Potts Puffy Tumor Drainage with Needle Aspiration: A Case Series of Three Adult Patients During the COVID-19 Pandemic

Forsan Jahshan MD[1], Helen Turner MD[4], Winnie Yeung MD[4], Isaac Shochat MD[2,3], and Yujay Ramakrishnan MD[4]

[1]Department of Otolaryngology-Head and Neck Surgery and Maxillofacial Surgery, Tel Aviv Sourasky Medical Center, Tel Aviv, Israel
[2]Department of Otolaryngology, Head and Neck Surgery, Hillel Yaffe Medical Center, Hadera, Israel
[3]Rappaport Faculty of Medicine, Technion–Israel Institute of Technology, Haifa, Israel
[4]Department of Otolaryngology-Head and Neck Surgery, Nottingham University Hospitals, Nottingham, UK

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Pott's Puffy tumor (PPT) is a rare complication of frontal sinusitis, involving a subperiosteal abscesses with associated osteomyelitis of the frontal sinus anterior table. It mainly affects children and adolescents but can also occur in adults. It presents with localized forehead swelling, pain, fever, headache, and sometimes intracranial complications like epidural or subdural abscesses [1,2]. The standard treatment for PPT typically involves surgical drainage under general anesthesia and broad-spectrum intravenous antibiotics. During the coronavirus disease 2019 (COVID-19) pandemic (March–June 2020), delayed surgeries and resource limitations led to the use of minimally invasive techniques [3] such as needle aspiration without general anesthesia. In this study, we present three adult PPT cases from Nottingham University Hospitals, United Kingdom, treated with early abscess aspiration during this period.

We conducted retrospective study of PPT cases presented during the early COVID-19 pandemic. Following patients' consent, case notes were reviewed for baseline demographics, previous treatments, presenting symptoms, and examination findings.

PATIENT DESCRIPTION

CASE 1

A 56-year-old male presented with a 5-week history of forehead swelling with no sepsis or visual or neurological symptoms. He had undergone recent dental extractions and received two courses of amoxicillin/clavulanic acid with partial relief but recurring swelling after stopping the treatment. Examination revealed well-defined soft tissue swelling over the forehead and glabella, with normal laboratory results and physical findings.

Computed tomography (CT) with intravenous (IV) contrast revealed complicated frontal sinusitis with osteomyelitis and a subperiosteal abscess extending through the anterior table, confirming PPT [Figure 1], but without posterior table erosion or intracranial involvement, as it would likely contraindicate needle aspiration due to the increased risk of intracranial complications. An 18G needle aspiration was performed through healthy skin, and pus was sent for microbiological analysis. IV ceftriaxone and oral metronidazole were started, but due to rapid recurrence, a frontal sinus trephine and drainage were performed 2 days later under general anesthesia. Both samples showed no bacterial growth, and we decided to continue the same antibiotic regimen for 6 weeks.

At the 6-week follow-up, the patient was asymptomatic, and a recent CT scan showed significant improvement in the right frontal sinus with bone matrix formation and resolution of the soft tissue swelling. Further follow-up confirmed full recovery.

CASE 2

An 18-year-old female presented with a 4-day history of forehead and left eye pain and swelling, a 40°C fever, and three episodes of vomiting. She had a history of chronic rhinosinusitis with polyps and asthma. Physical examination revealed forehead swelling and left periorbital cellulitis, with the remainder of her examination and laboratory results within normal limits. Contrast CT and magnetic resonance imaging of the head and sinuses confirmed left PPT with

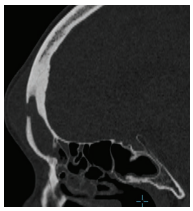
periorbital cellulitis, without posterior table erosion or intracranial involvement. The patient was treated with IV ceftriaxone and oral metronidazole and underwent two 18G needle aspirations of the abscess two days apart. Microbiology laboratory results revealed Clindamycin-sensitive *Streptococcus milleri* from the first aspiration, with no growth from the second. Antibiotics were adjusted to oral clindamycin for 6 weeks, and no further surgery was needed. At the 6-week follow-up, her symptoms had resolved, and imaging showed complete infection resolution. Full recovery was confirmed at subsequent follow-up examinations.

CASE 3

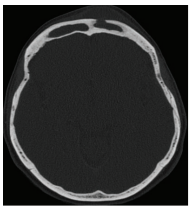
A 59-year-old female presented with a 2-week history of forehead pain, swelling, and erythema, following head trauma 10 weeks earlier. Examination revealed a 3 cm swelling on her forehead, with slightly elevated white blood cell count (13.9 × 10^9/L), neutrophils (8.35 × 10^9/L), and C-reactive protein (19 mg/L). Initially, she refused admission or surgery due to COVID-19 concerns. She was prescribed oral flucloxacillin by the maxillofacial team and discharged. A CT scan showed PPT with frontal sinus opacification, an anterior wall defect, and an abscess extending through the bone, but no intracranial or orbital involvement. She underwent needle aspiration and started oral amoxicillin/clavulanic acid but returned a week later with worsening pain. Microbiology identified *Fusobacterium nucleatum* sensitive to metronidazole and penicillin. She was admitted and treated with IV ceftriaxone and oral metronidazole, undergoing five more aspirations over 10 days due to recurrent swelling. Eventually, a fistula developed, leading her to consent to drainage under general anesthesia, followed by a Draf III procedure. At 6 weeks, she still had swelling, so antibiotics were extended for another 6 weeks. At 4 months, she was symptom-free, with no swelling, and a CT scan showed re-ossification of the left frontal sinus and resolution of the fistula.

Figure 1. Computed tomography scans of the sinuses demonstrate a frontal sinus opacification with extension into the subcutaneous tissue through a frontal anterior table defect

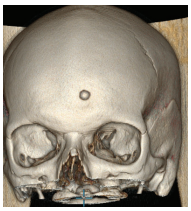
[A] Parasagittal



[B] Axial



[C] A 3D reconstruction of the same patient, demonstrating the bony defect



COMMENT

PPT is a challenging condition that can lead to serious morbidity and even mortality if not treated properly [1,4]. The accepted approach includes surgical drainage and IV empiric broad-spectrum blood–brain barrier penetrating antibiotics. As for osteomyelitis, the antibiotic treatment is usually given for 6–8 weeks [2,5].

In this series, two patients received 6 weeks of systemic antibiotics, and one received 12 weeks. The relatively long treatment period in the latter may be attributed to the delay in her treatment plan as initially she refused admission or abscess drainage under general anesthesia. Moreover, it has been shown that surgical drainage plays a key role in PPT treatment as it enables culture sampling in addition to drainage. A recent literature review included 83 cases of pediatric and adolescent PPT showed all patients were treated with systemic antibiotics and only 3.5% of the patients did not require surgical intervention, while 46.5%, 20%, and 27% needed external, endoscopic, and combined drainage approach, respectively [2].

In the current study, the drainage was conducted using a simple 18G needle following a CT scan of the sinuses and the head demonstrating intact posterior table without intracranial complications. The first patient did not respond to aspiration and the swelling rapidly recured therefore he underwent a frontal sinus trephine while the second patient responded well to aspirations and had only two PPT aspirations without the need for any further surgical intervention. The third patient did not respond at all to aspirations and refused any surgical intervention under general anesthesia and underwent six more aspirations without improvement. Later, she had a definitive surgical treatment with Draf III procedure.

Importantly, none of our patients developed a fistula due to aspiration, the last patient's fistula occurred in the middle of the swelling, while the aspiration was performed through a healthy skin over the glabella rather than on the swelling or erythematous area. We believe that the fistula developed due to delayed treatment. Moreover, we find that needle aspiration can help obtain a safe and early sample. Two-thirds of the patients had a positive culture result from needle aspiration sample. Of note, in these two positive culture patients, the results were obtained only from the first sample while the subsequent samples returned negative. This finding might be due to the antibiotic treatment. Needle aspiration can be performed quickly, with limited equipment, and might lead to an expedited recovery. It also allows samples for

rapid microbiological analysis before starting antibiotic treatment. Furthermore, it is a safe and effective measure as it may increase the probability of positive results, especially when the surgical drainage under general anesthesia is likely to be delayed due to patient or hospital factors. To the best of our knowledge, this is the first case series that focuses on the utility of needle aspiration in the treatment and management of PPT patients.

Correspondence

Dr. F. Jahshan
Dept. of Otolaryngology-Head and Neck Surgery and Maxillofacial Surgery, Tel Aviv Sourasky Medical Center, Tel Aviv 6423906, Israel
Email: forsan.jahshan@gmail.com

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Capsule

TGFβ links EBV to multisystem inflammatory syndrome in children

In a subset of children and adolescents, SARS-CoV-2 infection induces a severe acute hyperinflammatory shock termed multisystem inflammatory syndrome in children (MIS-C) at 4 to 8 weeks after infection. MIS-C is characterized by a specific T cell expansion and systemic hyperinflammation. **Goetzke** and colleagues showed that acute MIS-C is characterized by impaired reactivation of virus-reactive memory T cells, which depends on increased serum levels of the cytokine TGFβ resembling those that occur during severe COVID-19. This functional impairment in T cell reactivity is accompanied by the presence of TGFβ-response signatures in T cells, B cells and monocytes along with reduced antigen-presentation capabilities of monocytes and can be reversed by blocking TGFβ. Furthermore, T cell receptor repertoires of patients with MIS-C exhibit expansion of T cells expressing TCRVβ21.3, resembling Epstein–Barr virus (EBV)-reactive T cell clones capable of eliminating EBV-infected B cells. In addition, serum TGFβ in patients with MIS-C can trigger EBV reactivation, which is reversible with TGFβ blockade. Clinically, the TGFβ-induced defect in T cell reactivity correlates with a higher EBV seroprevalence in patients with MIS-C compared with age-matched controls, along with the occurrence of EBV reactivation. These findings establish a connection between SARS-CoV-2 infection and COVID-19 sequelae in children, in which impaired T cell cytotoxicity triggered by TGFβ overproduction leads to EBV reactivation and subsequent hyperinflammation.

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Capsule

A broad-spectrum lasso peptide antibiotic targeting the bacterial ribosome

Lasso peptides (biologically active molecules with a distinct structurally constrained knotted fold) are natural products that belong to the class of ribosomally synthesized and post-translationally modified peptides. **Jangra** and colleagues reported the identification and characterization of the lasso peptide antibiotic lariocidin and its internally cyclized derivative lariocidin B, produced by *Paenibacillus* sp. M2, which has broad-spectrum activity against a range of bacterial pathogens. The authors showed that lariocidins inhibited bacterial growth by binding to the ribosome and interfering with protein synthesis. Structural, genetic, and biochemical data showed that lariocidins bind at a unique site in the small ribosomal subunit, where they interact with the 16S ribosomal RNA and aminoacyl-tRNA, inhibiting translocation and inducing miscoding. Lariocidin is unaffected by common resistance mechanisms, has a low propensity for generating spontaneous resistance, shows no toxicity to human cells, and has potent in vivo activity in a mouse model of *Acinetobacter baumannii* infection.

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Eitan Israeli