

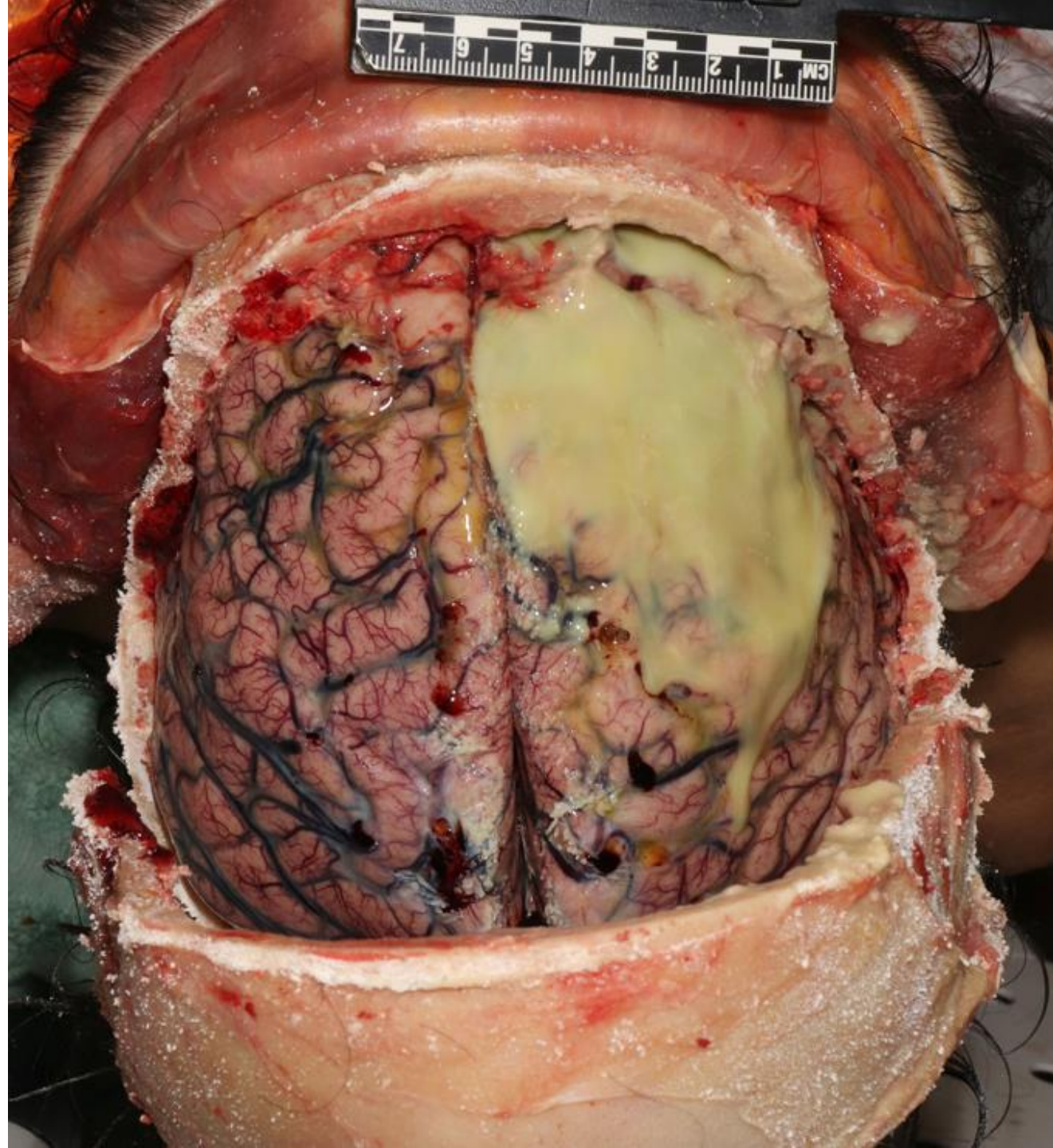


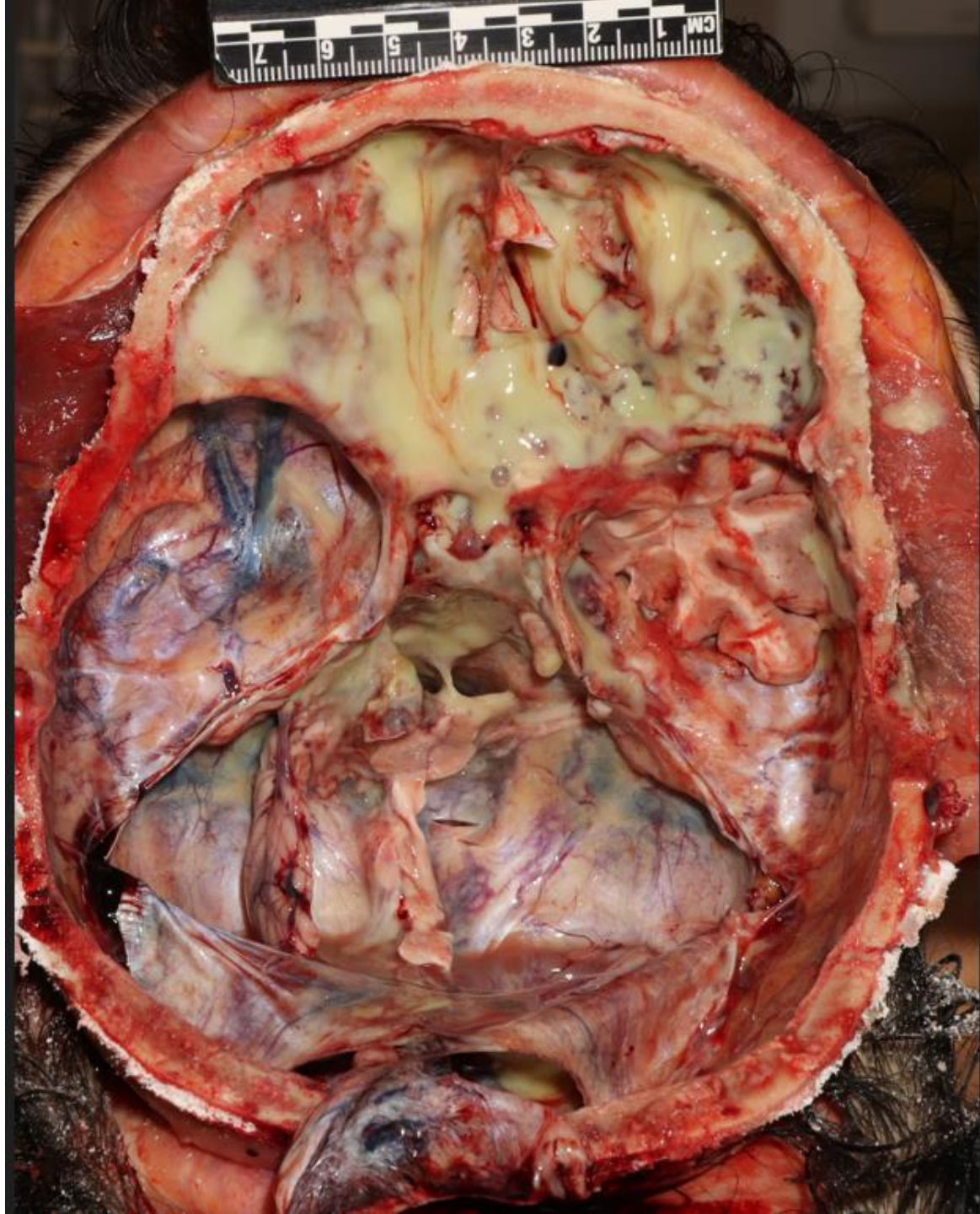
# Case #74

NAME Educational Activities Committee

Submitted by Colleen Klein, MD with photos by Vanesa Casas  
(Maricopa County Office of the Medical Examiner).

Case workup completed by Mark Shelly, DO  
(Tarrant County Medical Examiner's Office).





A 43-year-old male with a history of chronic methamphetamine use was found unresponsive in a friend's garage. The findings in the photos were discovered on autopsy examination. Bacterial cultures taken from the frontal lobe resulted a polymicrobial population, with moderate growth of *Streptococcus intermedius* and scant growth of *Staphylococcus aureus*.

Which of the following is the most likely source of this intracranial empyema given the provided information?

- A. Blunt force head trauma
- B. Infective endocarditis
- C. Oral infection
- D. Systemic infection
- E. Otitis media

Answer...

## C: Oral infection (47.61% responses)

Inspection of the oral cavity in this case demonstrated purulent discharge and dental abscess in the setting of poor oral health which was considered to be the source of the intracranial empyema.

Contiguous infection is the primary etiology (between 40-50%) of intracranial abscess, most often in the setting of otitis media, frontal sinusitis, or oral infection. The frontal and parietal lobes are the most frequently involved. The oral cavity is a common source of cerebral infections, largely due to anatomical proximity. In the setting of poor or even moderate oral health, commensal bacteria are often the culprits of intracranial abscesses and empyema. These infections are often polymicrobial due to the variety of bacterial found in the oral cavity that are also involved gum disease and dental plaque formation. Overall, Streptococci species are among the most commonly involved (50%), with anaerobic bacteria (*Actinomyces*, *Fusobacteria*), and *Staphylococcus* species the second most common (17% and 15% respectively).

Chronic methamphetamine use is associated with higher incidences of dental caries, periodontal disease, xerostomia (dry mouth), and clenching, all which contribute to tooth decay. Oral disease in methamphetamine use commonly manifests as blackening, staining, and crumbling of the teeth. Poor oral health is also prevalent in vulnerable populations such as those experiencing homelessness, older adults, ethnic minorities, and populations in lower socioeconomic status.



Image showing the decedent's oropharynx and poor dentition.



Other responses:

A. Blunt force head trauma (6.25% responses)

B. Infective endocarditis (22.34% responses)

D. Systemic infection (15.82% responses)

E. Otitis media (7.98% responses)

Intracranial infection can also occur after traumatic injury, neurosurgery, in the setting of systemic infection (sepsis), or by idiopathic means. This decedent had no history of trauma or recently surgical procedure, and no other symptoms of systemic infection. Otitis media is more commonly seen in pediatric populations, and is usually caused by *Streptococcus pneumoniae*, *Moraxella catarrhalis*, and *Haemophilus influenzae*. Infective endocarditis is more likely to cause an intraparenchymal abscess and is commonly caused by *Staphylococcus aureus* rather than a polymicrobial population dominated by Streptococcus species.

# References

- Kichenbrand C, Marchal A, Mouraret A, Hasnaoui N, Guillet J, Rech F, Phulpin B. Brain abscesses and intracranial empyema due to dental pathogens: Case series. *Int J Surg Case Rep.* 2020;69:35-38. doi: 10.1016/j.ijscr.2020.03.025. Epub 2020 Mar 28. PMID: 32248015; PMCID: PMC7132046.
- Helweg-Larsen J, Astradsson A, Richhall H, Erdal J, Laursen A, Brennum J. Pyogenic brain abscess, a 15 year survey. *BMC Infect Dis.* 2012 Nov 30;12:332. doi: 10.1186/1471-2334-12-332. PMID: 23193986; PMCID: PMC3536615.
- Mukherjee A, Dye BA, Clague J, Belin TR, Shetty V. Methamphetamine use and oral health-related quality of life. *Qual Life Res.* 2018 Dec;27(12):3179-3190. doi: 10.1007/s11136-018-1957-6. Epub 2018 Aug 3. PMID: 30076578; PMCID: PMC8346633.
- Walter AW, Bachman SS, Reznik DA, Cabral H, Umez-Eronini A, Nath A, Flourney MW, Young NS. Methamphetamine use and dental problems among adults enrolled in a program to increase access to oral health services for people living with HIV/AIDS. *Public Health Rep.* 2012 May;127 Suppl 2(Suppl 2):25-35. doi: 10.1177/00333549121270S205. PMID: 22547874; PMCID: PMC3314390.
- Taj S, Arshad MU, Khan H, Sidhu GS, Singh R. Infective Endocarditis Leading to Intracranial Abscess: A Case Report and Literature Review. *Cureus.* 2021 Jan 12;13(1):e12660. doi: 10.7759/cureus.12660. PMID: 33585144; PMCID: PMC7872870.
- Massa HM, Cripps AW, Lehmann D. Otitis media: viruses, bacteria, biofilms and vaccines. *Med J Aust.* 2009 Nov 2;191(S9):S44-9. doi: 10.5694/j.1326-5377.2009.tb02926.x. PMID: 19883356; PMCID: PMC7168357.