

Pneumosinus Dilatans: A Cadaveric Case Report

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ABSTRACT

During routine dissection of a 65 years old male cadaver, an enlarged left frontal air sinus was observed. The sinus was abnormally enlarged and extended on the roof of orbit upto the lesser wing of sphenoid. There were numerous loculi in the sinus cavity separated by septa. The frontal sinus dilation was not associated with localized bone destruction. Hence this is a rare case of “pneumosinus dilatans”. An enlarged frontal sinus can lead to sinusitis change in facial contour, facial pain, headache and diplopia.

KEYWORDS: Frontal air sinus, Pneumosinus dilatans, Roof of orbit.

INTRODUCTION

The frontal sinuses are rudimentary or absent at birth¹. Pneumatization of the frontal bone begins later in life at around the age of four². They are well developed by seventh or eighth years of life¹. Reaching their full size after puberty. The pneumatization of the frontal bone, however, may continue after forty years³. A small percent of people have absent frontal sinuses⁴. The average dimensions of an adult frontal sinus are 3.3 cm in height, 2.6 cm in breadth and 1.8cm in depth¹. The frontal sinuses may vary in size and are larger in men than in women^{5,6}. Pneumosinus dilatans (PSD) is an idiopathic expansion of paranasal sinuses containing air without an associated mass. This rare disorder may affect all paranasal sinuses but most commonly affects the frontal sinus, followed by the sphenoid sinus, ethmoid sinus, and maxillary sinus⁷.

CASE REPORT

The left frontal sinus was observed enlarged (Fig 1) during routine dissection of orbit of a 65 years old male cadaver. Between the two tables of orbital plate of frontal bone the abnormally enlarged left frontal sinus was observed (Fig. 2). The sinus cavity extended up to the lesser wing of sphenoid bone. It was multi-loculated and numerous septa divided the sinus cavity. The walls of the dilated sinus cavities were thin. There was no localized bone destruction or hyperostosis. The cadaver was well built and the height was 6 feet. There were associated anomalies on the left side like hypoplastic lung and small kidney with irregular surface. The right lung and kidney appeared normal.

DISCUSSION

“Pneumosinus dilatans” was first described by Meyes in 1898⁸. The term “pneumosinus dilatans” was introduced by Benjamins in 1918 who described an abnormally dilated frontal sinus containing only air^{5,9}. Pneumosinus

dilatans is characterised by idiopathic progressive expansion of one or more paranasal sinuses (PNS) beyond normal margins without evidence of mucous membrane changes. The expansion may involve complete or a part of the sinus¹⁰. According to the classification by Urken et al.², paranasal sinuses dilatation may be classified into three types: (1) Hyperpneumatization is characterized by sinus enlargement within the usual anatomical limits. (2) Pneumosinus dilatans is enlargement of sinus beyond the normal anatomical limits, with normal bone walls of the sinus. (3) Pneumocele corresponds to an abnormal enlargement of the paranasal sinus with thinning or erosion of bone wall^{2,11}. There are studies regarding an average size of the frontal sinuses among different human populations^{5,6,12}. According to the recent study of Rubira-Bullen et al. the height of the frontal sinus may vary between 7 and 65 mm and the width between 5 and 125 mm⁶.

PATHO PHYSIOLOGY

Expansion may be due to progressive increase of the pressure within the sinus resulting from a one-way ball valve mechanism, at the level of the frontal sinus ostium, allowing entering but not exit of air². Change in pressure during a forced Valsalva manoeuvre or forced sneezing pressure may be another mechanism for the expansion of the sinus¹³. Overgrowth of sinus may occur in an acromegalic subjects under the influence of general growth factor or as a compensatory phenomenon in cases of agenesis of a cerebral hemisphere^{14,15}. It has been found to be associated with orbital fibro-osseous diseases¹⁶. Fractures, severe infections, neoplasias may modify the normal development of the frontal sinuses¹⁶. The presentations in a enlarged frontal sinus are, sinusitis changing facial contour, facial pain, headache and diplopia^{3,10}.



FIG.1 – FS – FRONTAL AIR SINUS



FIG. 2 – OT – Outer table, IT – Inner table, FS – Frontal air sinus

DIAGNOSIS

CT scan of the brain and sinuses and presence of only air in the enlarged air cell of sinus confirm the diagnosis and establish a preoperative plan^{17,18}.

CONCLUSION

This is a rare case of Pneumosinus dilatans of frontal sinus extending into the orbital plate due to overall increase of body size or a congenital anomaly.

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