Secondary abscess formation in pituitary adenoma after tooth extraction

Case report

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The presence of an abscess in a pituitary tumor is a very rare finding. The authors report the case of a 69-year-old man with a pituitary adenoma confirmed by neuroimaging results, in whom a high fever, meningismus, and left-sided ophthalmoplegia developed 4 days after tooth extraction. The results of serial cranial magnetic resonance imaging were highly indicative of an abscess formation within the pituitary adenoma. During surgery the tumor was approached transsphenoidally and removed. Histological examination confirmed the presence of an abscess formation within the pituitary adenoma. It is most likely that the tooth extraction caused a bacteremia, which led to an inflammation with abscess formation within the pituitary adenoma. The authors conclude that invasive dental procedures should be avoided before planned resection of a pituitary adenoma.

KEY WORDS • pituitary adenoma • pituitary abscess

An abscess located in the pituitary gland is a relatively rare finding and can be described as either a primary or secondary abscess. A primary pituitary abscess arises within a previously healthy gland, whereas a secondary abscess is associated with an underlying sellar pathological lesion, such as craniopharyngioma, Rathke cleft cyst, or pituitary adenoma. Only a few cases of an abscess within a pituitary adenoma have been reported to date. The correct preoperative diagnosis is often difficult to make, but is important for optimal management of the condition. We describe an unusual case of a patient with a pituitary adenoma who experienced secondary pituitary abscess formation after undergoing tooth extraction. To the best of our knowledge, this is the first report to include contrast-enhanced MR images of a pituitary adenoma with an abscess, as well as MR images of the pituitary adenoma before and after abscess formation.

Case Report

History. This 69-year-old man was admitted to our hospital complaining of headache, dizziness, fatigue, blood pressure variations, and left thoracic pain, which had lasted for approximately 6 months. His medical history was remarkable for latent hypothyroidism.

Examination. On admission the patient’s overall status was poor and he appeared anxious and depressed. His vital parameters were normal and there were no signs of meningismus or focal neurological or visual field deficits. Laboratory findings were remarkable for a decrease in the levels of free triiodothyronine (1.7 ng/L, normal range 2.2–4.7 ng/L) and free thyroxin (0.58 μg/L, normal range 7–19 μg/L). The level of thyroid-stimulating hormone was normal (0.65 mU/L, normal range 0.4–3.5 mU/L) and the level of prolactin was moderately elevated (34.9 μg/L, normal range 1.8–15.9 μg/L). Additional endocrinological testing revealed that the levels of adrenocorticotropic hormone, cortisol, luteinizing hormone, follicle-stimulating hormone, and testosterone were significantly decreased. The patient’s insulin-like growth factor I concentration was also decreased (82 μg/L, normal range 92–284 μg/L) and his growth hormone level was less than 0.5 μg/L.

Cranial MR images (Fig. 1) were obtained using a 1.5-tesla magnet. The images revealed typical findings of a pituitary macroadenoma with intrasellar and suprasellar portions. There was sellar enlargement with protrusion of the sellar floor into the sphenoid sinus, but no elevation of the optic chiasm. An unenhanced sagittal T₁-weighted image (Fig. 1 left) revealed a hyperintense area in the rostral portion of the tumor protruding into the sphenoid sinus. The entire adenoma displayed a moderately heterogeneous contrast enhancement after intravenous administration of Gd-DTPA (Fig. 1 center and right). At the time of...
the examination, there was no evidence of inflammatory changes within the paranasal sinuses, either clinically or on MR images (data not shown).

Because of the endocrinological findings, the patient was treated with hydrocortisone, levothyroxine, and testosterone. After hormone replacement, the patient's clinical condition improved. However, a short time later, he complained of a severe toothache. After a dental examination, the source of his pain was given the diagnosis of profound marginal periodontitis (inflammatory disease of all parts of the marginal periodontium [gingiva, desmodont, root cement, and alveolar bone], which had been caused by bacteria and included loss of the periodontal tissues exceeding one third of the root length). Three teeth in the patient's lower left jaw were extracted and he was given antibiotic prophylaxis consisting of clindamycin. Four days after the tooth extraction, the patient's condition deteriorated and he complained of a high fever and meningismus. On neurological examination, we recognized a left-sided ophthalmoplegia with abducent nerve palsy and incomplete oculomotor nerve palsy. The patient's visual acuities and fields remained unchanged. Laboratory tests demonstrated that his C-reactive protein level had increased from less than 0.6 to 16.7 mg/dl and his white blood count had increased from 5.83 to $12.7 \times 10^9/L$. The patient was immediately placed on a triple antibiotic medication regimen consisting of cefotiam, gentamicin, and fosfomycin. A lumbar puncture was performed and the results of the CSF analysis demonstrated infection with a protein level of 178 mg/dl, a white blood cell count of 243 cells/$\mu$L (92% polymorphonuclear neutrophil leukocytes), and a lactate level of 22 mg/dl. No microorganisms grew from cultures of blood or CSF.

An MR imaging study, performed 5 days after the patient underwent tooth extraction, revealed a striking change in signal intensity on the unenhanced T1-weighted image (Fig. 2 left). A large portion of the tumor was replaced by a hyperintense mass, leading to tumor expansion with secondary elevation of the optic chiasm. After intravenous administration of Gd-DTPA (Fig. 2 center and right), only a moderate enhancement of the remainder of the adenoma could be seen. There was striking enhancement along the sellar floor and diaphragm as well as in the interpeduncular cistern and along the cerebellar gyri. The sphenoid sinus filled with fluid and its walls were strongly enhanced. There was still no evidence of inflam-
matory change in the maxillary sinuses (data not shown), although there was strong mucosal enhancement of the sphenoid sinus along the protruding portions of the pituitary adenoma.

**Operation.** Surgery was performed on the following day. A standard septal, transsphenoidal approach was used. After the sphenoid sinus was opened macroscopic examination revealed the mucosa to be inflamed. The very thin floor of the sellar was opened and the endosteum was incised, resulting in the free flow of purulent material. The bulk of the tumor had a slightly denser consistency than that typical of pituitary adenoma. Following tumor and abscess removal, a fascia lata graft was used for closure. No CSF was seen during surgery. Neuropathological examination of the biopsy specimen revealed a pituitary adenoma with a concomitant putrid inflammation that was indicative of abscess formation. The adenoma was composed of polygonal tumor cells with monomorphic nuclei (Fig. 3 upper). The identification of the neoplasm was facilitated by application of reticulin stains, which highlighted the abnormal stromal pattern of the underlying adenoma (Fig. 3 center). Immunohistochemical investigation for pituitary hormones yielded nondiagnostic results. The tumor cells expressed both keratin and chromogranin. Preexisting normal pituitary tissue was not observed. In the center of the adenoma, we identified large necrotic areas that were infiltrated by numerous, partly necrotic granulocytes (Fig. 3 lower). Bacteria were not identified by application of the Gram stain.

**Postoperative Course.** The patient’s postoperative course was uneventful. Laboratory parameters for infection and body temperature normalized in response to antibiotic therapy. A control lumbar puncture performed 14 days after surgery revealed no sign of CSF infection (protein 58 mg/dl, white blood cell count 2/µl, lactate 11 mg/dl), and antibiotic therapy was therefore terminated. While continuing a regimen of hydrocortisone and levothyroxine replacement, the patient was transferred in stable condition for further psychological treatment of his persisting anxiety and depression on postoperative Day 17. He still had left-sided abducent nerve palsy, but his oculomotor palsy was improving. An MR image obtained 3 months after surgery revealed complete resection of the adenoma with no obvious intrasellar pathological condition. At that time the patient’s left-sided ophthalmoplegia had completely resolved.

**Discussion**

Abscess formation within a pituitary adenoma is an extremely rare finding. Pituitary adenomas are vulnerable to infection due to impaired circulation, areas of necrosis, or local immunological impairment. The source of pituitary infection can be either bacteremia or a direct extension from an adjacent infection such as meningitis, sphenoid sinusitis, cavernous sinus thrombophlebitis, or a contaminated CSF fistula. In the present case, it is most likely that the multiple tooth extraction caused a transient bacteremia and that organisms were deposited into the pituitary adenoma, resulting in an infection with secondary abscess formation. Despite antibiotic prophylaxis, transient bacteremia frequently occurs in patients undergoing clinical procedures such as tooth extraction and periodontal and endodontic treatment, regardless of the status of the dentition or periodontium. The association between brain-abscess formation and oral microorganisms has been reported. In the present case results of both imaging
and histological examinations also revealed an inflammation in the sphenoid sinus. Although not proven, based on the imaging findings, we assume that the infection extended into the sphenoid sinus from the pituitary gland via the thinned sellar floor and not vice versa. Findings from the patient’s medical history and MR imaging sessions performed before he underwent tooth extraction and experienced abscess formation were unremarkable for sinus infection. Five days after the tooth extraction, however, MR images revealed abscess formation within the pituitary adenoma and signs of sphenoid sinusitis. Neither maxillary sinus had signs of inflammation.

It has been stated that necrosis in the center of a pituitary tumor can, on occasion, be confused with an inflammatory abscess. In such cases, definitive bacterial cultures are required to confirm the finding of an active abscess of infectious origin. No organisms were found in the cultures of blood and CSF and no organisms were observed during histopathological examination in the present case. At the time of testing, however, the patient was receiving antibiotic therapy. Despite these negative findings, the clinical presentation in this case, as well as the laboratory and histopathological results, were typical of findings associated with an abscess of infectious origin.

Changes in the MR appearance of the lesion, such as the bright signal on the T1-weighted images, together with dramatic neurological deterioration, are usually interpreted as hemorrhagic infarction of a hypovascular pituitary adenoma. This was ruled out intraoperatively as well as during histopathological examination. Thus, cystic regions with high proteinaceous fluid content, such as abscess formation, are the most likely reason for the change in the MR imaging characteristics. Retrospectively, we interpreted the portions of tumor protruding into the sphenoid sinus, which initially appeared hyperintense on T1-weighted images and did not display rim enhancement after administration of Gd-DTPA, as regressive cystic changes within the adenoma; these remained unchanged over the course of the disease.

The favorable outcome in the present case supports the importance of an early diagnosis, thus making contrast-enhanced MR imaging mandatory. Prompt antibiotic and surgical therapy constitute mainstay treatment of an abscess within a pituitary adenoma. Because pituitary adenomas are vulnerable to infection and oral surgical procedures such as tooth extraction can cause bacteremia, we recommend avoiding these procedures before planned surgery of a pituitary adenoma.

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References


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