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The Unknown Cause of Pott's Puffy Tumor – Importance of Early Diagnose

A causa desconhecida de Pott puffy tumour – importância do diagnóstico precoce

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Abstract

Pott's puffy tumor (PPT) is characterized by swelling of the glabelar region and osteomyelitis of the frontal bone, owing to a subperiosteal pseudoinflammatory tumor responsible for the detachment of the pericranium from the outer table of the skull. Nowadays, the incidence of PPT is very low, so this entity is frequently underdiagnosed. The late treatment and identification of PPT are strongly associated with intracranial complications, which could jeopardize the life of the patient.

In the literature, PPT is described as a complication of frontal head trauma or of chronic sinusitis. There are a few cases reported in patients with frontal insect bites or in recreational nasal drug users, such as cocaine or methamphetamines.

In the present case report, the authors describe the case of a 40-year-old male who was submitted to a frontal sebaceous cyst surgery. In the postoperative period, he developed an infectious process compatible with PPT. After an extensive review of the literature, no similar cases were identified. Therefore, in the opinion of the authors, sebaceous cyst surgery should be included in the short list of risk factors for the development of PPT.

Keywords

- epidural abscess
- frontal osteomyelitis
- Pott puffy tumor
- sebaceous cyst

Resumo

O Pott puffy tumor (PPT, na sigla em inglês) é caracterizado por edema da região glabelar e osteomielite do osso frontal, em consequência de uma lesão tumoral subperióstea, pseudoinflamatória, que promove a separação espontânea do pericrânio da camada cortical óssea externa do crânio. Atualmente, a incidência de PPT é muito baixa, causa pela qual o subdiagnóstico desta entidade é frequente. O atraso no tratamento desta entidade está fortemente associado a complicações infecciosas intracranianas que colocam em risco a vida do paciente.

Na literatura, o PPT está descrito como complicação de traumatismo craniano frontal ou de sinusite crônica. Existem ainda alguns relatos em pacientes com picadas de inseto na região frontal ou em consumidores de drogas recreativas por via nasal, como cocaína ou metanfetaminas.

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Palavras-chave
- abcesso epidural
- osteomielite frontal
- Pott puffy tumor
- quisto sebáceo

No presente caso clínico, os autores relatam o caso de um homem de 40 anos, submetido a excisão de quisto sebáceo na região frontal que, no pós-operatório, desenvolveu um processo infeccioso compatível com PPT. Após uma extensa revisão de literatura, não foram identificados relatos semelhantes, pelo que se considera que a cirurgia de quisto sebáceo da região glabelar deve ser englobada na pequena lista de fatores de risco para o desenvolvimento de PPT.

Introduction

Pott puffy tumor (PPT) is an eponymous for a subperiosteal abscess of the frontal region, generally associated with frontal osteomyelitis. The arising of broad-spectrum antibiotics lowered the incidence of PPT. Although it is a rare entity in the postantibiotic era, clinicians should be alert to this life-threatening entity. Intracranial complications, such as dural sinus thrombosis or subdural abscess, are usually present at the time of the diagnosis, so neurosurgical intervention is often needed.[1] Nowadays, PPT is generally a complication of chronic sinusitis. The most common infectious agents belong to the Streptococci family, being *Staphylococcus aureus* a less frequent causative agent.[2] To the best of our knowledge, there are no cases of PPT as a complication of sebaceous cyst surgery reported in the literature.

Case Report

A 40-year-old male underwent surgery to remove a noninfected and nonpainful lump in the glabelar region with a diameter of 2 cm (►**Fig. 1**). Prior to the surgery, a soft tissue ultrasound showed a closed sac under the skin filled with serous material. The histological analysis showed a unilocular cyst in the upper dermis composed of a flattened and granular layer of kerathohyalin granules, compatible with sebaceous cyst (►**Fig. 2**). Two weeks after the procedure, the patient developed a painful swelling in the frontal region with a serous drainage of the surgical wound. Given the suspicion of postoperative soft tissue infection, the patient was medicated with oral flucloxacillin. Two weeks later, he presented to the emergency department complaining of bilateral frontal headache and maintenance of the frontal swelling, now with fluctuation and inflammatory signs. Tympanic temperature, heart rate, respiratory rate and blood pressure were normal. No signs of meningeal irritation or of neurological deficit were observed in the neurological exam. Blood cell count and biochemical parameters were normal. The patient denied any past history of sinusitis, head trauma, immunosuppression, or of consumption of inhaled drugs.

A contrast-enhanced computed tomography (CT) scan of the head was performed. A frontal subperiosteal abscess with extension to the epidural space (►**Figs. 3** and **4**) due to frontal bone osteomyelitis (►**Figs. 5** and **6**) was identified. No signs of frontal sinusitis were observed. The patient underwent emergency surgery. A frontal craniectomy was performed to drain the epidural abscess. No signs of dural infection were observed. The infected bone was replaced by a titanium mesh (►**Figs. 7** and **8**). On the bacterial cultures, a methicillin-resistant *S. aureus* (MRSA) was identified. After the surgery, the patient underwent intravenous antibiotic therapy with vancomycin and ceftriaxone for 6 weeks, plus metronidazole for 7 days.

At 1 year postoperatively, the patient continues asymptomatic, with no signs of skin or intracranial infection. The primary cortical areas remain intact, and no focal neurological deficits are observed. The cranioplasty performed presents an excellent aesthetic result. He returned to his daily routine with no restrictions.

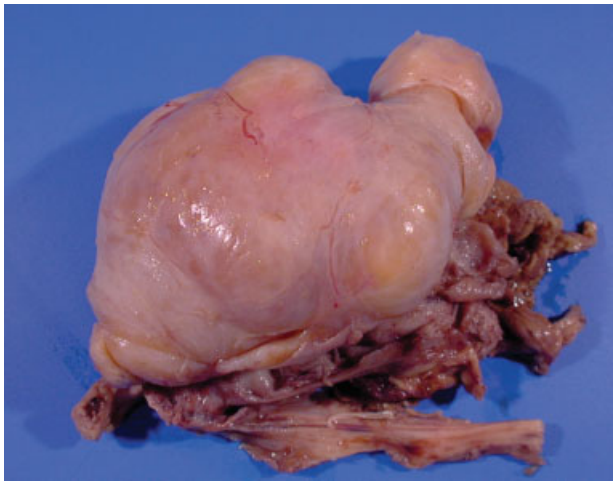

Fig. 1 Macroscopic image of the removed lesion.

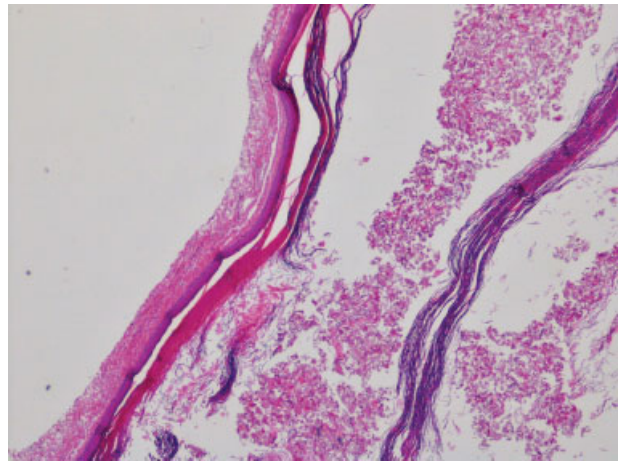

Fig. 2 Histological features of the removed sebaceous cyst.

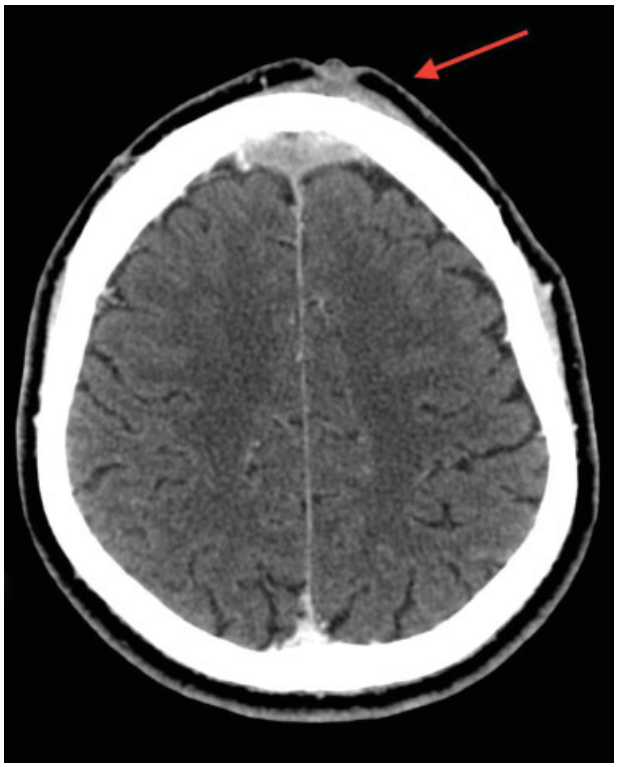

Fig. 3 Contrast-enhanced computed tomography scan with subperiosteal abscess and epidural empyema – axial view.

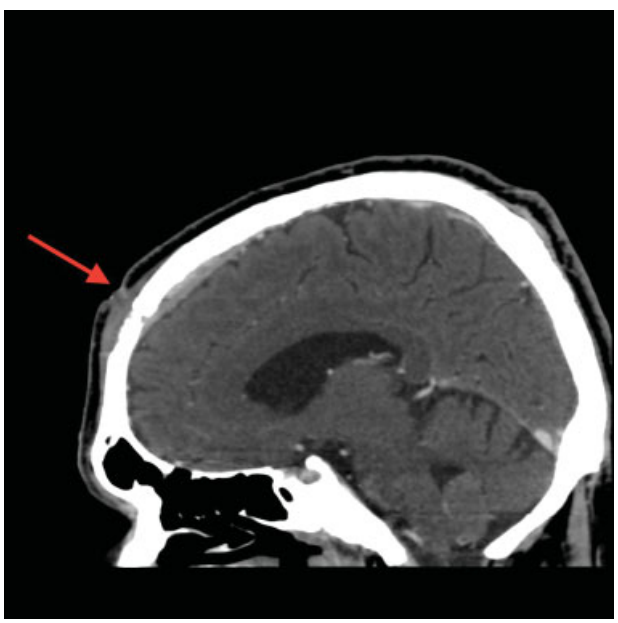

Fig. 4 Contrast-enhanced computed tomography scan with subperiosteal abscess and epidural empyema – saggital view.

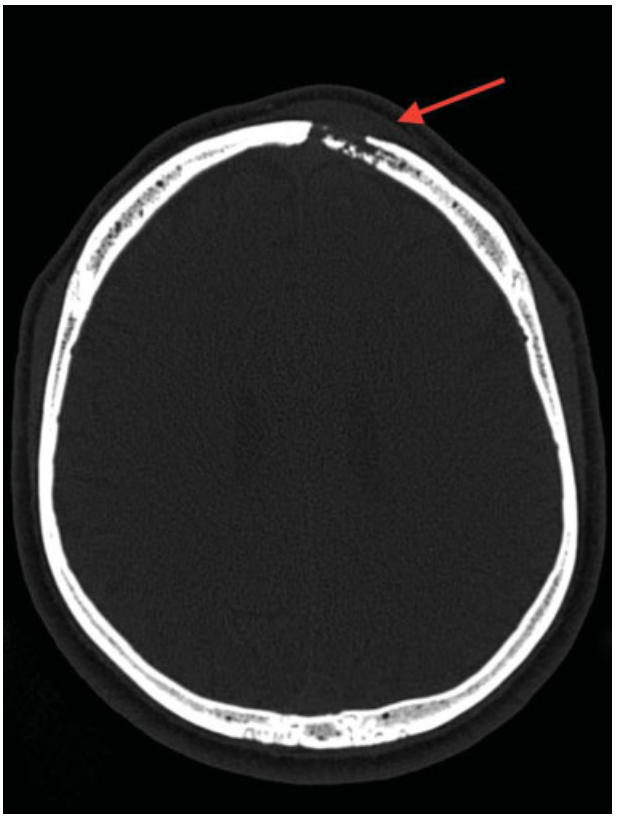

Fig. 5 Computed tomography scan, bone window, showing a frontal osteomyelitis – axial view.

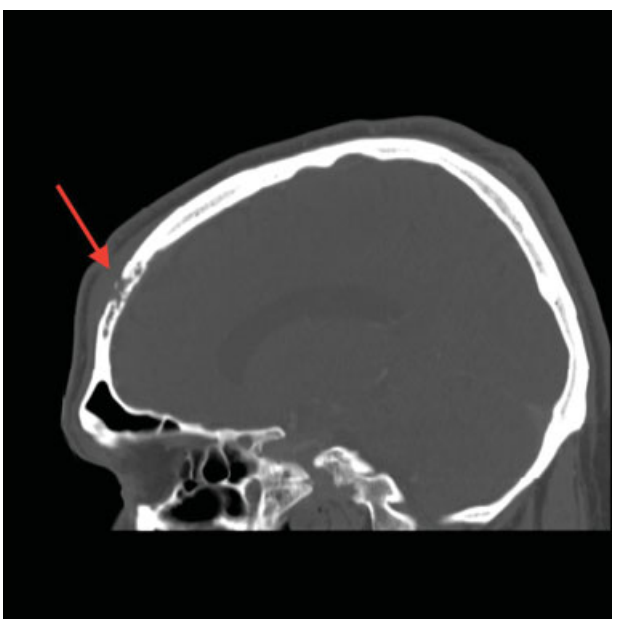

Fig. 6 Computed tomography scan, bone window, showing a frontal osteomyelitis - – saggital view.

Discussion

Pott puffy tumor was first described by Sir Percival Pott in 1760 as a complication of frontal head trauma. In 1879, Lannelongue described the first case of PPT related to frontal sinusitis.[3] Although it is rare in the postantibiotic era, PPT continues to emerge. The main etiologies are chronic frontal sinusitis and frontal traumatic brain injury. Few cases of cocaine and amphetamine consumption and insect bite are also described. Subjects with diabetes mellitus, chronic renal disease, and aplastic anemia have a predisposition for this infection.[4]

To understand the pathophysiology of PPT, it is important to know the anatomy of diploic veins. Diploic veins are large, thin-walled valveless veins present between the inner and

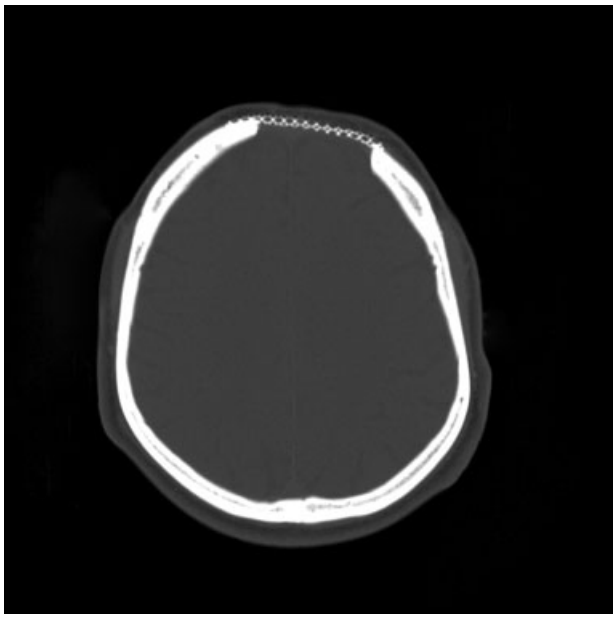

Fig. 7 Postoperative computed tomography scan showing frontal cranioplasty with a titanium mesh – axial view.

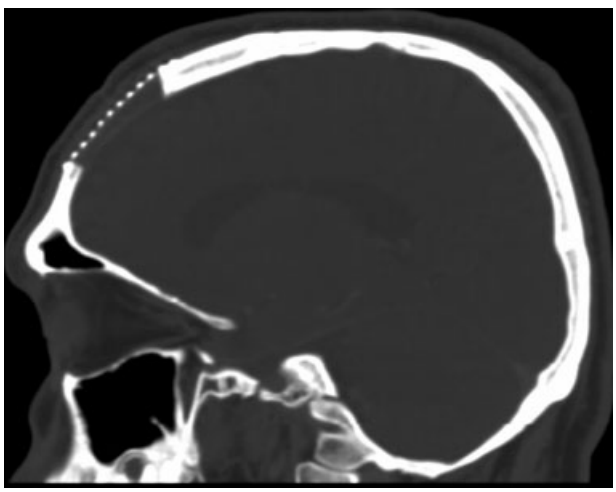

Fig. 8 Postoperative computed tomography scan showing frontal cranioplasty with a titanium mesh – saggital view.

outer layers of the cortical bone in the skull. They communicate with the meningeal veins and the dural sinus, and with the veins of the pericranium. The four main diploic veins are the frontal, anterior temporal, posterior temporal, and occipital.[5]

Pott puffy tumors emerge more frequently in male adolescents with chronic sinusitis. In these cases, the inflammatory content inside the frontal sinus can destroy its anterior wall promoting the formation of the subperiosteal abscess. A hematogenous spread of the inflammatory content in the frontal sinus can occur through the diploic veins of the bone directly to the dural sinus.[6] Therefore, sinus thrombosis, subdural empyema, and intracerebral abscess are the most common complications. The destruction of the posterior wall of frontal sinus is much slower, so epidural abscess is a less frequent complication.[7]

In the literature, we did not find any case of PPT as a complication of sebaceous cyst removal. Our case portrays a healthy patient who underwent a routine procedure, with no surgical complication reported and with complete cyst excision. In our opinion, cyst fragmentation, partial removal, or wound contamination due to poor aseptic techniques could be the factors responsible for this MRSA infection. The inflammatory content of the cyst passed from the subcutaneous layer to the pericranium, where a subperiosteal abscess was formed.

The spread of the infection to the bone may have occurred through the supraorbital vein. This vein originates in the forehead, runs downwards superficial to the frontalis muscle, and passes through the supraorbital notch, where it receives the frontal diploic vein from a micro foramen in the notch.[5] Therefore, this communication could justify the occurrence of the osteomyelitis in the reported case. Finally, the germ identified in the epidural abscess was a skin commensal, *S. aureus*, indicating that, probably, the infection started in the skin.

Conclusion

Pott puffy tumor is a life-threatening entity that should be promptly diagnosed. This infection is generally unfamiliar to the majority of the emergency physicians. Pott puffy tumor should not be forgotten, since an early diagnosis is associated with a good outcome and with the complete resolution of the infection. The risk of intracranial infection after sebaceous cyst removal is extremely low and we did not find any case reported in the literature. However, it can occur and could be catastrophic. The existing venous anastomosis between the intracranial and extracranial venous systems promotes an easy propagation of infection from the skin to the meningeal layers and the cerebral parenchyma. Therefore, after cyst removal in the cranial region, the surgical wound must be carefully watched, preventing the onset of soft tissue infections.

Conflicts of Interests
The authors have no conflicts of interests to declare.

References

1 Forgie SE, Marrie TJ. Pott's puffy tumor. Am J Med 2008;121(12): 1041–1042
2 Raja V, Low C, Sastry A, Moriarty B. Pott's puffy tumor following an insect bite. J Postgrad Med 2007;53(02):114–116
3 Flamm ES. Percivall Pott: an 18th century neurosurgeon. J Neurosurg 1992;76(02):319–326
4 Akiyama K, Karaki M, Mori N. Evaluation of adult Pott's puffy tumor: our five cases and 27 literature cases. Laryngoscope 2012; 122(11):2382–2388
5 García-González U, Cavalcanti DD, Agrawal A, et al. The diploic venous system: surgical anatomy and neurosurgical implications. Neurosurg Focus 2009;27(05):E2
6 Perić A, Milojević M, Ivetić D. A pott's puffy tumor associated with epidural - cutaneous fistula and epidural abscess: Case report. Balkan Med J 2017;34(03):284–287
7 Kombogiorgas D, Solanki GA. The Pott puffy tumor revisited: neurosurgical implications of this unforgotten entity. Case report and review of the literature. J Neurosurg 2006;105(2, Suppl)143–149