Brain Abscess in an Irish Cohort: an Update on Aetiology and Microbiology

Emily Glynn[1] , Conor Mulrooney[2] , Siobhain Kelly[1] , Binu Dinesh[1] , Karen Burns[1] , Karina O'Connell[1] , Sinead O'Donnell[1,2], Fidelma Fitzpatrick[1,2], Ciara O'Connor [1]

[1]Department of Microbiology, Beaumont Hospital – Dublin, Ireland
[2]Department of Clinical Microbiology, The Royal College of Surgeons in Ireland – Dublin, Ireland

Background

Brain abscess is an uncommon diagnosis associated with significant morbidity. We describe the epidemiology, risk factor profile, microbiology and outcomes of bacterial intracranial abscess in our institution, a tertiary neurosurgical referral centre.

Methods

A twelve-year retrospective review of patients admitted with bacterial intracranial abscess: January 1st 2010 – December 31st 2021. Radiology, laboratory and electronic patient records were reviewed.

Results

Of 163 patients, 110 were male (67.5%); median age at diagnosis was 48 years (interquartile range [IQR] 31) Community-acquisition occurred in 158 (97%). A preceding ENT (sinusitis or mastoiditis) or dental infection was identified in 41% (n=67), infective endocarditis (IE) in 17% (n=28) and a prior neurosurgical procedure in 13% (n=21). No attributable risk factor was identified in 18% (n=30).

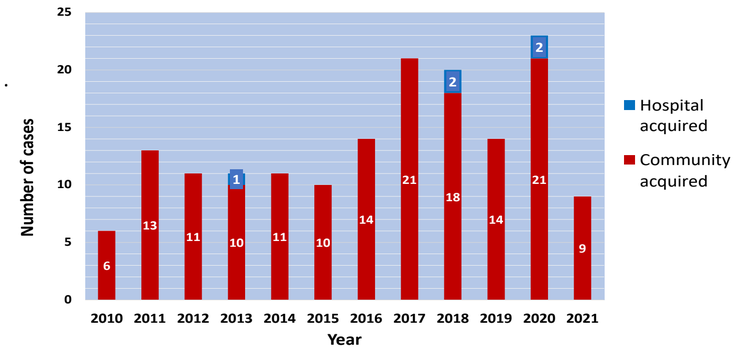

Fig. 1: Intracranial abscess incidence by year of presentation, stratified by community and hospital acquired cases

A solitary abscess was present in 85% (n=139). Solitary lesions were more common in those with dental or ENT infections (46% [n=64] versus 12.5% [n=3] of those with multiple lesions; p=0.02).

IE was more common in those with multiple lesions (37.5% [n=19] versus 13.7% [n=9] of those with solitary lesions; p=0.004).

Immunosuppressed patients were more likely to have multiple rather than solitary lesions (37.5% [n=9] versus 4.3% [n=6]; p<0.001).

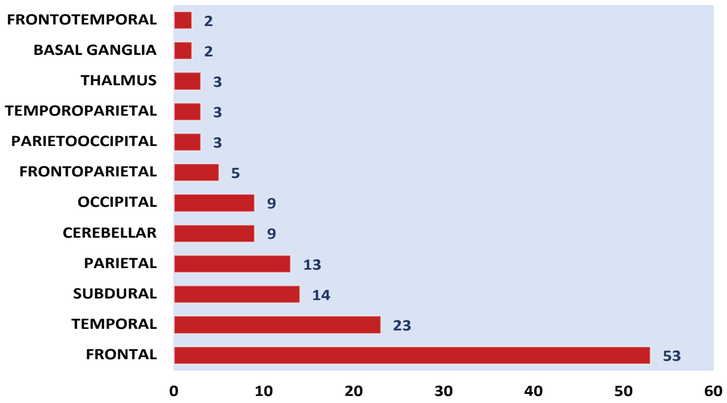

Fig. 2: Anatomic location of solitary lesions

Neurosurgical drainage was performed in 92% (n=150). A single isolate was cultured in 68 patients (42%); *Streptococcus intermedius* most common (n=31). Polymicrobial infection occurred in 28.3% (n=46). Of 35 culture-negative specimens, 20 were referred for 16S PCR; an organism detected in nine cases.

Median length-of-stay was 21 days (IQR 15.5) and in-hospital mortality was 1.2%.

Organism	No. of isolates
Gram-positive bacteria	101
Streptococci	68
Streptococcus intermedius	46
Streptococcus constellatus	7
Streptococcus viridans sp.	6
Streptococcus anginosus	4
Streptococcus pneumoniae	3
Streptococcus pyogenes	2
Staphylococci	25
Meticillin-sensitive *Staphylococcus aureus* (MSSA)	15
Meticillin-resistant *Staphylococcus aureus* (MRSA)	1
Coagulase-negative *staphylococcus*	9
Other	
Nocardia sp.	5
Corynebacterium sp.	2
Listeria monocytogenes	1
Gram-negative bacteria	23
Aggregatibacter sp.	13
Escherichia coli	4
Pseudomonas aeruginosa	3
Haemophilus influenzae	2
Enterobacter cloacae	1
Anaerobes	63
Toxoplasmosis	1

Table 1: Pathogens isolated from intra-operative specimens; both monomicrobial and polymicrobial infections (inclusive of 16S PCR results)

Conclusion

The predominant presentation of brain abscess was that of community-acquired abscess in a male with a solitary frontal lobe lesion associated with an ENT or dental infection. Observed in-hospital mortality was rare. *S. intermedius* was the most common pathogen. Given high numbers of IE observed in this study, echocardiogram should be considered in diagnostic workup of all patients presenting with brain abscess.