Streptococcus intermedius



Streptococcus intermedius (SI) is associated with prolonged hospitalization and low survival rates. The genetic mechanisms involved in brain abscess development and genome evolution in comparison to other members of the Streptococcus anginosus group are understudied.

Issa et al., performed a whole-genome sequencing of an SI isolate, LAU_SINT, associated with brain abscess following sinusitis with all SI genomes in addition to S. constellatus and S. anginosus. Selective pressure on virulence factors, phages, pan-genome evolution and single-nucleotide polymorphism analysis were assessed. The structural details of the type seven secretion system (T7SS) was elucidated and compared with different organisms. ily and nanA were both abundant and conserved. Nisin resistance determinants were found in 47% of the isolates. Pan-genome and SNPsbased analysis didn't reveal significant geo-patterns.

The results showed that two SC isolates were misidentified as SI. They propose the presence of four T7SS modules (I⁻IV) located on various genomic islands. They detected a variety of factors linked to metal ions binding on the GIs carrying T7SS. This is the first detailed report characterizing the T7SS and its link to nisin resistance and metal ions binding in SI. These and yet uncharacterized T7SS transmembrane proteins merit further studies and could represent potential therapeutic targets ¹⁾.

S. intermedius expresses one or more members of a family of structurally and antigenically related surface proteins termed antigen I/II, which plays a potential role in its pathogenesis. It is involved in binding to human fibronectin and laminin and in inducing IL-8 release from monocytes, which promotes neutrophil chemotaxis and activation. There are few published data on the role of this organism in brain abscess. A review focuses on the clinical evidence, pathogenic role, mechanism of predisposition, and currently employed strategies to fight against S. intermedius associated to brain abscess².

Case reports

Heckmann JG, Ernst S, Scher B, Meyer B. Rapidly Growing Thalamic Abscess. Neurohospitalist. 2018 Jan;8(1):44-45. doi: 10.1177/1941874417700773. Epub 2017 Mar 24. Review. PubMed PMID: 29276565; PubMed Central PMCID: PMC5734503.

A 74-year-old immunocompetent man who developed severe lower back pain and bilateral lower extremity weakness 4 days following two root canal procedures. Lumbar spine magnetic resonance imaging (MRI) showed several pockets of epidural abscesses extending from L1 through L5. Blood cultures grew Streptococcus intermedius, an anaerobic commensal bacterium of the normal flora of the mouth and upper airways. The patient was treated with IV penicillin for 7 days but his symptoms continued to deteriorate. A repeat MRI showed extension of the epidural abscess to T10-T11 level. The patient was emergently transferred to our hospital where he underwent bilateral decompressive laminectomy of T10 through S1 and abscess evacuation. Pus culture was positive for Streptococcus intermedius, which confirmed the diagnosis and the treatment plan. He was discharged on intravenous (IV) penicillin for 6 weeks. His symptoms improved significantly postoperatively as he retained his baseline strength in his lower extremity ³⁾.

A 72-year-old female with a medical history of hypertension came to hospital for evaluation with word-finding difficulty, an expressive aphasia that began a few days prior to presentation. Computed tomography of the head showed a left temporal lobe mass-like lesion, with surrounding vasogenic edema. The patient was empirically started on courses of antibiotics. The next day, she was subjected to magnetic resonance imaging of the brain, which showed a left temporal lobe septated rimenhancing mass lesion, with bright restricted diffusion and diffuse surrounding vasogenic edema consistent with abscess. The patient was also seen by the neurosurgery department and underwent stereotactic, left temporal craniotomy, with drainage, and resection of abscess. Tissue culture grew S. intermedius sensitive to ampicillin sulbactam. Subsequently her expressive aphasia improved ⁴⁾.

A 65-year-old orthopaedic surgeon complained of fevers, right-sided radiating neck pain, stiffness, swelling, erythema, and right upper extremity weakness one month after he had broken a crown over his right mandibular premolar, a continued source of pain. Imaging of the cervical spine showed a right C4-C5 facet inflammatory arthropathy and a small epidural abscess that was cultured and initially treated with intravenous antibiotics. The oral maxillofacial surgery team performed an extraction of the infected, symptomatic tooth. For continued right upper extremity weakness, the patient underwent C4-C5 laminoforaminotomy and irrigation and debridement of the right C4-C5 facet joint. After 6 weeks of intravenous antibiotics, the patient's infectious and inflammatory markers had normalized. By 4 months, he had regained full strength at his upper extremity and a painless and full range of motion of his cervical spine.Pyogenic cervical facet joint infection is very rare and potentially dangerous. A high clinical suspicion and appropriate imaging, including magnetic resonance imaging, are important for correct diagnosis. Prompt medical and surgical treatment may avert complications, and although the patient presented made a complete recovery, patients may be left with neurological compromise ⁵.

Rapid identification of Streptococcus intermedius by multiplex polymerase chain reaction 1 week before culture positivity in a patient with antibiotic-treated thalamic brain abscess ⁶⁾.

A ten-year-old boy with the diagnosis of glycogen-storage disease and obesity was admitted to the

emergency room with complaints of vomiting, decreased level of consciousness, imbalance on walking. On neurological examination, the patient was ataxic. His cranial magnetic resonance imaging (MRI) examination showed mastoiditis on the right side and 39×34 mm abscess formation with surrounding edema on the right cerebellar hemisphere. The patient underwent surgery to drain the abscess, microbiological samples were obtained and empirical antibiotic treatment with vancomycin and piperacillin-tazobactam were started. Postoperative cranial MRI examination showed that the lesion regressed 10×10 mm with a reduction in the edema. On the second week of the treatment, the antibiotics were switched to vancomycin and meropenem because of the relapsing fever. The therapy was continued for 6 weeks. A final MRI (after completing antibiotherapy) showed resolution of the cerebellar abscess. The child's clinical condition improved and he was discharged without any sequelae.

Children with congenital heart disease and an immonocompromised state are particularly at risk. Streptococcus intermedius is usually a commensal microorganism in the normal flora of the mouth which can cause brain abscess rarely in children. Brain abscess induced mortality rates are still relatively high, even with the advancement of imaging technologies, the combination of surgical drainage and antimicrobial therapy.

This case is one of the few reported cases of cerebellar abscess caused by S. intermedius in an immunocompetent child, due to its low virulence, a rare occurence and timely management resulting in fully healed ⁷⁾.

A 74-year-old man presented with progressive dyspnea after a 10-days latency following a thoracic trauma. CT imaging showed multiple rib fracture and an empyema that was primarily treated by a chest tube. In the course of the hospital stay, a rapidly progressive paraplegia developed and the MR imaging revealed a peridural abscess caused by a pleural empyema. Due to trauma-related barrier damage and the initial delay of the operative therapy a usually less invasive pathogen (streptococcus intermedius) could affect the peridural space. The successful therapy consisted of urgent laminectomy and a subsequent video-assisted thoracoscopy supported by systemic antibiotic therapy ⁸.

A rare case of a brain abscess in a child with heterotaxy syndrome, severe cardiac anomalies, and extensive dental caries. The pathogen was Streptococcus intermedius isolated from the cerebrospinal fluid. The source of the pathogen was probably an infection of a primary molar with a dentoalveolar abscess involving the bud of the permanent successor. After a long course of antibiotic regimens followed by a craniotomy with abscess drainage, a shunt, and comprehensive dental treatment, the patient was discharged from the hospital without any neurological sequel. At home, she completed an additional 3 months of oral antibiotics. This is the only known documented case of a toddler with a brain abscess of probable odontogenic origin without previous dental intervention. It emphasizes the importance of collaboration between cardiologists and pediatric dentists, especially in referring children with congenital heart defects for early dental checkups ⁹.

A 69-year-old man who had presented with headache and fever developed confusion and restlessness. Magnetic resonance imaging revealed a mass with ring enhancement extending to the right ventricle. Emergency aspiration of cerebrospinal fluid (CSF) from the spinal canal revealed

severe purulent meningitis. Bacterial culture of the CSF and blood was negative. Because of prolonged consciousness disturbance, the patient underwent evacuation of the intraventrcular abscess using a neuroendoscope. The pus was centrifuged and collected for bacterial culture, and this revealed Streptococcus intermedius/milleri. After implantation of a ventricular catheter, gentamicin sulfate was administered twice a day for 9 days. Cefotaxime sodium was also administered intravenously for 14 days, followed by oral administration of cefcapene pivoxil hydrochloride for 10 days. The patient made a complete recovery, and was discharged 31 days after admission. After 20 months of follow-up, he is doing well and has returned to his work. In cases of intraventricular rupture of a brain abscess, a neuroendoscopic approach is useful for evacuation of intraventricular debris or septum, and identification of the causative bacterium for selection of antibiotics, possibly reducing the period of hospitalization ¹⁰.

A case of primary ventriculitis, which resulted in adhesions and multiloculated hydrocephalus, necessitating numerous surgical procedures to control it. No predisposing factor(s) could be identified. Although the organism could not be cultured from CSF, as he was already on antibiotic treatment, it could, however, be identified by 16S rDNA polymerase chain reaction on the CSF sample. It appears important to recognise this condition and to treat it aggressively to prevent complications such as adhesions and multiloculated hydrocephalus¹¹.

A 65-year-old woman having a massive involvement of the entire CNS with multiple localizations, both intracranial and spinal. Early diagnosis was obtained through brain CT scans followed by cranio-spinal contrast enhanced MRI scans. Patient was treated with external ventricular drainage and suboccipital craniectomy, while on antibiotic therapy.

Patient's neurological condition gradually improved. By the end of the eighth hospital week, she was discharged without any neurological deficit.

Spinal subdural empyema and brain subdural empyema are not always, as in this case, two different entities. Prompt diagnosis and treatment constitute the major variables affecting outcome ¹²⁾.

A 12-year-old previously healthy boy who developed a brain abscess in the vicinity of the left precentral gyrus. Clinical examination prior to surgery showed a severe right hemiparesis, more pronounced in his leg. We performed an ultrasonographically guided puncture and aspiration of the abscess through a small craniotomy. Immediately after the procedure he became hemiplegic. Bacteriological examination of the aspirated pus revealed Streptococcus intermedius, Streptococcus beta-haemolyticus group F, Fusobacterium species and gram-negative rods. The same species of microorganisms were identified in a smear from the vicinity of the extracted tooth. The patient was carefully screened for possible other sources of infection, but none was found. Following appropriate antimicrobial treatment he recovered completely and returned home without any neurological deficit ¹³.

Two cases of brain abscess in the left frontal lobe caused by S. intermedius, which responded well to antimicrobial treatment combined with needle aspiration, are presented. In the first patient, the

predisposing disease was paranasal sinusitis of the frontal and ethmoid sinuses. In the second patient, the source of the pathogen was not detected despite extensive examination. The patients underwent aspiration of pus under ultrasound guidance in the first patient, and via a computed tomography-guided stereotactic procedure in the second patient. They subsequently received appropriate antimicrobial therapy against S. intermedius isolated from the pus culture. Both patients were discharged without any neurological deficits. ¹⁴.

A rare case of multiple abscesses in both cerebral hemispheres complicated by hemorrhage is reported. Minimally invasive surgery utilizing magnetic resonance imaging (MRI) guidance was performed after extensive testing failed to yield a diagnosis. Streptococcus intermedius was isolated from cultures taken during surgery and intravenous antimicrobial therapy was instituted ¹⁵.

References

1)

Issa E, Salloum T, Panossian B, Ayoub D, Abboud E, Tokajian S. Genome Mining and Comparative Analysis of Streptococcus intermedius Causing Brain Abscess in a Child. Pathogens. 2019 Feb 13;8(1). pii: E22. doi: 10.3390/pathogens8010022. PubMed PMID: 30781742.

Mishra AK, Fournier PE. The role of Streptococcus intermedius in brain abscess. Eur J Clin Microbiol Infect Dis. 2013 Apr;32(4):477-83. doi: 10.1007/s10096-012-1782-8. Epub 2012 Nov 28. Review. PubMed PMID: 23187823.

3)

Ramhmdani S, Bydon A. Streptococcus intermedius: an unusual cause of spinal epidural abscess. J Spine Surg. 2017 Jun;3(2):243-249. doi: 10.21037/jss.2017.05.04. PubMed PMID: 28744508; PubMed Central PMCID: PMC5506302.

Khaja M, Adler D, Lominadze G. Expressive aphasia caused by Streptococcus intermedius brain abscess in an immunocompetent patient. Int Med Case Rep J. 2017 Jan 23;10:25-30. doi: 10.2147/IMCRJ.S125684. eCollection 2017. PubMed PMID: 28176963; PubMed Central PMCID: PMC5271399.

Kaye ID, Protopsaltis TS. Cervical Facet Joint Infection and Associated Epidural Abscess with Streptococcus intermedius from a Dental Infection Origin A Case Report and Review. Bull Hosp Jt Dis (2013). 2016 Sep;74(3):237-43. Review. PubMed PMID: 27620549.

Tsuang FY, Lin YT, Yen DH, Teng LJ, Tsai JC. Rapid identification of Streptococcus intermedius by multiplex polymerase chain reaction 1 week before culture positivity in a patient with antibiotic-treated thalamic brain abscess. J Microbiol Immunol Infect. 2017 Aug;50(4):549-551. doi: 10.1016/j.jmii.2016.04.001. Epub 2016 May 13. PubMed PMID: 27262210.

Yakut N, Kadayifci EK, Karaaslan A, Atici S, Akkoc G, Ocal Demir S, Dagcinar A, Akbulut F, Soysal A, Bakır M. Braın abscess due to Streptococcus intermedius secondary to mastoiditis in a child. Springerplus. 2015 Dec 23;4:809. doi: 10.1186/s40064-015-1608-0. eCollection 2015. PubMed PMID: 26722629; PubMed Central PMCID: PMC4689728.

Lescan M, Lepski G, Steger V, Schlensak C, Walker T. Rapidly progressive paraplegia and pleural empyema: how does that correlate? Gen Thorac Cardiovasc Surg. 2013 Nov;61(11):640-2. doi: 10.1007/s11748-012-0199-8. Epub 2012 Dec 30. PubMed PMID: 23275088.

9)

Moskovitz M, Birenboim R, Katz-Sagi H, Perles Z, Averbuch D. A brain abscess of probable odontogenic origin in a child with cyanotic heart disease. Pediatr Dent. 2012 Sep-Oct;34(5):403-6. PubMed PMID: 23211917.

10)

Nishizaki T, Ikeda N, Nakano S, Sakakura T, Abiko M, Okamura T. Successful neuroendoscopic treatment of intraventricular brain abscess rupture. Clin Pract. 2011 Jul 1;1(3):e52. doi: 10.4081/cp.2011.e52. eCollection 2011 Jul 1. PubMed PMID: 24765313; PubMed Central PMCID: PMC3981362.

11)

Vajramani GV, Akrawi H, Jones G, Sparrow OC. Primary ventriculitis caused by Streptococcus intermedius. Br J Neurosurg. 2007 Jun;21(3):293-6. PubMed PMID: 17612921.

Pompucci A, De Bonis P, Sabatino G, Federico G, Moschini M, Anile C, Mangiola A. Cranio-spinal subdural empyema due to S. intermedius: a case report. J Neuroimaging. 2007 Oct;17(4):358-60. PubMed PMID: 17894630.

13)

Strojnik T, Roskar Z. Brain abscess after milk tooth self-extraction. Wien Klin Wochenschr. 2004;116 Suppl 2:87-9. PubMed PMID: 15506321.

Yamamoto M, Fukushima T, Ohshiro S, Go Y, Tsugu H, Kono K, Tomonaga M. Brain abscess caused by Streptococcus intermedius: two case reports. Surg Neurol. 1999 Feb;51(2):219-22. PubMed PMID: 10029431.

15)

Baumann CK. Multiple bilateral cerebral abscesses with hemorrhage. J Neurosci Nurs. 1997 Feb;29(1):4-8, 13-4. PubMed PMID: 9067848.

From: https://neurosurgerywiki.com/wiki/ - **Neurosurgery Wiki**

Permanent link: https://neurosurgerywiki.com/wiki/doku.php?id=streptococcus_intermedius



Last update: 2024/06/07 02:55