Pott's puffy tumor with cranial epidural and subdural abscesses presenting as multiple scalp swellings in a 16-year-old boy: a case report

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Abstract

A 16-year-old boy was admitted with fever, headache, and tender, fluctuant scalp swellings. A lumbar puncture was consistent with meningitis. Aspiration of the mass yielded purulent fluid and cultures yielded *Staphylococcus aureus*.Treatment with ceftriaxone and gentamicin was initiated. Unfortunately, the patient died before further intervention could be performed. Postmortem exam revealed multiple scalp abscesses, frontal bone osteomyelitis with coronal suture widening, epidural and subdural empyemas, and leptomeningeal inflammation. This presentation is consistent with a variation of Pott's Puffy Tumor.

Key words: Pott's Puffy Tumor, Staphylococcus aureus, scalp abscess, subdural empyema

Introduction

Pott's puffy tumor was first described in 1760 by Sir Percivall Pott as a syndrome of frontal bone osteomyelitis and scalp swelling due to abscesses developing from frontal sinusitis.[1,2] This disease is an uncommon complication of sinusitis that most often affects adolescent males. The presentation is subtle due to nonspecific symptoms associated with early infection. Prompt diagnosis and treatment are essential to prevent significant morbidity and mortality. We present a case of a 16-year-old male who was admitted to Bugando Medical Centre in western Tanzania with widespread scalp abscesses.

Case Presentation

In December 2008, a 16-year-old boy was transferred to our hospital with fever, headache, and fluctuant scalp masses that had developed suddenly. He had no significant past medical history, and had been well until 6 days prior to transfer to our hospital when he developed fevers and headache. After three days of worsening headache, the patient was brought to a local hospital where he was treated empirically for malaria without improvement. On the third day at that hospital, he developed multiple fluctuant scalp masses. His headache improved the same day, but fevers persisted and the patient developed transitory hallucinations. He was transferred to our hospital for further management. Review of systems was unremarkable for trauma, skin infections, symptoms of sinusitis, or any other abnormalities.

On physical examination, the patient was febrile at 38.5^{o} C but other vital signs were normal. He was alert and oriented but appeared uncomfortable. Examination of the scalp revealed multiple tender, non-erythematous, fluctuant swellings over the right frontal and parietal regions without skin lesions. He had mild neck stiffness without photophobia or papilledema. The remainder of the examination was unremarkable.

Lumbar puncture revealed an elevated white blood cell count with neutrophilic predominance in the cerebral spinal fluid. The glucose was 72 mg/dL (serum glucose 182 mg/dL) and the protein was 120mg/dL. A rapid test for HIV was nonreactive. Skull X-rays showed soft tissue swelling and widening of the right coronal suture. The patient was started on ceftriaxone 2 grams intravenously twice daily and gentamicin 60 milligrams intravenously three times daily for presumed meningitis with scalp abscess. Differentials of cerebrospinal fluid leak, scalp hematoma, and malignancy of the skull with malignant fluid collection were also considered. The surgical team was consulted and 15mL of purulent fluid was aspirated from one of the fluctuant masses. Culture of this fluid revealed *Staphylococcus aureus* resistant to penicillin. The patient expired before further intervention could be performed.

Postmortem examination was performed by the hospital pathologist. External examination confirmed multiple scalp abscesses extending from the frontal to the parietal region. Incision of the scalp released 300mL of pus from the periosteal space. Examination of the skull revealed frontal bone osteomyelitis and a widened right coronal suture. Removal of the skull exposed a massive right frontal epidural empyema and prominent leptomeningeal inflammation with a sinus tract that extended through the meninges at this site. Incision of the leptomeninges revealed a coexistent subdural empyema. The pathologist's impression was frontal bone osteomyelitis with secondary extension to the subperiosteal, subdural, and epidural spaces.

Discussion

Pott's Puffy Tumor, although relatively rare, has been described with increasing frequency over the last decade, including in Africa.[3-5] The syndrome is defined as a subperiosteal abscess and osteomyelitis of the frontal bone that manifests as a localized swelling of the overlying region of the forehead.[6] The infection almost invariably arises as a complication of frontal sinusitis. Pathophysiologically, intracranial extension of sinusitis is believed to be caused by a retrograde septic thrombophlebitis of the valveless diploic veins of the skull or the ethmoid sinus.[7] Infection in these veins can subsequently spread externally to form periosteal abscesses or internally to give rise either to a subdural or epidural empyema. Multiple interior and exterior abscesses can often occur simultaneously.[7,8]

Our case was an atypical and complicated presentation of Pott's Puffy Tumor in two regards. First, widening of the right coronal suture line, visible on skull X-ray and confirmed on autopsy, apparently developed in response to very high intracranial pressure. Although the skull remains incompletely fused until late adolescence, suture line widening due to increased intracranial pressure

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is very uncommon in patients above the age of four. [9] It is possible that the presence of frontal bone osteomyelitis compromised the integrity of the coronal suture and this facilitated its widening under pressure.

A second remarkable aspect of this case was the broad distribution of the patient's scalp abscesses, extending from the frontal to parietal regions. Classically, Pott's Puffy Tumor presents as a focal, frontal abscess overlying the affected frontal bone. However, sinusitis leading to an epidural abscess has presented as a posterior scalp abscess alone.[10] In our case, the opening of the coronal suture may have facilitated the spread of the abscess though the subperiosteal space.

The most common organisms cultured are those associated with acute (*Streptococcus* sp.*, Staphylococcus* sp.*, Haemophilus influenza*) or chronic sinusitis (often including anaerobes).[6,7] As intracranial extension of sinusitis is often polymicrobial, patients require broad-spectrum antibiotics that include anaerobic coverage.[2] Even with adequate antibiotics, patients have a high mortality rate without urgent surgical intervention for drainage of abscesses and relief of intracranial pressure. With appropriate surgical intervention (craniotomy or craniectomy, accompanied by sinus exenteration), survival in previously-healthy children is typically in the range of 90-100%.[2,5,7,8] Interestingly, although the appearance of Pott's Puffy Tumor heralds progression of disease, the development of a communicating tract between the intra- and extracranial spaces can temporarily relieve intracranial pressure. This is probably the reason that our patient's headache was relieved on the day that his forehead swelling appeared.

In summary, in this report we have described a case of a 16-year-old boy who presented with *Staphylococcus aureus* subperiosteal abscess and died despite treatment with broad-spectrum antibiotics. Autopsy revealed frontal bone osteomyelitis with spread to the subperiosteal, epidural, and subdural spaces and opening of the coronal suture. This case illustrates many features of Pott's Puffy Tumor as well as the importance of early surgical intervention in this condition.

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References

1. **Pott P. Observations on the nature and consequences of wounds and contusions of the head, fractures of the skull, concussions of the brain. London, 1760: 38-58.**
2. **Bambakadis N and Cohen A. Intracranial complications of frontal sinusitis in children: Pott's puffy tumor revisited. *Ped Neurosurg* 2001; 35:82-9.**
3. **Kombogiorgas D and Solanki G. The Pott puffy tumor revisited: neurosurgical implications of this unforgotten entity. *J Neurosurg* 2006; 105: 143-9.**
4. **Shehu BB and Mahmud MR. Pott's puffy tumor: a case report. *Ann African Med* 2008; 7: 138-40.**
5. **Nathoo N et al. Cranial extradural empyema in the era of computed tomography: a review of 82 cases. *Neurosurgery* 1999; 44:748-53.**
6. **Verbon A et al. Pott's puffy tumor due to Haemophilus influenzae: Case report and review. *CID* 1996; 23:1305-7.**
7. **Kombogiorgas D et al. Supperative intracranial complications of sinusitis in adolescence: single institute experience and review of the literature. *Br J Neurosurg* 2007; 21:603-9.**
8. **Quraishi H and Zevallos J. Subdural empyema as a complication of sinusitis in the pediatric population. *Int J Ped Otorhino* 2006; 70: 1581-6.**
9. **Madeline LA and Elster AD. Suture closure in the human chondrocranium: CT assessment. *Radiology* 1995; 196:747-56.**
10. **Durand B et al. Sinusitis-associated epidural abscess presenting as a posterior scalp abscess—a case report. *Int J Ped Otorhinolaryng* 1998; 43: 147-51.**
11. **Bordley J and Bischofberger W. Osteomyelitis of the frontal bone. *Laryngoscope* 1967; 77:1234-44.**