Intracranial abscess

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Intracranial abscess is defined as a focal, encapsulated infection of brain parenchyma and is caused by a wide array of microorganisms such as bacteria, Mycobacterium, protozoa, fungal infection or helminths.

Epidemiology

Intracranial suppuration (ICS) is a life-threatening condition caused by various disease processes and consisting of brain abscess and extradural and subdural empyema. The major causes have changed over the decades.

It is a relatively rare condition, with the incidence estimated at 0.3 to 1.3 per 100,000. However, this number is believed to be elevated in particular high-risk groups; for example HIV/AIDS patients.

Brain abscesses commonly develop in the frontal lobe and cerebellum. Patients who underwent previous cranial surgery and patients with comorbid diseases are more prone to intracranial infections. Large abscesses with significant edema are the best candidates for emergent surgical evacuation [1)].

Classification

Intracranial abscess classification.

Etiology

Intracranial infections may result from contiguity, such as mastoiditis or acute otitis media, or from

haematogenous dissemination from an infectious source.

Sinusitis, head trauma, ear infection and meningitis were the major sources of ICS. A pulmonary source was not a major feature. In the last 4 years, trauma became the commonest source of ICS. A steady decline in ear infection- and meningitis-related ICS was noted [2].

There are multiple mechanisms responsible for the development of intracranial abscesses. The infectious organism can invade the brain by either direct spread, which accounts for 20% to 60% of the cases. This is typically caused by a contiguous infection such as sinusitis, otitis, mastoiditis, or dental infection. Brain abscesses can also arise from hematogenous seeding or cranial trauma, which typically manifest as multiple abscesses. Streptococcus and Staphylococcus are the most frequent causes of brain abscesses, with Viridans streptococci and Staphylococcus aureus being the most common. Anaerobes are also a common constituent of brain abscesses, which originate from the normal oral flora. A patient's immune status is also important when considering the cause of the infection. Bacterial abscesses are typically seen in immunocompetent individuals, while immunocompromised patients can be infected with a wide array of organisms, including fungi [3].

Clinical features

Intracranial abscess should be considered in male patients presenting with headache and neurological signs and symptoms, whether with or without fever, on admission for early diagnosis and provision of timely, adequate therapy and, if required, surgical intervention to reduce mortality and sequelae rates [4].

Outcome

Although it is a rare condition, mortality remains at a high rate for patients with brain abscesses. However, one systematic review and meta-analysis demonstrated that the prognosis of patients with brain abscesses has significantly improved.

A study showed that over past 6 decades, case fatality rate decreased from 40% to 10%, and the rate of patients with full recovery increased from 33% to 70%. Another study, a report in 289 patients with pyogenic brain abscess treated between 1999 and 2006, showed a mortality rate as low as 2.7%. Several factors have been credited towards these improved outcomes. Introduction of CT imaging has been critical in improving treatment results for brain abscesses. One retrospective study demonstrated that intracranial abscess mortality rate dropped from 40% to 20% within the first decade after the invention of CT imaging. This invention has allowed clinicians to make a faster diagnosis and facilitated less invasive, more precise neurosurgical procedures such as stereotactic aspiration of abscesses. Improvements in neurologic surgical technique and antimicrobial therapy, which are the mainstay of therapy, have also been instrumental in these improved outcomes [5].

Early administration of antibiotic therapy based on MR findings is critical in obtaining a good outcome in the treatment of brain abscess. Treatment should be continued, even for patients in a critical

condition [6].

Case series

The archive of the radiology departments at Umtata General Hospital and Nelson Mandela Academic Hospital in the Transkei region, Eastern Cape Province, SA, was searched retrospectively for computed tomography (CT) reports of patients diagnosed with ICS. Cases in which the CT images, patients' clinical information and CT reports were available for an uninterrupted period of at least 1 year were included.

Five-time frames were established, encompassing 8 years of data. The first time frame established an incidence of ICS of 1/100,000/year for the Transkei region. All the time frames were utilised to determine the incidence according to gender and age, and the source and distribution of ICS. The incidence of ICS was higher among males than females, and highest in the age groups 0-10 and 11-20 years. A seasonal variation in the incidence of sinusitis- and meningitis-related ICS was noted. Numbers of cases declined during the last 3 years of the study period.

Over 13 years, 103 patients with intracranial infection underwent surgical evacuation. Seventy-one (68.9%) patients were men, and the mean age was 38.57 years. For intracranial infections, direct and indirect microbiological identification methods were used. The clinical and radiological data of patients were retrospectively analyzed and compared statistically based on the type of infection, location, history of previous surgery, comorbid diseases, and demographic features of the patients.

Results: Forty-six (44.7%) patients had an intraparenchymal abscess, 25 (24.3%) had subdural empyema, and 32 (31.0%) had epidural empyema. An emergent surgical evacuation was performed in 60 (58.25%) patients. Microbiological agents were not isolated in 26 (25%) patients, while multiple microorganisms were isolated in 17 (16.5%) patients. Intraparenchymal abscesses are more common in the frontal lobe and cerebellum, while subdural empyemas are located more frequently in the frontoparietal region. There was no significant difference between intracranial infection and age, gender, history of surgery, and preoperative antibiotic use. However, a statistically significant relationship between intracranial infection, history of previous surgery, and the patient's comorbid disease were found. Specifically, intraparenchymal abscesses were more frequently detected in immunocompromised patients, and subdural empyemas were common in patients with previous tumor surgery.

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Yilmaz Tehli G, Kirmizigoz S, Durmaz MO, Ezgu MC, Tehli O. Risk Factors and Surgical Treatment Options for Intracranial Infections. Turk Neurosurg. 2022 Oct 22. doi: 10.5137/1019-5149.JTN.40387-22.4. Epub ahead of print. PMID: 36482857.
2)
Anwary MA. Intracranial suppuration: Review of an 8-year experience at Umtata General Hospital and Nelson Mandela Academic Hospital, Eastern Cape, South Africa. S Afr Med J. 2015 Sep 21;105(7):584-8. doi: 10.7196/SAMJnew.7881. PubMed PMID: 26428757.
3) , 5)
Tommeraasen MA, Cooper JS. Hyperbaric, Intracranial Abscess. 2018 Mar 23. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2018 Jan-. Available from http://www.ncbi.nlm.nih.gov/books/NBK493227/ PubMed PMID: 29630279.
4)

Yıldırmak T, Gedik H, Simşek F, Kantürk A. Community-acquired intracranial suppurative infections: A 15-year report. Surg Neurol Int. 2014 Sep 26;5:142. doi: 10.4103/2152-7806.141891. eCollection 2014. PubMed PMID: 25317357; PubMed Central PMCID: PMC4192928.
6)
Yanai K, Oya S, Fujisawa N, Tsuchiya T, Indo M, Nakamura T, Matsui T. [A review of treatment outcomes for intracranial abscess at our institution]. No Shinkei Geka. 2014 Mar;42(3):213-9. Japanese. PubMed PMID: 24598870.