EJCRIM
European Journal
of Case Reports
in Internal Medicine

POTT'S PUFFY TUMOR ASSOCIATED WITH SUBPERIOSTEAL EMPYEMA AND OSTEOMYELITIS IN A PEDIATRIC PATIENT

Hassan Akhtar[1,2], Fiona Sweeney[1], Wojciech Wawrzynek[1]

[1] Department of General Practice, The Medical Centre, Roscommon, Ireland
[2] Western Scheme, Irish College Of General Practitioners, Galway, Ireland

Corresponding author's e-mail: dr.hassanakhtar121@gmail.com

Received: 20/01/2025
Accepted: 27/01/2025
Published: 12/02/2025

Conflicts of Interests: The Authors declare that there are no competing interests.
Patient Consent: Written informed consent was obtained from the patient and his mother for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.
Acknowledgments: We are very thankful to Dr Magdalini Chasioti (Consultant Radiologist, University Hospital Galway)
This article is licensed under a Commons Attribution Non-Commercial 4.0 License

How to cite this article: Akhtar H, Sweeney F, Wawrzynek W. Pott's puffy tumor associated with subperiosteal empyema and osteomyelitis in a pediatric patient. *EJCRIM* 2025;**12**:doi:10.12890/2025_005185

ABSTRACT

Pott's puffy tumor, a rare complication of frontal sinusitis or trauma, presents with subperiosteal abscess and osteomyelitis of the frontal bone. Early diagnosis with imaging studies and prompt treatment with antibiotics and percutaneous drainage of the abscess requires in most cases for a successful outcome.

We report a case of a 12-year-old boy who initially presented with left sided retro-orbital/frontal area headache associated with high grade temperature and painful localized small forehead swelling. Symptoms developed few days after he had a dental extraction of left upper molar tooth. Initial workup showed raised inflammatory markers and a computed tomography scan (CT) of the brain was consistent with ethmoid/maxillary sinusitis. He was discharged home on his first presentation to a regional hospital after having intravenous antibiotics for 24 hours which were subsequently switched to oral antibiotics. He presented again after a week with recurrence of forehead swelling involving and extending into both retro-orbital areas associated with painful eye movements and few episodes of vomiting. Repeat imaging showed Pott's puffy tumour overlying the left frontal bone with underlying osteomyelitis. He was given intravenous antibiotics, abscess was surgically drained by the ear, nose, and throat (ENT) department, and he had a good clinical outcome on discharge with follow-up planned with ENT.

Pott's puffy tumor, although rare, requires a high index of suspicion in patients presenting with frontal swelling and suggestive clinical features. Early diagnosis with CT scan and prompt treatment with antibiotics and percutaneous drainage, when indicated, can lead to a favorable outcome. Collaboration between clinicians, radiologists, and microbiologists is essential for optimal management of this potentially serious complication of frontal sinusitis.

KEYWORDS

Chronic sinusitis, Pott's Puffy tumor, osteomyelitis

EFIM
European Federation of Internal Medicine

Publisher
smc media srl

LEARNING POINTS

- *Challenges in diagnosis:* The rarity and non-specific symptoms of Pott's puffy tumor, emphasizing the importance of maintaining a high index of suspicion, especially in patients with suggestive clinical features.
- *Role of imaging:* The crucial role of computed tomography/magnetic resonance imaging scans in diagnosing Pott's puffy tumor and identifying complications like subdural empyema.
- *Antibiotic selection:* The rationale behind the chosen broad-spectrum antibiotic regimen and the importance of tailoring therapy based on local resistance patterns and culture results.
- *Surgical intervention:* The role of percutaneous drainage and other surgical procedures in managing Pott's puffy tumor, emphasizing their use in cases with large abscesses or inadequate response to antibiotics alone.
- *Importance of collaboration:* The importance of collaboration between clinicians, radiologists, and microbiologists for optimal diagnosis, treatment planning, and patient management in cases of Pott's puffy tumor.

INTRODUCTION

Pott's puffy tumor, first described by Percival Pott in the 18th century, is an uncommon infectious process characterized by a subperiosteal abscess and osteomyelitis of the frontal bone[1]. Frontal sinusitis and trauma are the most frequent predisposing factors[2]. Due to its rarity and non-specific symptoms, Pott's puffy tumor can be challenging to diagnose promptly. This case report highlights the importance of maintaining a high index of suspicion for this entity, especially in patients presenting with frontal swelling and suggestive clinical features.

Pott's puffy tumor typically arises from the spread of bacterial infection from the frontal sinuses to the frontal bone. Less commonly, direct trauma to the frontal bone can initiate the infectious process[3]. *Staphylococcus aureus* is the most frequently isolated organism, followed by Streptococcus species and Gram-negative bacteria[4]. Prompt diagnosis and treatment with antibiotics are crucial to prevent potentially life-threatening complications, including meningitis, epidural abscess, brain abscess, and cavernous sinus thrombosis[5].

CASE REPORT

A 12-year-old boy with no significant medical background initially presented to a family practice with frontal headache associated with fever and minimal swelling involving left retro-orbital/frontal area. He had undergone a dental extraction for left upper molar tooth abscess almost 1 week previously. He denied any headache, had no problems with co-ordination, no issues with balance, no rash, and no history of any sick contacts identified. On examination he was febrile, had a mild soft tissue swelling of forehead and tenderness noted in the left frontal area. Eye movements in all directions were normal, there were no signs of tooth infection, and the systemic examination was normal.

He was referred to the emergency department where initial investigations showed a raised white blood cell (WBC) count of 15.9 $\times 10^9$/l, predominantly neutrophils at 13 $\times 10^9$/l and raised C-reactive protein (CRP) of 42.1 mg/l. Urea and creatinine levels were normal and blood culture showed no growth in 48 hours. Computed tomography (CT) scan of the brain showed opacification of ethmoid and maxillary sinuses suggestive of sinusitis *(Fig. 1)*. He was given 2 doses of intravenous cefuroxime and metronidazole. His forehead swelling was fully resolved, and he was discharged on oral amoxicillin/clavulanic acid along with steroid/antihistamine nasal drops. He was also referred to the ear, nose and throat (ENT) department for follow-up as outpatient.

He presented to family practice 1 week later with a history of worsening forehead swelling involving and extending into both orbital areas associated with painful eye movements and a few episodes of vomiting. He was tachycardiac (heart rate 128/bpm), febrile (temperature 37.8°C) and ha marked swelling of the forehead *(Fig. 2)*. Neurological examination and the rest of the systemic examination was normal. He was again referred to the emergency department and repeat blood tests showed a raised WBC count of 17.9 $\times 10^9$/l, neutrophils 13.5 $\times 10^9$/l and lymphocyte 2.9 $\times 10^9$/l. CT brain on this presentation showed extensive soft tissue swelling and a subperiosteal abscess over the frontal bone, consistent

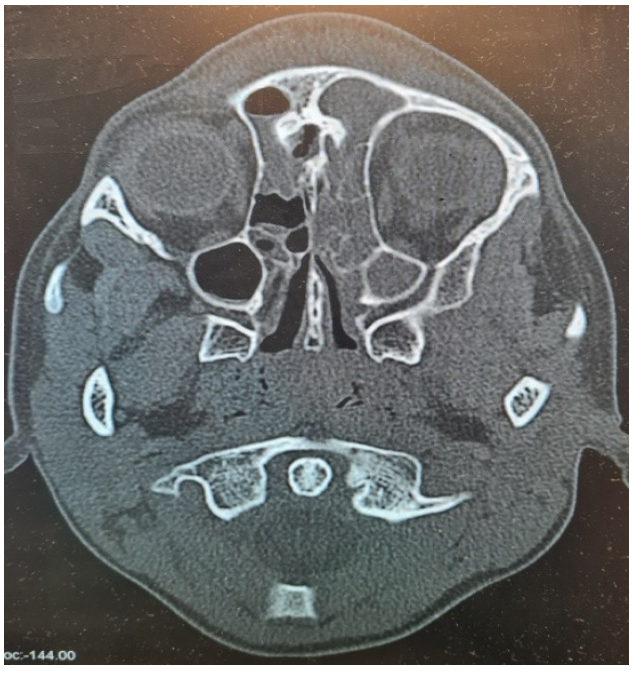


Figure 1. Computed tomography scan: opacification of the ethmoid and maxillary sinuses noted in keeping with sinusitis. Small periosteal soft tissue swelling.



Figure 2. Frontal-retro-orbital soft tissue swelling.

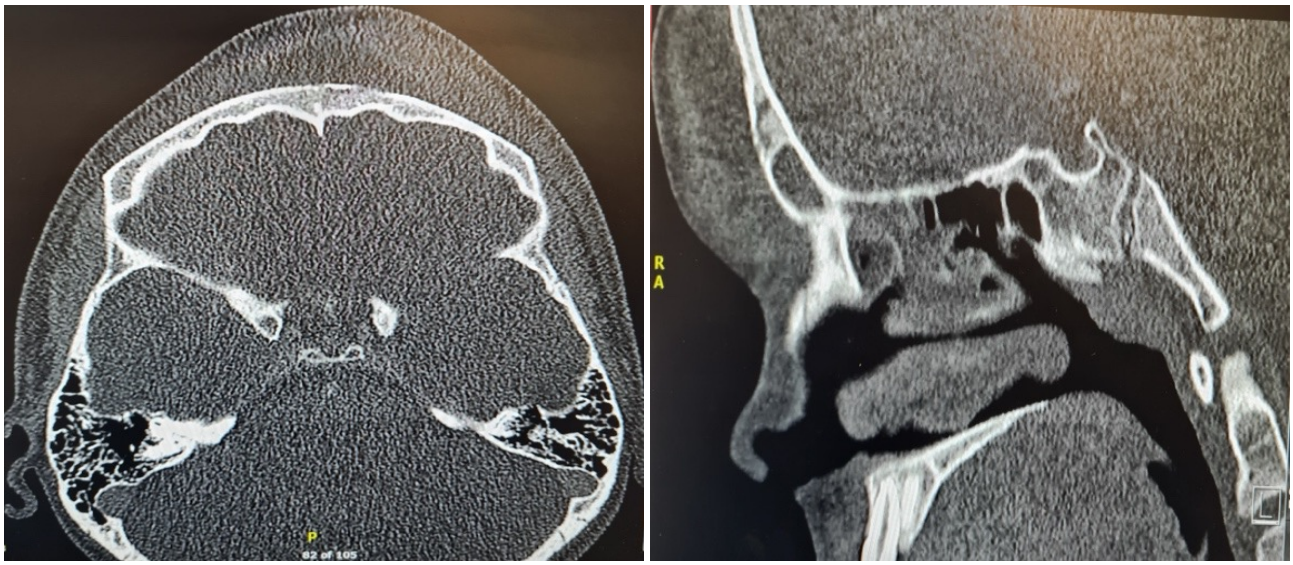


Figure 3. Computed tomography scan: coronal and sagittal views showing frontal soft tissue oedema and very small to appreciate subgaleal collection 2.6 mm in thickness. There is extensive soft tissue swelling overlying the nasal bones, left orbit and the frontal bone, more severe on the left side. Extracranial subperiosteal abscess (cc 5.7 × ap 1.5 × ts 3.7 cm, 15 ml). Appearances are in keeping with a Pott's puffy tumour. A small area of lucency within the left frontal bone immediately superior to the left frontal sinus with associated cortical destruction, suspicious for osteomyelitis.



Figure 4. Left orbital drain in-situ for extracranial subperiosteal abscess.

with Pott's puffy tumor *(Fig. 3)*. He was seen by the ENT department and the abscess was surgically drained *(Fig. 4)*. Gram stain showed Gram-positive cocci and viridians group Streptococcus isolated on culture results. He was given a combination of intravenous antibiotics, cefotaxime and metronidazole for 10 days with good clinical outcome and was switched to oral antibiotics, amoxicillin/clavulanic acid and clindamycin on discharge, for 3 weeks. He is currently on follow-up with ENT and the pediatric department.

DISCUSSION

This case report illustrates the classic presentation of Pott's puffy tumor with frontal swelling, fever, and headache in a pediatric patient with a history of frontal sinusitis. The presence of elevated inflammatory markers (WBC count and CRP) further supported the diagnosis of an infectious process. Pott's puffy tumor can be associated with intracranial and surgical complications in 60-85% of patients[6]. These complications arise because of direct extension of infection into the brain or due to septic thrombophlebitis[7].

Imaging modalities, particularly CT and MRI scans, play a pivotal role in diagnosing Pott's puffy tumor by demonstrating characteristic findings of osteomyelitis and associated complications like subdural empyema, as seen in

this case[8,9]. Early diagnosis and prompt initiation of broad-spectrum antibiotics are crucial for successful management. The selection of antibiotics should be guided by local resistance patterns and may be adjusted based on culture and susceptibility testing. In this case, the combination of intravenous cefotaxime and metronidazole along with oral amoxicillin/clavulanic acid-clindamycin provided coverage for common bacterial pathogens involved in Pott's puffy tumor, including *S. aureus*, Streptococcus species, and anaerobic bacteria.

Surgical intervention, such as percutaneous drainage or surgical debridement, might be necessary in cases with large abscess formation or inadequate response to antibiotics alone[10]. Fortunately, our patient responded well to the combined approach of antibiotics and percutaneous drainage.

REFERENCES

1. Rohde RL, Shoureshi P, Ferguson BJ, Bush ML. Pott's puffy tumor: A comprehensive review of the literature. *Am J Otolaryngol* 2022;**43**:103529.
2. McDavid L, Hayes J. Pott's puffy tumor treated endoscopically in an 84-year-old female: A case report of a rare entity. *Otolaryngol Case Rep* 2020;**17**:100217.
3. Koltsidopoulos P, Papageorgiou E, Skoulakis C. Pott's puffy tumor in children: a review of the literature. *Laryngoscope* 2020;**130**:225–231.
4. Obeagu EI. Burden of chronic osteomyelitis: Review of associated factors. *Madonna Univ J Med Health Sci* 2023;**3**:1–6.
5. Maenhout M, Gudelj M, Gilbert A. Pott's puffy tumour: a rare complication of sinusitis. *Eur J Case Rep Intern Med* 2024;**11**:004287.
6. Sharma P, Sharma S, Gupta N, Kochar P, Kumar Y. Pott puffy tumor. *Proc (Bayl Univ Med Cent)* 2017;**30**:179–181.
7. Jung J, Lee HC, Park IH, Lee HM. Endoscopic endonasal treatment of a Pott's puffy tumor. *Clin Exp Otorhinolaryngol* 2012;**5**:112–115.
8. Birgach N, Heuer P, Anastasopoulos P, Fitzgerald K, Mohammed S. Pott's puffy tumor: a case report. *J Clin Images Med Case Rep* 2023;**4**:2253.
9. Bhalla V, Khan N, Isles M. Pott's puffy tumour: the usefulness of MRI in complicated sinusitis. *J Surg Case Rep* 2016;**2016**:rjw038.
10. Kühn JP, Linsler S, Nourkami-Tutdibi N, Meyer S, Becker SL, Yilmaz U, et al. Pott's puffy tumor: a need for interdisciplinary diagnosis and treatment. *HNO* 2022;**70**:8–13.