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Intracranial abscess secondary to dental infection

We report a case of *Aggregatibacter actinomycetemcomitans* (*A. actinomycetemcomitans*) bacteremia and secondary brain abscess in a patient where periodontal disease was implicated as the probable source.

**Keywords**

Brain abscess; periodontal disease; *Aggregatibacter actinomycetemcomitans*.

**Introduction**

The oral cavity is considered as being home to a rich and abundant microflora, including *Aggregatibacter actinomycetemcomitans* (*A. actinomycetemcomitans*), which is recognised as one of the major pathogens in destructive periodontal disease. A cerebral abscess linked to a dental source is a rare occurrence, since in most individuals the blood-brain barrier, along with the immune response, will exclude bacteria. In this age of antibiotics and with modern living conditions, pyogenic brain infections of odontogenic origin are uncommon in western society. It has been postulated that oral microorganisms may enter the cranium by several pathways: 1) by direct extension, 2) by haematogenous spread, 3) by local lymphatics, and 4) indirectly, by extraoral odontogenic infection. Brain abscesses thought to be of dental origin have been reported to have a lethal outcome.2

**Case report**

A 68-year-old man was admitted to Cork University Hospital (CUH) following general medical practitioner (GP) referral with a two-day history of sudden onset slurred speech, left-sided facial droop, and left upper limb weakness. He had no relevant past medical history. He did not smoke or drink alcohol. He was not taking any medications. He lived alone in poor social circumstances. On examination he was alert and orientated. He was dysarthric, his Glasgow Coma Scale was 15/15, blood pressure was 143/75mmHg (BP was 170/111 in the GP surgery), pulse rate was 86 beats per minute regular, temperature 36.8˚C. A left-sided VII nerve palsy was noted. He had reduced power, reflexes and tone in both his upper and lower left limbs. A pan-systolic murmur radiating to the axilla was noted. He was noted to have very poor dentition by the admitting staff. The rest of his examination was within normal limits.

Laboratory investigations revealed a normal white cell count, and his C-reactive protein was 78mg/L. A provisional diagnosis of cerebral vascular accident, possibly secondary to hypertensive disease, was made. However, CT brain revealed a ring enhancing lesion in the right frontal lobe, in keeping with a brain abscess (Figure 1).

**Clinical relevance**

The majority of brain abscesses secondary to odontogenic infection occur following dental treatment.3 This report documents an abscess prior to dental treatment, signifying the dangers of untreated dental infection. In this case, and as described previously, molecular identification techniques, i.e., partial sequencing of 16S rDNA of clinical samples, may be helpful for detection and identification of pathogens.4 *A. actinomycetemcomitans* is an important pathogen to consider as a causative agent of brain abscess in those with poor dental health.
In view of this diagnosis and the presence of the murmur, multiple blood cultures were taken to rule out endocarditis as a source of infection. On further questioning, the patient described left-sided facial swelling and non-traumatic loss of a tooth one week prior to admission.

Empiric therapy with meropenem, vancomycin and IV dexamethasone was commenced. The patient underwent craniotomy and ultrasound-guided drainage of the brain abscess on day three after admission. The organisms from the blood culture and brain abscess aspirate failed to identify satisfactorily using Analytical Profile Index (for quick identification of clinically relevant bacteria), and so were sent for molecular testing. *A. actinomycetemcomitans* was identified from both blood cultures and the fluid from the brain abscess by partial sequencing of 16S rDNA by the Molecular Identification Service at the HPA Colindale, London. Transoesophageal echocardiogram revealed moderate to severe mitral regurgitation but no vegetations. A dental review was requested by the neurosurgical team. A clinical examination revealed multiple carious and periodontal involved teeth in the maxilla. An OPG radiograph was requested; however, the patient was unable to maintain an upright position to facilitate this. Therefore, lateral and oblique views were taken. The radiographs showed the presence of what appeared to be destructive periodontal disease and dental caries, particularly in the maxillary posterior teeth (Figure 2).

On day four following admission the patient was brought to theatre and had a dental clearance in the maxilla and two left mandibular teeth removed under general anaesthetic. The teeth extracted were mostly periodontally infected with extensive dental caries. Therefore, it is postulated that periodontal disease was the original source of infection in this patient (Figure 3).

Antibiotic therapy with meropenem was continued for six weeks. Repeat CT scans showed gradual resolution of the brain lesion (Figure 4). The patient underwent intensive rehabilitation with physiotherapy and occupational therapy. At discharge he still had some left-sided weakness and was not well enough for independent living, and therefore went to sheltered housing. He will be followed up with the neurosurgery and cardiology services in CUH.

**Discussion**

*Actinomycetemcomitans* is a member of the *Haemophilus, Actinobacillus, Cardiobacterium, Eikenella*, and *Kingella* (HACEK) group of microorganisms. This group of organisms has a predilection for the oral cavity.
Researchers must continue not only to uncover more information as a means of ameliorating serious systemic infection. Hence, positive association from preventing and treating periodontal disease measures and professional dental care will assist in focusing on a maintenance of good periodontal health through oral hygiene oral cavity in patients presenting with intracranial infections. This highlights the importance of performing a detailed examination of the oral cavity in patients presenting with intracranial infections. Maintenance of good periodontal health through oral hygiene measures and professional dental care will assist in focusing on a positive association from preventing and treating periodontal disease as a means of ameliorating systemic infection. Hence, researchers must continue not only to uncover more information about the correlations between periodontal and systemic diseases, but also to focus on positive associations that may result from treating periodontal disease as a means of ameliorating systemic diseases. Simple oral healthcare tasks, such as brushing and flossing, and limiting other risk factors, such as smoking, may assist in initially decreasing periodontal pockets and periodontal bacterial flora, consequently decreasing the likelihood of the progression of periodontal disease in causing detrimental systemic disease.

References