

AN ABNORMALLY ENLARGED FRONTAL SINUS – A CASE OF PNEUMOSINUS DILATANS

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ABSTRACT

During routine autopsy of a 62-y-old female cadaver, an unusually enlarged frontal sinus was observed. The sinus was abnormally over-developed in both width and height, as the sinus cavity spreads deeply into the frontal tubera. Numerous septa divided the sinus cavity. Because of the obvious dilation of the frontal sinus and the lack of localized bone destruction and hyperostosis, a rare condition called “pneumosinus dilatans” probably occurs in this interesting case.

Key words: frontal sinus, abnormal, pneumosinus dilatans

INTRODUCTION

The frontal paranasal sinuses are two irregularly shaped hollow cavities, lined by mucoperiosteum, that are located between the outer and inner tables of the frontal bone behind the superciliary arches and at the roof of the nose (9,19). They are separated from one another by a thin bony septum and are usually asymmetrical (9). The frontal sinuses may vary in size and are larger in men than in women (9,14). Numerous studies have reported an average size of the frontal sinuses among different human populations (7,12,18,14). According to the recent study of Rubira-Bullen et al. (14) the height of the frontal sinus may vary between 7 and 65 mm and

the width – between 5 and 125 mm. However, some conditions exist, where even larger in size frontal sinuses are present.

CASE REPORT

During routine autopsy of a 62-y-old female cadaver, after removing the skull cap, an unusually enlarged frontal sinus was observed (Fig. 1a,b,c). It was abnormally over-developed in both width and height, as the sinus cavity spreads deeply into the frontal tubera, reaching nearly the parietal border of the frontal bone. Numerous septa divided the sinus cavity. The dilated sinus cavities, which otherwise had a nearly normal thickness, corresponded to a moderate external bossing of the forehead around the frontal tubera. Because of the obvious dilation of the frontal sinus and the lack of localized bone destruction and hyperostosis, a rare condition called “pneumosinus dilatans” probably occurs in this interesting case.

DISCUSSION

The frontal sinuses develop early in fetal life (around the fourth month) as diverticula from the lateral nasal wall (14). At the end of intrauterine life

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(32-40 weeks) the primordial frontal sinuses are still surrounded by a cartilage, part of the cartilaginous nasal capsule (17). Pneumatization of the frontal bone begins later in life at around age of four (3). The frontal sinuses are generally fairly well developed between the seventh and eighth years, reaching their full size after puberty. The pneumatization of the frontal bone, however, may continue after forty years (11). A small percent of people have absent frontal sinuses (8). The normal development of the frontal sinuses may be modified by a number of factors such as fractures, neoplasias, severe infections and also mucocoeles (14).

diagnosis can be confirmed by an X-ray or CT of the skull (1,2,6). In general, pneumosinus dilatans is a rare condition, the aetiology of which is poorly understood. Many mechanisms have been proposed by various authors:

1. ball-valve action secondary to either redundant mucosa or a minor inflammatory process with consequent rise in pressure within the sinus (10);
2. spontaneous drainage of a mucocoele (4);
3. hormonal influence of osteoblastic activity allows ingrowth and expansion of the sinus (15);

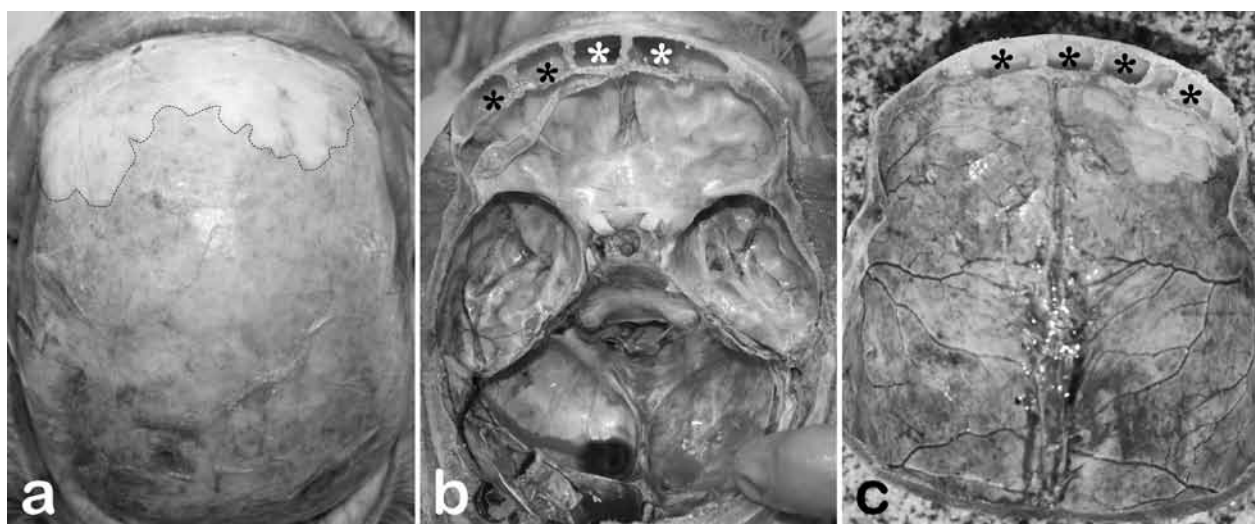


Fig. 1. Photographs of the described case of pneumosinus dilatans: (a) external surface of the skull cap with the approximate projection of the enlarged frontal sinuses (dashed-line); (b) inner surface of the cranial base with the opened cells of the enlarged frontal sinuses (asterisks); (c) inner surface of the calvaria with the opened cells of the enlarged frontal sinuses (asterisks).

The term “pneumosinus dilatans” was introduced by Benjamins (5) who described an abnormally dilated frontal sinus containing only air. According to the classification of Urken et al. (16) there are three conditions related to an abnormally enlarged frontal sinus – hypersinus, pneumosinus dilatans and pneumocoele. Later, however, Reicher et al. (13) used the term “pneumosinus dilatans” for all cases of dilated, air filled sinuses with outwardly bulging walls. This swelling of the forehead, due to enlarged frontal sinus, frequently unilateral and asymptomatic, can be the only clinical sign of pneumosinus dilatans (1). Other common symptom may be a severe local or global headache (2,6). The

4. congenital abnormality leading to unchecked development and growth of the sinus cavity (16).

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