

Subdural Empyema Caused by Streptococcus Constellatus in Immunocompetent Pediatric Patient: Case Report and Literature Review

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Abstract

Subdural empyema is a pathology characterized by the presence of a purulent collection in subdural space. It usually can be caused by microorganisms like *Streptococcus milleri*, *Staphylococcus aureus*, and *Staphylococcus epidermidis*; otherwise, its etiology agent can be different depending on the age of the patient. We present the case of a subdural empyema caused by *Streptococcus constellatus* in an immunocompetent child with a favorable clinical evolution posterior to medical and surgical management.

Keywords: *Subdural Empyema, Streptococcus Constellatus, Streptococcus Milleri.*

Introduction

The subdural empyema is a purulent collection that is located in the space between the dura mater and the arachnoid, its presence is more frequent in older adults, as well as in patients who present with immunosuppressed states (Caminos C. B. et al 2006; Henadus, M. A. 2013). Its etiology is related to the age of the patient; however, non-hemolytic *Streptococcus* are the microorganisms most linked to this entity. *Streptococcus Constellatus* is a subtype of *Streptococcus milleri* that has been related to the development of pleural empyemas as well as liver abscesses, however, its relationship with subdural empyemas has been poorly described in the literature (Caminos C. B. et al 2006; Agrawal A et al, 2007).

Clinical Case

An 11-year-old male patient, with no pathological history, was consulted for a clinical picture of 3 days of evolution that begins with the presence of unquantified thermal increases, in the absence of cough, dysphonia, rhinorrhea, or otalgia. The mother administered conventional anti-inflammatory drugs with no improvement in symptoms; On his third day of evolution the patient became drowsy, was taken to

the first level hospital of his municipality where they found him stuporous, with anisocoric pupils for which they refer to reference institution with suspected neuro infection.

Upon admission to the emergency department of the tertiary hospital, the patient was normotensive, with bradycardia, heart rate of 45 bpm, with pulse oximetry ranging between 93 - 97% and afebrile. Neurological examination showed stuporous with Glasgow 8/15 (AO1-RV2-RM5), anisocoric (OD 3mm - OI 5mm), non-reactive pupils, with episodes of psychomotor agitation and generalized tonic movements, bilateral positive Babinski, meningeal signs were negative. A CT scan of a simple and contrasted skull was taken (Figure 1), which showed a convex frontoparietal hypodense image, left, which displaced the cortex, without enhancement with contrast medium, generating midline displacement and partial collapse of the ipsilateral ventricle, which is why it was considered that he had endocranial hypertension syndrome which benefited from neurosurgical management. Broad-spectrum antibiotic management (ceftriaxone, vancomycin and metronidazole) was initiated due to suspected neuroinfectious process.

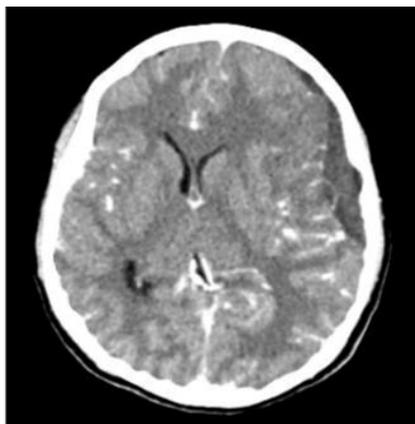


Fig 1. Contrasted brain CT, axial sections, hypodense image, left temporal convex, which did not capture contrast, with midline displacement, deformation of ventricular system. Source: Images by the authors

The patient was taken to craniotomy by neurosurgery team for drainage of said lesion performing left frontoparietal craniotomy, with subsequent dural opening, at which time it is possible to evidence an encapsulated lesion, pearly adherent, with an abundant purulent content of approximately 25 cc, compatible with a subdural empyema, capsule resection of said lesion was achieved, With no evidence of residual bleeding, no associated surgical complications, samples were obtained for complementary pathological studies. The patient presented an adequate clinical evolution in his management in critical care, however, the presence of sequelae right hemiparesis, predominant in the upper limb, was evidenced. A control brain CT scan (Figure 2) showed slight residual bleeding in the area of resection, without major vasogenic edema, complete drainage of the subdural collection, with midline rectification, and no evidence of recurrence of subdural injury.

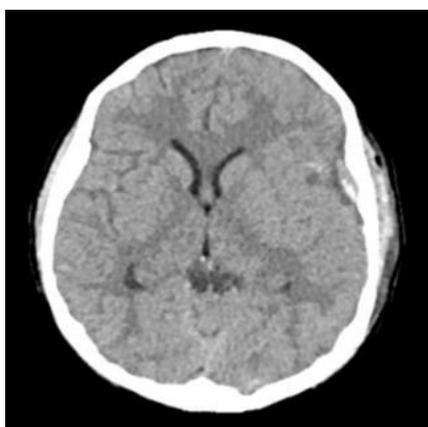


Fig 2: Simple brain CT, axial sections, postoperative image showing drainage of left subdural collection, with residual bleeding in surgical area with midline displacement correction. Source: Images by the authors

In the secretion culture, isolation of *Streptococcus constellatus* resistant to penicillin G and ampicillin,

sensitive to ceftriaxone, was obtained, which is why it was considered to adjust management with ceftriaxone in a scheme of 21 effective days. After the isolation of this infrequent microorganism, paraclinics were requested in order to rule out an associated immunodeficiency state, finding serology for HIV negative, AgsHb negative, VDRL non-reactive. Likewise, an X-ray of the paranasal sinuses was performed, looking for infectious focus at that level as a predisposing factor of neuro infection, however, its result was within normal ranges. Also, careful ponderal measurements were made which cataloged the patient in weight and height appropriate for his age. During his clinical evolution, the patient presented progressive resolution of the motor deficit described, giving discharge without functional limitations. The child continued to be monitored by outpatient clinic by the neurosurgery group with a satisfactory clinical evolution.

Discussion

The subdural empyema is a focal, intracranial purulent collection located between the dura mater and the arachnoid (Caminos C. B, et al, 2006). This pathology accounts for about 20% of intracranial infections, predominantly involving people in the third and fourth decades of life, affecting more men than women. Its mortality occurs in 4% of cases, while its morbidity in relation to neurological deficit amounts to 50%, hemiparesis in 15-35% and epileptic seizures in 12-37.5%. (Caminos C. B. et al, 2006; Henadus, M. A, 2013)

Immunization against *Haemophilus influenzae* type B has decreased the incidence of subdural empyema at younger ages, and its presentation is currently more common in adolescents and adults, where its origin is mainly secondary to sinus infections. (Hendaus, M.A, 2013) It is common for the episode of sinusitis to precede the development of the subdural collection by 2 weeks, once the infection is developed the collection extends through the subdural space until it finds a dural fold such as the cerebral sickle or the cerebellum tent, which is why the subdural empyemas in the vast majority of cases are unilateral. (De Bonis et al, 2009; Gupta S. et al, 2011; Coria J et al 2002).

The most prevalent etiological agents depend on the mechanism of infection as well as the age of the patient, in neonates the most frequently described microorganisms are *Enterobacteria*, *Streptococcus* group B or *Listeria Monocytogenes*, while in children the main agents are *H. influenzae*, *Escherichia coli*, *S. pneumoniae* or *Neisseria meningitidis* in relation to meningeal infection. (Coria J et al, 2002; Busts R. O

et al, 2006)

In adults, the microorganisms most frequently described as causes of subdural empyema are gram-negative bacilli (*Escherichia coli*), or anaerobes of the genus *Bacteroides*, such as *Streptococcus milleri*. (Caminos C. B. et al, 2006) A series of non-hemolytic anaerobic and microaerobic streptococci that inhabit as commensal at the level of the mouth, oropharynx, gastrointestinal tract are also described. This variety of *Streptococcus viridans* is divided into three subtypes, *Streptococcus anginosus*, *Streptococcus constellatus* and *Streptococcus intermedius*. (Agrawal, A et al, 2007; Busts R. O et al, 2006).

Streptococcus constellatus is a commensal agent that can become pathogenic in patients with multiple risk factors, cases in which it has been related to the formation of pleuropulmonary, intraabdominal, genitourinary empyemas and in rare cases subdural involvement. (De Bonis et al, 2009) This is a bacterium, Gram positive, catalase negative, which can produce, alpha glucosidase and hyaluronidase, which, like its capsular material, are important determinants of its pathogenicity. (Coria J et al, 2002).

The involvement of the central nervous system is infrequent, in these cases, its etiology has been related to predisposing factors such as immunosuppression, history of neurosurgery, cranioencephalic trauma, ischemic stroke, as well as oral, dental and neck infections. (De Bonis et al, 2009; Gupta S et al, 2011) Sinusitis has been reported as the most important predisposing factor in immunocompetent patients. In some cases, isolation of other oropharyngeal commensal agents has been reported (Coria J et al 2002; Bouziri A et al 2011). In the reported case, no risk factor was found that clearly explained the predisposition of this patient to the development of a severe infection by this etiological agent, nor was a second infectious agent associated with this entity identified.

In most cases in which the bacterium has been isolated, it is sensitive to beta-lactam drugs and macrolides, describing penicillin G, as the agent of choice of this entity, in the same way vancomycin and clindamycin being used against patients with allergy to penicillins (Gupta S et al, 2011; A Soriano et al, 2000). It is noteworthy that in our case the antibiogram showed resistance of the bacterium against penicillins, however, sensitivity against cephalosporins, which is why ceftriaxone was our management of choice.

This infection, with probable fatal outcome, should be

treated with early surgical drainage, optimal antibiotic management, and close imaging follow-up. (S Sahin et al 2015) Computed Axial Tomography (CT) is a cost-effective and quick to obtain image, however, it can be negative in up to 50% of cases of subdural empyema. Magnetic Resonance is the study of choice in cases of subdural empyema, presenting a sensitivity of 93% (Hendaus M A et al 2013; Gupta S et al 2011). In our institution there was no resonator at the time of diagnosis to characterize the image described

Early surgical drainage of the collection is of great importance in which craniotomy is preferred to trepanation drainage, due to the greater tissue exposure, as well as a better characterization of the lesion. (Bustos R. O. et al 2006) In the case discussed, it was decided to perform craniotomy that would allow adequate exposure of the capsule of the lesion to guarantee an appropriate resection of the same. Broad-spectrum antibiotic therapy as an initial approach is indicated, adjusting the antibiotic scheme later with the results of the culture and antibiogram of the collection, as well as the findings of the blood culture. (Adriana Amao et al, 2013).

The prognosis of patients suffering from this pathology has improved in recent decades, this due to advances in diagnostic and therapeutic methods, as well as greater awareness of health personnel against this type of entities. (Barrachina Hidalgo S, 2015) In spite of everything, approximately 50% of the survivors of this pathology present long-term sequelae, such as: hemiparesis, seizures, behavioral and learning problems. (W.N. Chang et al 2002)

Conclusion

Subdural empyema is a pathology with high morbidity and mortality rates, which is described in a large majority of cases as a neurosurgical emergency, infection by *Streptococcus Constelatus*, an uncommon etiological agent in pediatric age has been mostly related to risk factors, however, its presence in immunocompetent patients has also been described. It is necessary that these patients have a diagnosis, and early treatment, offering an early surgical intervention as well as an optimal antibiotic management, oriented according to antibiogram results, for this a multidisciplinary group must address the case with the aim of reducing the permanent neurological sequelae, improving the patient's prognosis in the same way.

Conflict Of Interest

The authors of this article declare no conflicts of interest.

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