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Case Report

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FRONTAL SINUS PNEUMOCELE-CASE REPORT WITH RADIOLOGICAL REVIEW

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ABSTRACT

Pneumocele is a rare condition affecting paranasal sinuses which is slow growing. It is characterized by focal or generalized abnormal dilatation of paranasal sinus with thinning or erosion of its walls. Enlargment of paranasal sinus can occur due to hypersinus, pneumosinus dilatans and pneumocele. Though these terms are used synonymously, their differentiation is essential which can be done by CT scan. Rarity of the condition and paucity of radiological literature confirm relevance of details of these entities. CT scan is diagnostic of these conditions. Due to varied etiologies, the treatment is individualized. Sinus decompression is usually recommended in most instances.

KEYWORDS: Pneumocele, frontal sinus, hypersinus, pneumosinus dilatans, computed tomography.

INTRODUCTION

Frontal sinus pneumocele is a rare condition in which there is abnormal expansion of air containing sinus beyond the normal margins of frontal bone. The expansion may involve entire or part of sinus.[1] Etiology and pathogenesis of pneumocele is unclear. Patient may complain of slowly changing facial contour, dull aching pain in affected area, local pressure symptoms or diplopia.[2] Enlargement of paranasal sinus is seen in hypersinus, pneumosinus dilatans and pneumatocele. It is important to differentiate between these entites. Radiograph show enlargement of involved paranasal sinus. CT scan is essential to differentiate between these three entities.

CASE REPORT

We report a case of 30year old female with history of nasal discharge since 1 month with mild difficulty in breathing. CT scan of PNS was advised to rule out any mass in nasal cavity or paranasal sinuses. Plain CT scan of PNS was done by taking 1mm thin axial and coronal sections in helical mode. Frontal sinus on right side showed marked expansion posteriorly with marked thinning of posterior cortex. (Figure 1-4) It was encroaching intracranially in right frontal region(Figure 2,4). Other findings were mild deviation of nasal septum to right side and mucosal thinning in right maxillary sinus, anterior ethmoidal air cells and sphenoid sinus due to sinusitis. Diagnosis of pneumocele of frontal sinus on right side was made. There was no evidence of bone erosion.

Imaging

Figure: 1 Scanogram showing enlarged frontal sinus.

Figure: 2 (A)

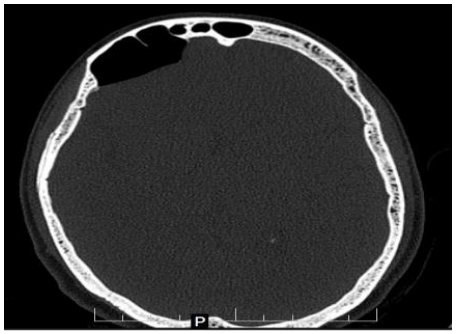

Figure: 2 (B)

Figure: 2 (A,B) Axial CT showing expansion of frontal sinus on right side with thinning of posterior cortex.

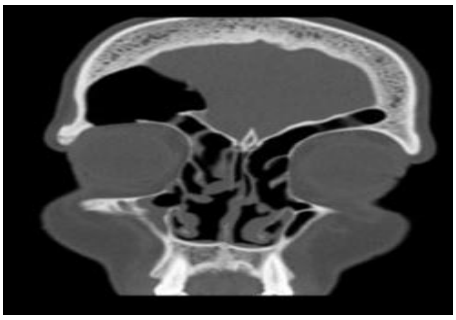

Figure: 3(A)

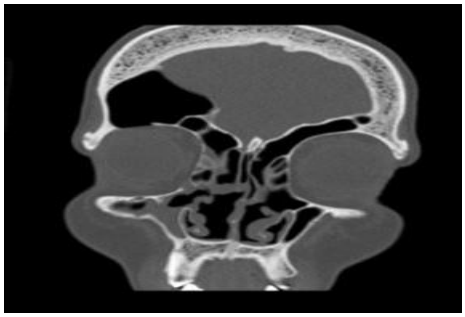

Figure: 3(B)

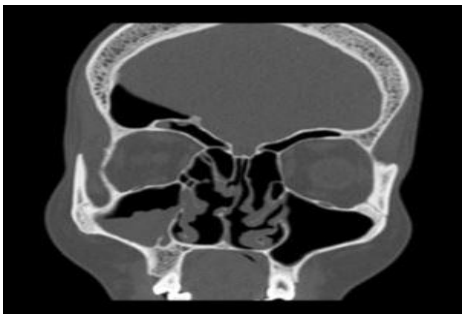

Figure: 3(C)

Figure: 3 (A-C) Coronal CT showing expansion of frontal sinus on right side with thinning of roof and floor.

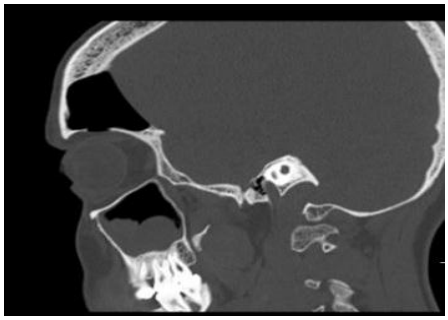

Figure: 4(A)

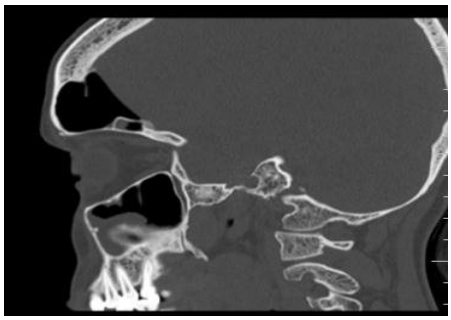

Figure: 4(B)

Figure: 4(A,B) Sagittal CT showing expansion of frontal sinus on right side with thinning of roof and floor.

DISCUSSION

Terms like hyperpneumatisation, sinus hypertrophy, sinus ectasia, pneumosinus dilatanse, pneumatocele and aerocele are used in literature to describe a hyperpneumatised paranasal sinus. A simplified classification is suggested Urken at.el describing only three type of sinus hyperpneumatization.[3]

The three type are hypersinus, pneumosinus dilatans and pneumocele.[4] This classification was developed for description of frontal sinus anatomical variation, but it has been used in literature for all paranasal sinuses. Hypersinus is also called hyperpneumatic sinus. The involved sinus is larger then usual frontal sinus, but it does not extent beyond the normal boundaries of the frontal bone. There is no frontal bossing, encroachment in ethmoid, orbit or nasal cavity or intracranial extension. Wall thickness is normal with no thickening or erosion.[3] Pneumosinus dilatans refers to an abnormally expanded aerated sinus beyond the confines of its boundary. But the sinus wall is of normal thickness. Pneumocele either entire sinus or focal portion of the sinus is abnormally enlarged, extending beyond the boundaries of the sinus with either generalized or focal thinning of sinus wall.[2,3,5] As pneumosinus dilatans and pneumocele are difficult to differentiate radiographically, they were used interchangeably.[1]

Pneumosinus dilatans extends anteriorly causing frontal bossing or posteriorly or laterally displacing adjacent anatomical structure like ophthalmic bulb and frontal lobe. In first two variants the sinus walls are normal

while in pneumocele there is generalized thinning or focal erosion of bony walls.[6]
A frontal pneomocele is a rare disorder that can cause facial deformity. Pneumocele most commonly affects frontal sinus, followed in frequency by sphenoid, ethmoid and maxillary sinus.[5] A pneumocele is characterized by pathological expansion of aerated sinus lined by normal mucosa.

Several mechanisms have been postulated for development of pneumocele which includes developmental, inflammatory like chronic sinusitis., nasal polyposis, neoplastic like formation of tumors, post-traumatic causes, sinus surgery. One way valve obstruction of naso-frontal duct leading to increase in sinus pressure is a proposed mechanism.[4,7] The one way valve which occurs due to physiological block at sinus osteum allows air to enter in to the sinus but prevent its return. This persistent air entrapment elevates pressure in affected sinus. Proposed causes are spontaneous drainage of mucocele, presence of gas producing microrganisms, hormonal abnormality, congenital factors and osteometal complex functioning as an unidirectional valve.[5]

CT scan helps in differentiating pneumocele from hypersinus and pneumosinus dilatans by demonstrating over expansion of frontal sinus with thinning and erosion of bony margins.[6] In our patient, CT scan demonstrated enlargement of right frontal sinus with localized thinning of posterior wall.

Various treatment modalities are proposed based on etiology. These include direct sinus needle puncture, endoscopic sinus surgery, creation of naso-antral window through routine Caldwell operation. These treatments show arrest of expansion of sinus.[1,8] Most pneumoceles are asymptomatic as in our case.

In symptomatic cases, common complaints are slowly progressing swelling, presence of facial deformity, dull aching pain in affected area and headache.[8]

Differential diagnosis includes mucocele and benign and malignant neoplasm of paranasal sinus.[4] CT scan is diagnostic which shows partial or total expansion of sinus with concurrent thinning or erosion of bony sinus wall with no signs of inflammation.[6]

CONCLUSION

Enlargement of paranasal sinus is seen in hypersinus, pneumosinus dilatans and pneumatocele. Radiograph show enlargement of involved paranasal sinus. CT scan is essential to differentiate between these three entities.

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