

## Clinical History:

A 31-year-old man presented with gradual onset of left frontal headache for one month. Physical examination was essentially normal. A skull radiograph was requested (**Figure 1**).

**Figure 1: Frontal radiograph of the skull**



Answer  
on  
page 659

## What is the diagnosis?

- a) Paget's disease of skull
- b) Fibrous dysplasia (leontiasis ossea)
- c) Benign hyperostosis of the skull vault
- d) Skull fracture causing pneumocephalus
- e) Frontal sinus osteoma complicated by pneumocephalus

**This radiology case was prepared by:**

**Dr. W.T. Fung**, Medical Officer,  
Department of Diagnostic Radiology,  
Queen Mary Hospital.

**Dr. W.C.G. Peh**, Associate Professor,  
Department of Diagnostic Radiology,  
The University of Hong Kong.

## RADIOLOGICAL CONFERENCE

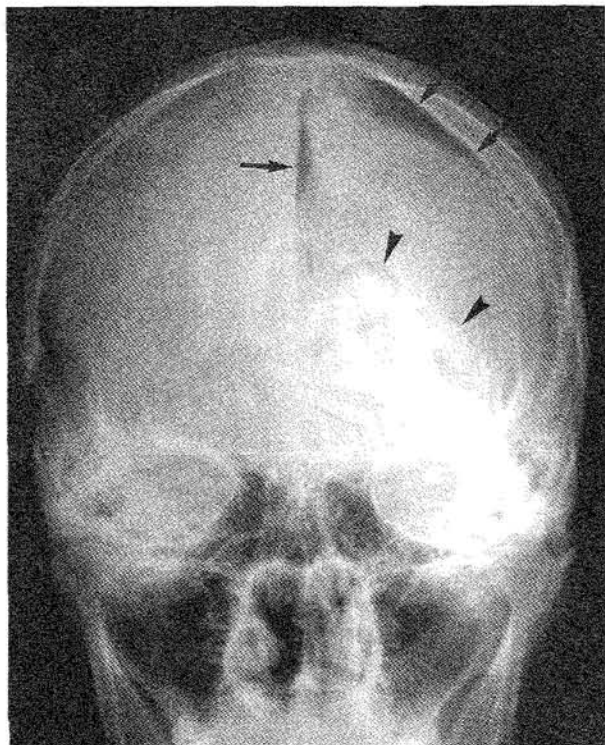
### Answer:

- e) Frontal sinus osteoma complicated by pneumocephalus

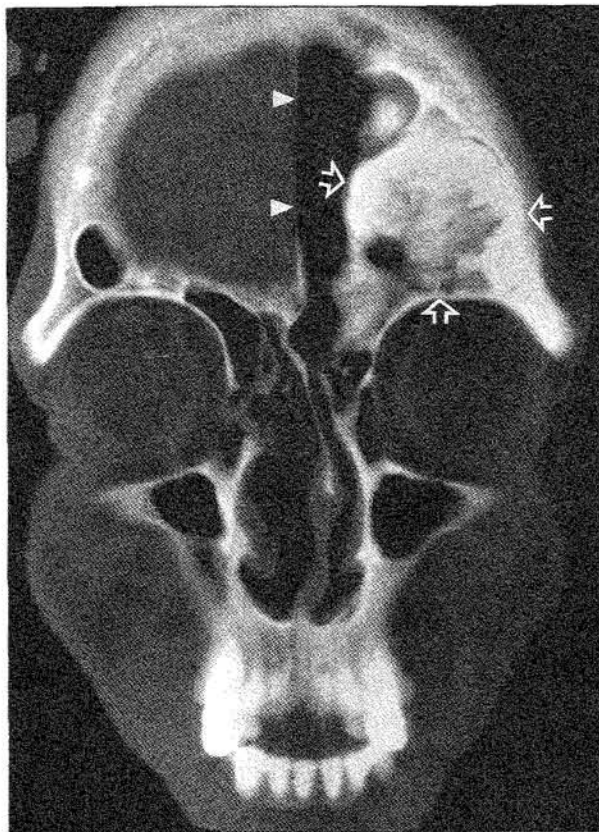
### Radiological findings

A dense lobulated mass lesion is seen within the left frontal sinus, appearances of which are typical of an osteoma. Pneumocephalus is indicated by abnormal intracranial gas lucencies along the midline and over the left vertex of the cranium (Figure 2). Computed tomography (CT) confirmed the well-defined dense nature of the osteoma and its exact extent (Figure 3).

**Figure 2:** Same radiograph as Figure 1. A dense lobulated mass typical of an osteoma is seen within the left frontal sinus (arrowheads). Abnormal intracranial gas lucencies are seen along the midline and over the vertex of the cranium (arrows)



**Figure 3:** Coronal CT of the paranasal sinuses. The image is displayed in bone window setting for better delineation of bony detail. The osteoma (open arrows) appears as a well-defined bony mass within the left frontal sinus. Pneumocephalus (arrowheads) is also well demonstrated



### Discussion

#### (a) Paget's disease of skull

This condition of excessive bone remodelling is very rare in patients under 40 years and among Chinese. The skull is affected in 65% of cases. Radiographically, the skull vault is thickened and there are multiple 'cotton wool' islands of bony density.<sup>1</sup> None of these features are present in this case.

(Continued on page 661)

# RADIOLOGICAL CONFERENCE

## (b) Fibrous dysplasia (leontiasis ossea)

Leontiasis ossea is a sclerosing form of fibrous dysplasia affecting the facial bones and the skull base. The rest of the skeleton is rarely affected.<sup>1</sup> In this case, the site of involvement does not fit this diagnosis.

## (c) Benign hyperostosis

This is commonly seen in post-menopausal women, and rarely affects men. On radiographs, benign hyperostosis is seen as thickening and localized increased density of the inner table of the skull vault, giving rise to the so-called "choppy-sea" appearance. It involves mainly the frontal region, in a symmetrical and bilateral manner.<sup>1</sup> In this case, this diagnosis can be excluded on basis of age, sex and radiological appearance.

## (d) Skull fracture

Fractures involving the frontal sinus, other sinuses and the skull vault may give rise to the serious complication of intra-cranial pneumocephalus. There may be a radiographically-detectable air-fluid level in the sinuses if the fracture involves these structures. In this case, the absence of a traumatic history and lack of a fracture line at the frontal sinus are against this diagnosis.

## (e) Frontal sinus osteoma complicated by pneumocephalus

Other causes of intra-cranial pneumocephalus include previous cranial surgery, intracranial abscess or erosion of the paranasal sinuses by tumour mass or inflammatory process. A relevant clinical history helps in narrowing the differential diagnosis. Frontal sinus osteoma is the most common cause of intrasinus ossification, with development of pneumocephalus being a rare but well recognized complication.<sup>2,3</sup>

Osteoma is the commonest tumour affecting the paranasal sinuses, occurring in up to about 1% of individuals.<sup>4</sup> The frontal sinus is most frequently affected, followed by the ethmoid sinus. Involvement of the sphenoid and maxillary sinuses is uncommon. Men are more commonly affected than women with a male-to-female ratio of about 3 to 1.<sup>5</sup> It predominantly occurs in the 3rd and 4th decades of life.

Two types of osteoma, ivory and cancellous, are identified. The former is the more common type which appears as a dense well-defined lobulated mass. Cancellous osteoma has a very low density and is therefore less obvious on plain radiographs. CT is useful for confirming the presence and defining the exact extent of osteoma, particularly of the cancellous type. Multiple sinus osteomata are seen in Gardner's syndrome, which also manifests with colonic polyps, basal cell naevi and epidermoid cysts of the skin.<sup>3,4</sup>

The majority of osteomata are asymptomatic. They are usually detected incidentally during radiographic examination of the skull or sinuses for other unrelated causes. Symptomatic osteomata may present with facial pain, sinus infection or headache. Obstruction to the sinuses by the osteoma may lead to complications such as secondary mucocele formation or proptosis. Bony erosion of the sinus wall and encroachment of orbit and cranium may occur with large tumours, causing leakage of cerebrospinal fluid, meningitis and brain abscess. As in our case, pneumocephalus results from erosion of the floor of the anterior cranial fossa by a frontal sinus osteoma.<sup>3,5</sup>

Surgery is usually required for patients who have symptoms or complications related to the osteoma. For asymptomatic osteomata, some controversy exists regarding their management. In general, regular plain radiographs every 1 to 2 years are recommended for the follow-up of small asymptomatic osteomata that are located away from the sinus ostium.<sup>6</sup> Patients should be advised to return for early reassessment should symptoms arise. Early surgical removal is suggested for large tumours, and for those that are located near the nasofrontal duct.<sup>5</sup> ■

# RADIOLOGICAL CONFERENCE

## References

1. Chapman S, Nakielny R. *Aids to Radiological Differential Diagnosis*. 3rd ed. Bailliere Tindall, London. 1995; 384-385.
2. Zizmor J, Noyek AM. Radiology of the nose and paranasal sinuses. In: Paparella MM, Shumrick DA (eds). *Otolaryngology*. 2nd ed. W.B. Saunders Co, Philadelphia. 1980; 1016-1066.
3. Lloyd GAS. Osteogenic tumours. In: Lloyd GAS. *Diagnostic Imaging of the Nose and Paranasal Sinuses*. Springer-Verlag, Heidelberg. 1988: 167-173.
4. Powell T, Jenkins JPR. Ear, nose and throat. Head and neck radiology. In: Grainger RG, Allison DJ (eds). *Diagnostic radiology. An Anglo-American textbook of imaging*. 2nd ed. Churchill Livingstone, Edinburgh. 1992; 2121-2163.
5. Rappaport JM, Attia EL. Pneumocephalus in frontal sinus osteoma: A case report. *J Otolaryngol* 1994; 23: 430-435.
6. Weymuller, EA. Neoplasms. In: Cummings CW. (ed.). *Otolaryngology - Head and Neck Surgery*. CV Mosby, St. Louis. 1986; 923-936.



# C O N F E R E N C E

Please reserve your dates next year for the following conference:

## 1997 Seoul WONCA Asia Pacific Regional Conference

Date : *August 30 – September 3, 1997*

Place : *Seoul, Korea*

For details, you may also contact:

***Taiwoo Yoo, M.D.***

Acting Chairman, Scientific Subcommittee

1997 Seoul WONCA Asia Pacific Regional Conference

SL Kangnam PO Box 305, Seoul 135-603, Korea

Tel : 82-2-3476-7700

Fax : 82-2-3476-8800