

Case Report

A Case of Pott's Puffy Tumor Developing Secondary to Pansinusitis in an Obese Diabetic Adolescent

Obes Diabetik Bir Adölesanda Pansinüzite İkincil Gelişen Pott's Puffy Tümör Olgusu

Ömer Güneş^{ID}, Aysun Yahşi^{ID}, Saliha Kanık Yüksek^{ID}, Latife Güder^{ID}, Özlem Mustafaoğlu^{ID}, Ahmet Yasin Güney^{ID}, Belgin Gülhan^{ID}, Gülsüm İclal Bayhan^{ID}, Aslınur Özkaya Parlakay^{ID}

Ankara City Hospital, Pediatric Infectious Diseases, Ankara, Türkiye

ABSTRACT

Pott's Puffy tumor is a rare osteomyelitis of the frontal bone presenting with swelling and headache in the frontal region that can be seen after frontal sinusitis. It is a complication that requires urgent surgical intervention. In this case study, a case of complicated Pott's Puffy tumor secondary to pansinusitis in a 16-year-old adolescent male with underlying obesity and uncontrolled type 2 diabetes is presented.

Keywords: adolescent, osteomyelitis, pansinusitis, Pott's Puffy Tumor

ÖZET

Pott's Puffy tümörü frontal sinüzitlerden sonra görülebilen frontal bölgede şişlik ve baş ağrısı ile prezente olan, nadir görülen frontal kemiğin osteomyelitidir. Acil cerrahi müdahale gerektiren bir komplikasyondur. Bu yazıda 16 yaşında altta yatan obezitesi ve kontrol altında olmayan tip 2 diabeti olan adölesan bir erkekte pansinüzite ikincil olarak gelişen bir komplike Pott's Puffy tümör olgusu sunulmuştur.

Keywords: Adölesan, osteomiyelit, pansinüzit, Pott's Puffy Tümör

INTRODUCTION

Pott's Puffy Tumor (PPT) is defined as a subperiosteal abscess of the anterior wall of the frontal sinus associated with underlying frontal osteomyelitis (1). PPT appears clinically as a localized frontal swelling. It usually develops after improperly treated frontal sinusitis or misdiagnosed conditions (2). And may also occur as a result of conditions, such as head trauma, surgery in the frontal region, dental infections, insect bites, mastoiditis, and fibrous dysplasia (3). Although it can be seen at any age, it is more common in adolescents due

to the increase in blood flow velocity in diploic veins (4). It may develop by erosion of the frontal sinus walls or by transporting the thrombus formed by the septic route to the dura by diploic veins (5). Cranial computed tomography (CT) should be preferred primarily as diagnostic imaging. Contrast-enhanced brain magnetic resonance imaging (MRI) is also important for the diagnosis and follow-up of intracranial complications (6). Long-term broad-spectrum antibiotic therapy and surgical treatment are required for complete recovery.

Received: 22.11.2022 · Accepted: 23.02.2023 · Published: 30.04.2023

Correspondence / Yazışma: Ömer Güneş · Ankara Şehir Hastanesi, Pediatrik Enfeksiyon Hastalıkları, Ankara, Türkiye · dromergunes@gmail.com

Cite this article as: Gunes O, Yahsi A, Kanik Yuksek S, Mustafaoglu O, Guney AY, Gulhan B, et al. A Case of Pott's Puffy Tumor Developing Secondary to Pansinusitis in an Obese Diabetic Adolescent. *Pediatr Acad Case Rep.* 2023;2(2):44-48.

CASE REPORT

A 16-year-old male patient, who was followed up for obesity, type 2 diabetes and essential hypertension, applied to a pediatric outpatient clinic outside our hospital with the complaint of headache that started five days ago. Oral amoxicillin-clavulanate treatment (50 mg/kg/day) was initiated for acute rhinosinusitis. On the 3rd day of antibiotic treatment, because the patient's clinical findings did not regress and acute phase reactants were high, amoxicillin-clavulanate treatment was discontinued. Intramuscular ceftriaxone treatment (50 mg/kg/day) was started, and he used this treatment regularly for four days before he was admitted to our hospital. While the patient was receiving ceftriaxone treatment, preseptal cellulitis was considered due to the addition of swelling in the right forehead (Figure 1a), and the patient was referred to the pediatric emergency room of our hospital. When the patient was admitted to our pediatric emergency service, a physical examination revealed a lesion compatible with Pott's raised tumor in the right frontal region, intense edematous and hyperemic, clear cornea, and chemosis in the left periorbital region. At admission, he had marked leukocytosis with a predominance of neutrophils, and acute phase reactants were markedly elevated. Pansinusitis, preseptal cellulitis in the right frontal region, and a cystic lesion with a diameter of 7 mm under the skin were detected in the computerized cranial-orbital computed tomography (CT) taken before he was admitted to our hospital (Figure 1b). With the preliminary diagnosis of pansinusitis, preseptal cellulitis, Pott's raised tumor, intravenous ceftriaxone (100 mg/kg/day) and intravenous clindamycin (30 mg/kg/day) were started and admitted to the Pediatric Infectious Diseases clinic. Cranial diffusion magnetic resonance imaging (MRI) performed after hospitalization showed signs of pansinusitis, pre-postseptal cellulitis, and osteomyelitis in the frontal bone adjacent to the frontal sinus. No significant destruction was observed in bone structures, and no abscess formation was observed (Figure 1c). On the 3rd day of his hospitalization, endoscopic sinus surgery was performed for pansinusitis by the Department of Ear-nose-throat Diseases. Methicillin-susceptible *Staphylococcus aureus* (MRSA) growth was observed in the sample sent from the abscess and in the peripheral blood culture taken. Paranasal sinus CT and contrast-enhanced cranial MRI were requested from the patient after an increase in bilateral preseptal edema and new onset of confusion in the follow-up of the patient. Paranasal sinus CT showed a progression of findings compared to the previous CT. Contrast-enhanced cranial

MRI showed progression compared to previous findings and meningeal enhancement in the frontal and vertical regions. The patient was transferred to the pediatric intensive care unit for close follow-up, lumbar puncture was performed, but cerebrospinal fluid did not come out. Ceftriaxone and clindamycin treatments were discontinued due to the progression of the above-mentioned MRSA growth and clinical and radiological findings of the patient, intravenous vancomycin (60 mg/kg/day) and meropenem (120 mg/kg/day) was started. The patient was empirically started on liposomal amphotericin b (5 mg/kg/day), an antifungal with a good anti-mucor effect since he had a predisposition to mucormycosis due to uncontrolled diabetes mellitus and showed critical clinical progression to the point of being transferred to the pediatric intensive care unit. In the clinical follow-up, a gradual increase in renal function tests, persistent fever and a significant increase in acute phase reactants were observed, and it was recommended to change the potential nephrotoxic anti-infectious treatments with alternatives by consulting with the pediatric nephrology. Given this recommendation, vancomycin and liposomal amphotericin b treatments, which have potential nephrotoxicity, were discontinued. Intravenous linezolid (1200 mg/day) and intravenous posaconazole (loading dose of 600 mg/day followed by a maintenance dose of 300 mg/day), linezolid as anti-MRSA and posaconazole as anti-mucor, were used as alternative agents and meropenem treatment was continued by adjusting the dose according to creatinine clearance. Posaconazole treatment was discontinued due to the patient's control cranial and paranasal imaging and no clinical finding suggestive of mucormycosis. After clinical and radiological progression, orbital MRI and venography were taken during the pediatric intensive care follow-up of the patient. In the MRI of the patient, millimetric-sized abscess formations merged with each other around the frontal sinus, findings consistent with thrombosis in the left superior ophthalmic vein, suspicious findings in terms of thrombosis in the right superior ophthalmic vein, and findings consistent with cortical vein thrombus in the right frontal and left frontoparietal were detected. It was observed that the sign of frontal osteomyelitis continued. The patient was started on low molecular weight heparin (2 mg/kg/day) therapy for venous thrombosis after consultation with the pediatric hematology department. After consultation with the ENT, the patient underwent revision endoscopic frontal sinus surgery, abs-

cess debridement (Draf 3) and right-left endoscopic maxillary-ethmoid-sphenoid sinus surgery for the second time. In the advanced imaging controls performed after anticoagulant treatment, it was observed that the thrombosis findings started to regress. It was observed that suspicious findings in terms of thrombosis defined in cortical veins disappeared. It was observed that maxillary, sphenoid, frontal and ethmoidal sinusitis findings decreased and meningeal contrast enhancement disappeared in pre-postseptal cellulitis findings before discharge. Under low molecular weight heparin treat-

ment, the treatment was discontinued when the signs of thrombosis in the control MRI disappeared. The patient, who received ceftriaxone for four days, clindamycin for four days, vancomycin for eight days, linezolid for 45 days, liposomal amphotericin b for eight days, posaconazole for three days, and meropenem for 63 days during the hospitalization, was discharged after outpatient follow-up on the 67th day of the hospitalization. The patient's consent was obtained for this case study.

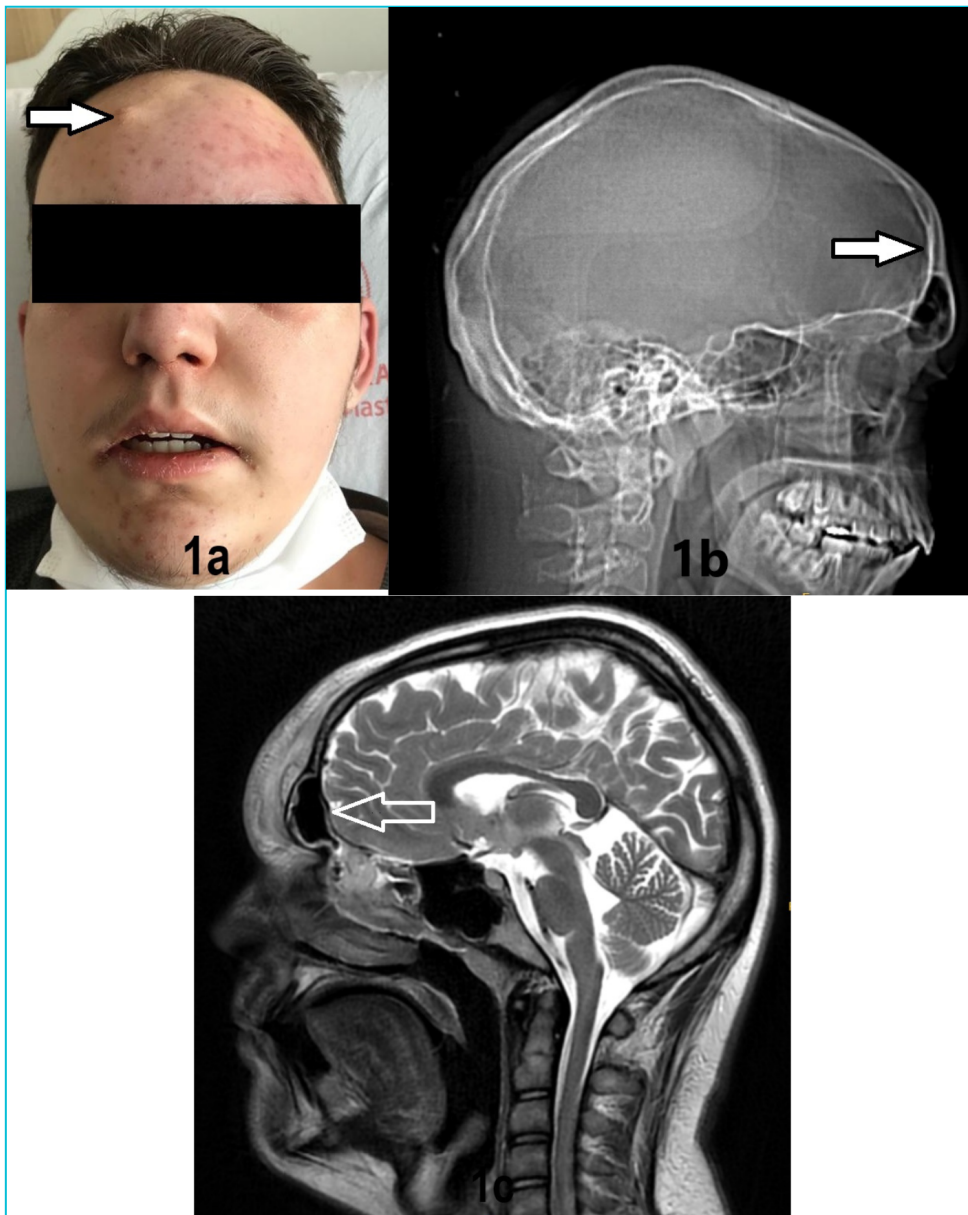


Figure 1. 1a. Pott's Puffy tumor lesion in the frontal region 1b. Pott's Puffy tumor compatible lesion on contrast-enhanced cranial computed tomography 1c. Pott's Puffy tumor compatible lesion on contrast-enhanced cranial MRI

DISCUSSION

Although PPT can be seen in all age groups, its frequency is even more prominent in adolescent age group (6). It is a critical picture for pediatricians because it may lead to life-threatening intracranial complications (7). Therefore, it is important to keep the threshold of clinical suspicion low. Cranial imaging is significant both regarding diagnosis and in terms of intracranial complications. Emergency surgery should be performed as soon as possible. While computed tomography is important as an imaging modality for sinusitis, osteomyelitis, and preoperatively, magnetic resonance imaging is prominent in the diagnosis of intracranial complications.

There are many reports of PPT cases in the adolescent age in the literature. A 14-year-old male patient who was treated with bilateral ethmoidectomies, frontal sinusotomies and frontal sinus trephination was applied to the clinic of PPT, and ceftriaxone and metronidazole treatments were administered from the PICC line for six weeks. (8). A 16-year-old male patient who developed an orbital abscess as a complication and underwent endoscopic sinus surgery right partial unsinectomy, middle meatal antrostomy and frontal recessotomy received intravenous amoxicillin-clavulanate and metronidazole treatment for seven days, and received outpatient oral antibiotic therapy for 3 weeks upon discharge (9). Ceftriaxone, oxacillin, metronidazole for four weeks and amoxicillin-clavulanate orally for four weeks were administered to a 14-year-old obese male patient with a previous history of asthma and chronic steroid use, who was treated with neurosurgical debridement followed by a combined course of intravenous (IV) and oral antibiotics (10).). A PPT case series consisting of six cases aged 7-18 years was reported by Palabiyik et al. Five of the cases were male and one was female. Two patients had an epidural abscess and one patient had preseptal orbital cellulitis. All had CT scan and/or magnetic resonance imaging. Endoscopic sinus surgery was performed in four patients, and neurosurgical intervention with antibiotic therapy was performed in two patients (11). A 15-year-old male patient (12) who presented with orbital hematoma after blunt facial trauma and developed PPT with orbital cellulitis and subperiosteal abscess (12), a 13-year-old male adolescent patient who experienced barosinusitis during scuba diving and was subsequently characterized by frontal sinusitis, frontal bone osteomyelitis, and subperiosteal abscess. (13) Case reports were also prepared.

Subgaleal abscess, mild frontal calvarial early osteomyelitis, and bilateral preseptal cellulitis were also present in a 14-year-old male adolescent who was treated with infliximab and had a history of chronic sinusitis and ulcerative colitis and was followed up for chronic sinusitis (14). 15-year-old male patient with PPT secondary to frontal sinus osteoma (15), PPT of the frontal, parietal bones with subgaleal abscess secondary to acute sinusitis 14-year-old male patient (16), three adolescent male PPTs aged 14, 15 and 17 years old secondary to complicated fusobacterium sinusitis case series (17) are among the reported reports.

When the above-mentioned adolescent case reports with PPT are examined, it is seen that almost all of the cases are male, almost all of them go to surgical treatment, and they receive antibiotic treatment between three and six weeks. Our case was an adolescent male patient, consistent with the literature. He had to receive repetitive surgical treatments and had the longest hospital stay (67 days) and intravenous antibiotics (9 weeks) reported in the literature.

In conclusion, when evaluating adolescents with frontal swelling, a high index of suspicion should be obtained in terms of life-threatening intracranial complications due to the possible diagnosis of PPT. Early diagnosis and appropriate emergency surgical intervention and appropriate treatment with broad-spectrum intravenous antibiotics, early diagnosis of intracranial complications are important. If the patient has underlying chronic diseases, it should be considered that the duration of treatment may be prolonged. Although the majority of patients recover with appropriate surgical and medical treatment, follow-up should be continued regarding neurological complications and sequelae after discharge.

Patient Consent Form / Hasta Onam Formu

The parents' of this patient consent was obtained for this study.

Conflict of Interest / Çıkar Çatışması

The authors declared no conflicts of interest with respect to authorship and/or publication of the article.

Financial Disclosure / Finansal Destek

The authors received no financial support for the research and/or publication of this article.

REFERENCES

1. Flamm ES. Percivall Pott: an 18th century neurosurgeon. *J Neurosurg* 1992; 76: 319–26.
2. Bambakidis NC, Cohen AR. Intracranial complications of frontal sinusitis in children: Pott's puffy tumor revisited. *Pediatr Neurosurg* 2001; 35: 82–9.
3. Heale L, Zahanova S, Bismilla Z. Pott puffy tumour in a five-year-old girl. *CMAJ* 2015; 187: 433–5.
4. alomão JF, Cervante TP, Bellas AR, et al. Neurosurgical implications of Pott's puffy tumor in children and adolescents. *Childs Nerv Syst* 2014; 30: 1527–34.
5. Costa L, Mendes Leal L, Vales F, et al. Pott's puffy tumor: rare complication of sinusitis [published online August 24, 2016]. *Braz J Otorhinolaryngol* 2020; 86(6): 812-4.
6. Podolsky-Gondim GG, Santos MV, Carneiro VM, et al. Neurosurgical Management of pott's puffy tumor in an obese adolescent with asthma: case report with a brief review of the literature. *Cureus* 2018; 10: 2836.
7. Blumfield E, Misra M. Pott's puffy tumor, intracranial, and orbital complications as the initial presentation of sinusitis in healthy adolescents, a case series. *Emerg Radiol* 2011; 18: 203–10.
8. Tibesar RJ, Azhdam AM, Borrelli M. Pott's Puffy Tumor. *Ear Nose Throat J*. 2021; 100: 870-2.
9. Linton S, Pearman A, Joganathan V, et al. Orbital abscess as a complication of Pott's puffy tumour in an adolescent male. *BMJ Case Rep* 2019; 12(7): 229664.
10. Podolsky-Gondim GG, Santos MV, Carneiro VM, et al. Neurosurgical Management of Pott's Puffy Tumor in an Obese Adolescent with Asthma: Case Report with a Brief Review of the Literature. *Cureus* 2018; 10: 2836.
11. Palabiyik FB, Yazici Z, Cetin B, et al. Pott Puffy Tumor in Children: A Rare Emergency Clinical Entity. *J Craniofac Surg* 2016; 27(3): 313-6.
12. Hassan S, Rahmani B, Rastatter JC, et al. Trauma-associated Pott's puffy tumor: an ophthalmologic perspective. *Orbit* 2020; 39(1): 38-40.
13. atel A, Vuppula S, Hayward H, et al. A Case of Pott's Puffy Tumor Associated With Barosinusitis From Scuba Diving. *Pediatr Emerg Care* 2021; 37(1): 51-4.
14. Miri A, Sato AI, Sewell RK, et al. Pott's Puffy Tumor in an Inflammatory Bowel Disease Patient on Anti-TNF Therapy. *Am J Case Rep* 2021; 22: 929892.
15. Öztürk N, Atay K, Çekin İE, et al. A rare case in childhood: Pott's puffy tumor developing secondary to frontal sinus osteoma. *Turk Pediatri Ars* 2020; 55(4): 445-8.
16. AlSarhan H, Jwery AK, Mohammed AA. Pott's puffy tumour of the frontal and Parietal bones with subgaleal abscess as a complication of acute sinusitis - a case report. *J Pak Med Assoc* 2021; 71(12): 170-3.
17. Sheth SP, Ilkanich P, Congeni B. Complicated Fusobacterium Sinusitis: A Case Report. *Pediatr Infect Dis J* 2018; 37(9): 246-8.