

Endonasal Endoscopic Drainage of Frontal Lobe Epidural Abscess

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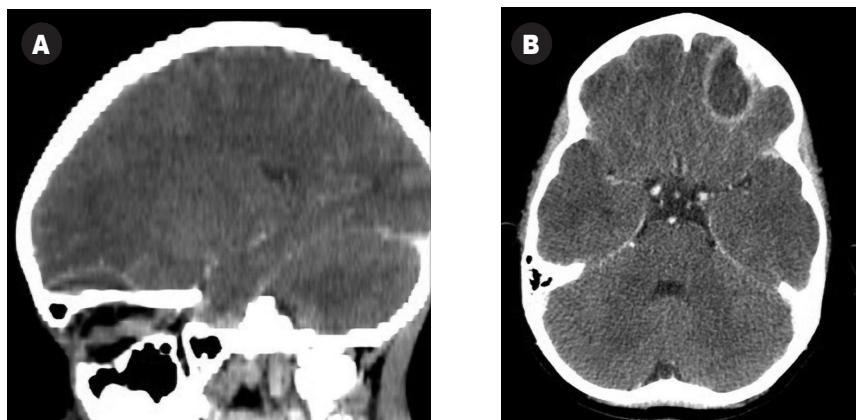
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Intracranial complications secondary to sinusitis, which are uncommon in clinical practice today, include cerebrospinal fluid leaks, meningitis, cavernous sinus and dural venous sinus thrombosis, and epidural, subdural and cerebral abscesses. Surgery is the mainstay of treatment in cases of intracranial complications of sinusitis, although a few have reported conservative treatment as the sole therapy [1]. In most cases, evacuation of an epidural abscess is performed via the intracranial approach. Only a few have reported on the extracranial endoscopic approach as the sole surgical treatment of an epidural abscess [2-5].

We present the case of a 9 year old boy with a frontal lobe epidural abscess secondary to acute sinusitis. Drainage of the abscess was performed using endoscopic sinus surgery alone. There were no neurological sequelae or complications during the procedure and the patient recovered quickly. To the best of our knowledge, this is the first case ever performed or reported in Israel using this technique.

Patient Description

A previously healthy 9 year old boy presented at the pediatric emergency department following 4 days of fever, multiple vomiting episodes and frontal headache. Rhinorrhea, nasal congestion or obstruction, previous nasal drainage and a past history of rhinosinusitis were not reported. The physical examination was normal apart from mild pain after percussion of the nasal bones and mild ptosis of the left upper eyelid without ophthalmoplegia or visual deficit. Fundoscopy did not show any papilledema. Nasal and oral examinations were normal. Water's X-ray



Sagittal [A] and horizontal [B] computerized tomography images of the frontal epidural abscess prior to evacuation.

views revealed opacification of the frontal sinuses. A computed tomography scan with contrast of the nasal sinuses and the brain to rule out intracranial involvement showed left ethmoidal and frontal sinus recess opacification and a rim-enhancing fluid collection of 3 x 1 cm at the left side of the anterior base of the skull. No bony abnormalities were observed [Figure A].

Intravenous treatment with ceftriaxone and metronidazole was initiated. A mild clinical improvement was noted for a day with less vomiting, reduced headache and no fever under the antibiotic treatment. Due to the resumption of vomiting 2 days later, surgical intervention was recommended. After consultation with a neurosurgeon, a neurologist and an otorhinolaryngologist it was decided to perform endoscopic endonasal surgery of the infected sinuses with continuous drainage of the abscess in order to avoid craniotomy.

The high resolution CT scan served as the topographic map for the surgery. In order to precisely locate the abscess, a standard left ethmoidectomy was performed, exposing and removing the

lamina papyracea to its highest point, close to the frontal recess. Pushing the orbital contents laterally enabled the surgeon to completely expose the left anterior base of the skull, near the roof of the orbit. The left ethmoid sinuses revealed inflamed hyperplastic mucosa with no purulent secretion. Drilling at the base of the skull bone, which proved to be very hard, produced a gush of a large amount of green-yellow purulent fluid. The opening was enlarged anteriorly by drilling to ensure that the abscess was completely drained. The opening of the skull base was closed by a mucosal free graft taken from the middle concha, supported for 5 days by a small merocell tampon covered by a finger of a surgical glove. Abscess fluid culture grew *Streptococcus viridans*.

The postoperative period was unremarkable with no neurological deficits, fever, diplopia, vision deficit or headache. Postoperative CT scan with contrast a week later showed a subcortical hypodense region consistent with encephalopathy, with no collection or rim enhancement and mild mucosal thickening of the left

frontoethmoid sinuses. The child was discharged 2 weeks later with home therapy of intravenous cefuroxime and metronidazole for 2 weeks.

Comment

The incidence of intracranial complications of sinusitis has decreased considerably in the last few decades [1], with fewer than 3% of hospitalized acute sinusitis patients presenting with these complications. Despite the use of broad-spectrum antibiotics in cases of sinusitis, epidural abscesses account for 2.3% of intracranial complications [2], with frontal sinusitis being the most common cause of an epidural abscess. Adolescent males are the most affected group with a mean age of 10–30 years [3].

Infection from the nasal sinuses may extend intracranially by venous thrombophlebitis or direct extension. Nasal sinus mucosal thrombophlebitis can occur in cases of sinusitis due to venous congestion associated with nasal suppuration. This can spread to the cerebral veins via the valveless diploic venous system and cause intracranial infection including epidural abscess. Direct extension can also occur through the foramina of the skull base, and through traumatic osteomyelitic or congenital bony dehiscence.

In the case described, no bony abnormalities or signs of osteomyelitis were revealed by the high resolution CT scan or during drilling at the operation site. The clinical appearance of an epidural abscess is non-specific with fever and headache being the most consistent early symptoms, making its diagnosis confusing. Later symptoms and signs may include vomiting, nuchal rigidity and focal neurological deficits detected in half of the younger patients.

It is widely accepted that surgery is the treatment of choice in most cases, especially cases of an intracranial abscess, although medical management alone has also been described [1,2]. The presented case was managed conservatively at first because the patient's clinical status was relatively good. Surgical drainage was indicated only after 48 hours of intravenous antibiotic treatment without any significant change. Surgical options for

treatment of an epidural abscess include intracranial and extracranial procedures. In most cases ESS is reported for treatment of the sinus infection. The most common intracranial procedure for evacuating an epidural hematoma is bifrontal craniotomy in order to gain direct vision and straightforward treatment of the abscess. Due to the high morbidity and complication rates associated with craniotomy, some authors reported performing only burr holes to evacuate the abscess. However, the limited operative field achieved by this procedure led to the use of the transfrontal and supraorbital endoscopic approach to treat anterior cranial base pathologies [4,5].

Only two cases were found in the English-language medical literature, and none in the Israeli literature, describing the use of ESS as the sole surgical approach to evacuate an epidural abscess, a planum sphenoidale epidural abscess [3] and a frontal epidural abscess [2] – none of these using a navigator, although in the case of a planum sphenoidale epidural abscess the procedure was done under fluoroscopic guidance [4]. Our patient was operated on by localization according to a three-dimensional high resolution CT scan. The case presented is the second in the written literature describing the evacuation of a frontal epidural abscess solely via ESS.

The ESS approach allows for drainage of the sinus infection with concomitant direct access to and drainage of the epidural abscess in a single procedure with low morbidity and lower rates of complications. In cases like ours, draining of the abscess via the anterior base of the skull, directly under the location of the abscess, is logical and the postoperative period revealed that the complications and risks are low. This approach enables the surgeon to better understand the pathophysiology of an epidural abscess by revealing the existence of osteomyelitis or a bony dehiscence. Location of the abscess via the nasal space is possible by detailed CT scan and thorough understanding of the topography of the surgical field according to the CT. The use of a

navigation system may enable drainage of less accessible intracranial abscesses with an even lower risk of complications and a better outcome.

In cases of epidural abscesses secondary to sinusitis that are located in the anterior base of the skull, draining the abscess endoscopically via the nasal space may be considered by a highly experienced surgeon. In cases of osteomyelitis or other anatomical abnormalities of the skull, this approach may allow the surgeon to surgically treat the patient with a minimally invasive technique. The location of the pathology in such a situation is highly accurate with the aid of high resolution coronal, axial and sagittal CT scans, when all the anatomical landmarks exist. In the case presented here, this approach enabled successful drainage of the abscess with minimal damage to the base of the skull and surrounding tissues. This method also enables the surgeon, with a high level of confidence, to close the structural defect to prevent a leak of cerebrospinal fluid.

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ESS = endoscopic sinus surgery