukuoka Igaku Zasshi. 1996 Feb;87(2):57-9. PubMed PMID: 8851369.

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