Actinomycotic granuloma of the Gasserian ganglion with primary site in a dental root

Case report

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An unusual case of cerebral actinomycosis of the Gasserian ganglion is reported. The location and the pathological diagnosis of granuloma are both extremely rare. The literature is briefly reviewed with special reference to similar reports. The manner of spread and the course of the disease are described. The present case tends to confirm the opinion that primary cerebral actinomycosis is extremely rare and probably does not exist. The case also definitely indicates that the organism reaches the central nervous system by way of nerve or perineural pathways.

KEY WORDS: actinomycosis, Gasserian ganglion, granuloma, trigeminal nerve

Actinomyces is an anaerobic, Gram-positive, filamentous organism that is related to true bacteria, although superficially it appears similar to mycetes. Typically, it develops by forming an interwoven mass of filaments that tend to divide into small fragments similar to bacteria. Many actinomyces live in a free environment, particularly in the soil. Actinomyces israelii is responsible for the majority of human and animal infections.

In actinomycosis, the central nervous system is involved in only 5% of cases. We are reporting a case of primary cerebral actinomycosis of the Gasserian ganglion.

Skull films showed enlargement of the right foramen ovale and decalcification of its lateral margin (Fig. 1 left). Right carotid angiography showed the presence of an avascular mass, probably extracerebral, in the floor of the middle fossa. Pneumoencephalography confirmed the presence of a right basal temporal lesion, with upward and lateral displacement of the temporal horn (Fig. 1 right). A tentative diagnosis of neuroma of the Gasserian ganglion was made.

Operation. A right temporal craniotomy was performed with extradural exposure of the middle fossa. The third division of the fifth cranial nerve appeared slightly enlarged. Posterior to it, a mass of the size of a nut was observed, occupying the cavum Meckeli. Opening of the cavum confirmed the presence of a neoplastic mass that had invaded the ganglion. Excision of the enlarged first, second, and third branches was performed, sparing the motor branch, which did not appear to be enlarged. The tumor was completely excised, and the foramina ovale and rotundum were visibly dilated.

Postoperative Course. The postoperative course was uncomplicated, and the patient was discharged 6 days later. He was neurologically normal, except for anesthesia in the distribution of the right trigeminal nerve.

This 25-year-old man was admitted to the Neurosurgical Division of the Cardarelli Hospital. Two years earlier he had complained of episodic pain in the area of the first and second branches of the right trigeminal nerve; the pain increased with exposure to cold and became progressively more frequent and severe.

Examination. The patient had analgesia of the first and second branches of the right fifth cranial nerve.
**Pathological Examination.** The excised mass was 2 to 3 cm in diameter and of grayish-pink color, with sulfur-yellow areas the size of a pinhead. It was irregular and nodular in shape. Histopathological preparation of the tissue, initially with routine procedures (hematoxylin and eosin, hematoxylin-van Gieson, Gomori stains), was followed by staining with periodic acid-Schiff (PAS), May-Grunwald Giemsa, and Gram, Gomori-Grocott. Histopathological examination showed an intense inflammatory process that displaced and destroyed the neural elements of the ganglion. The abscesses were made up of polymorphonuclear neutrophils, generally swollen (pus corpuscles), and amorphous material. Frequently, in the center of these areas of inflammation, radiating formations were observed that stained intensely with hematoxylin but were better demonstrated with PAS, Giemsa, and Groccot stains; these consisted of spindle-shaped elements, swollen at the periphery (Fig. 2). Histopathological diagnosis was actinomycoma of the Gasserian ganglion.

Systematic screening to locate the primary site of infection revealed a periapical osteitis of the right third inferior molar tooth, which was confirmed by radiological examination. The molar was extracted, and a histological examination after decalcification revealed the presence of an inflammatory process with a prevalent component of actinomycotic granulomas (Fig. 3). Histological diagnosis was actinomycotic granuloma. Cultures of the tooth grew *Actinomyces israelii.*

**Discussion**

Actinomycosis presents to the neurosurgeon in various clinical forms, including leptomeningitis of the cranial base, diffuse meningitis with cortical micro-abscesses, and the pseudotumoral form of abscess, either multilocular or granuloma. The most common source of infection is through lesions of the face, lips, ears, nose, and the paranasal sinuses.

Invasion may also occur through blood-borne metastatic spread from any organ. Raney has seen a case originating in the appendix. Lymphatic spread has been debated. The majority of authors believe that a primary cerebral origin is unlikely, and that this location is implicated only because the patient is inadequately screened. Nevertheless, Rasmussen described the case of an actinomycotic abscess of the parietal lobe treated with antibiotics. The presence of a focal infection was not revealed, even after thorough diagnostic studies. In this case, one can suppose that antibiotic treatment may have healed the primary lesion and not the metastatic cerebral infection. On the other hand, the opinion of Orf that the portal of entry may be through the perineural spaces around the olfactory nerve cannot be excluded. Moreover, diffusion by perineural pathways of the trigeminal nerve is thoroughly confirmed by the postmortem findings of Schwartz.
Intracranial actinomycosis

FIG. 2. Photomicrographs of the Gasserian ganglion. Left: A small actinomycotic aggregate with granulomatous reaction. At the bottom, some large ganglion cells can be seen in a stage of progressive degeneration. × 4. Right: Enlarged view of the actinomycotic Gasserian ganglion. The radiating aspect is clearly seen. × 25.

Gonzales Torres,¹ and Maltby,² who in 1951 published a case of actinomycotic abscess of the Gasserian ganglion.

We have presented a very rare case of actinomycotic granuloma of the Gasserian ganglion with the primary site in a dental root. This case confirms the opinion that diffusion to the nervous system may be by perineural pathways, and that systematic screening may often reveal the true primary source.

References
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Fig. 3. Photomicrograph of the molar tooth, showing typical actinomycotic granulomas. × 10.