SPHENOID MUCOCELES

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ABSTRACT

Four cases of sphenoid mucocele were presented. The lesions were confined to the expanded sinuses in two cases and with intracranial extension in other two cases. CT scan showed homogeneously low and high content lesions. MRI showed the lesions to be dark grey on T1WIs and fluid bright on T2WIs. The cases that lesions extended to intracranial cavity destroyed the bony skull bases widely but in smooth manner.

INTRODUCTION

Mucoceles are the most common expansile lesions of any paranasal sinuses. They are defined pathologically as being formed by a cuboidal epithelium that surrounds mucoid secretions (1). A mucocele develops from the obstruction of a sinus ostium or a compartment of a septated sinus. The wall of the lesion is the sinus mucosa and the sinus cavity is expanded as the bony walls are remodelled. Mucoceles occur primarily in the frontal sinuses (60-65%), but they also are found in the ethmoid sinuses (20-25%), maxillary sinuses (10%) and the sphenoid sinuses (1-2%) (1-5). The classical mucocele is a noninfected lesion that presents with signs and symptoms that result from the mass itself. Pain is rare and when noted indicates the presence of an infected mucocele or a pyocele. The sinus cavity expansion is the result of a dynamic process that consists of pressure necrosis that causes a slow erosion of the inner sinus bony wall while the outer periosteum responds by producing new bone. In this way, the sinus wall is remodelled and the sinus cavity slowly expands.

We presented four cases of sphenoid mucocele by images of plain film, CT scan and MRI study.

CASE REPORTS

CASE 1

A 50-year-old female patient had chronic sinusitis with several surgeries without improvement. She had no visual problem. Plain film of the paranasal sinuses showed an expansion of the sphenoid sinus with haziness. The lamina dura of the floor of the sella turcica was eroded without expansion of the fossa. Both ethmoid sinuses were cloudy (Fig.1). Contrast enhanced axial and coronal view CT scan of the paranasal sinuses revealed a homogeneous soft tissue lesion in the expanded sphenoid sinus. The density was measured 46-58 H.U. Extension of the lesion was noted to both posterior compartments of the ethmoid sinuses (Fig.1). The cavernous sinuses appeared normal. The pituitary gland was not involved. At surgery, there were polyps in the posterior ethmoid and sphenoid sinuses with thickened mucosa. No pus was obtained from the sphenoid sinus.

CASE 2

A 72-year-old female patient had bitemporal headache for 3 months. She developed double vision

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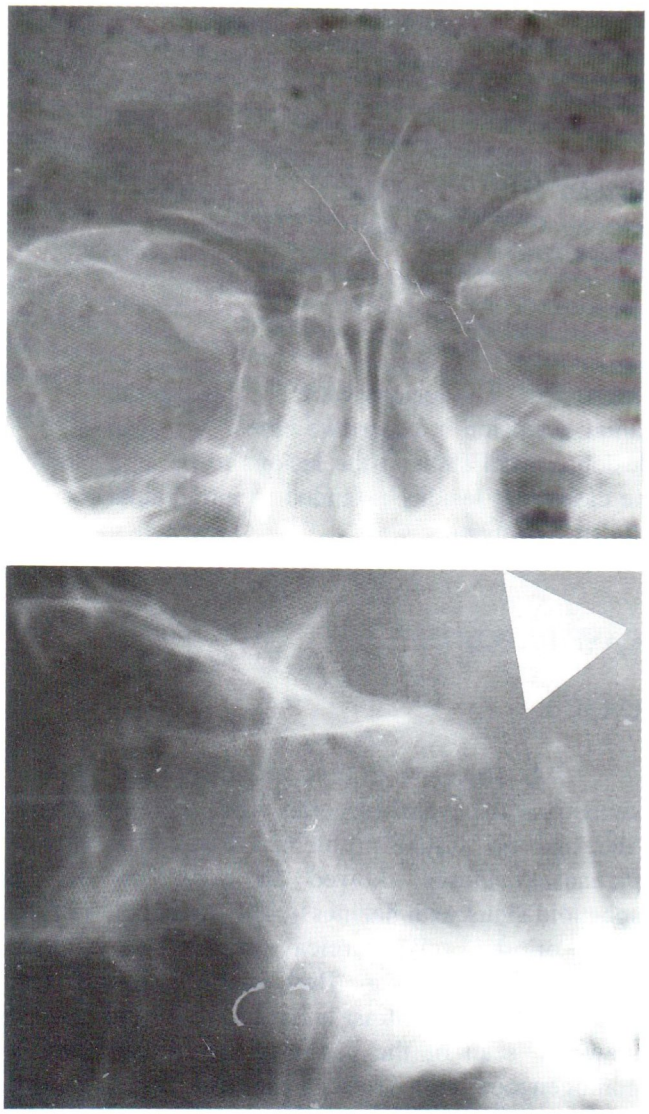


Fig. 1A. Case 1. PA and lateral film of the paranasal sinuses showed an expanded sphenoid sinus with ground glass appearance, erosion of the floor of the sella turcica and cloudiness of both ethmoid sinuses.

in the vertical orientation and hearing loss. Left eye proptosis was noted. The visual acuity of right eye was 15/200 and finger count at 2 feet for the left eye. Visual field defect was noted at the lateral half and superior medial 1/5 of right eye and it could not be evaluated for the left eye. The extraocular movement was normal for the right eye and was limited to 10-20% in all directions for the left eye. The corneal reflex was decreased in the left eye. MRI study was performed in axial, sagittal and coronal view. The T1WI and T2WI images were obtained at the paranasal sinuses. They showed an expansion of the sphenoid sinus with pressure erosion to the anterior clivus, floor of the pituitary fossa, left cavernous sinus and medial left orbital apex. Left optic nerve was compressed at the apex. The optic chiasma appeared normal (Fig. 2). The lesion had a homogeneous signal, grey on T1WI and fluid bright on T2WI. The contrast enhancement was not performed in this case. Sphenoid mucocele was found at surgery.

CASE 3

A 15-year-old female patient had a progressive blurred vision of left eye for two years. Visual acuity of left eye was hand-movement and normal for right eye. Positive left Marcus Gunn's sign was noted. Pale disc of right eye and optic atrophy of left eye was seen. Left exophthalmos was observed. Lateral view of the plain film of the skull showed an expansion of the sphenoid sinus, a totally destroyed pituitary fossa and soft tissue lesion in the nasopharynx. Non contrast enhancement of the base of the skull and the brain revealed a low density soft tissue lesion in the skull base with intracranial extension. The density of the lesion was 15 H.U. Contrast enhancement of the lesion in the axial and coronal view showed a non enhanced lesion in the expanded sphenoid sinus, extending to left nasopharyngeal airway, posterior left nasal cavity, left maxillary sinus, pre-medullary, pre-pontine region, medial left temporal fossa, sella and suprasellar area. Both sides of the cavernous sinuses were compressed and invaded at the left side (Fig. 3). The clivus, a part of left pterygoid bones, both petrous apices, medial and posterior walls of left maxillary sinus were disappeared. The lesions did not enter the left orbital cavity, though it had pressure effect on the posterior medial wall. The pituitary gland was not well identified. The chiasma was naturally compressed, judged from the location of the mass.

CASE 4

A 35-year-old male patient had poor vision for one week. Physical examination showed no

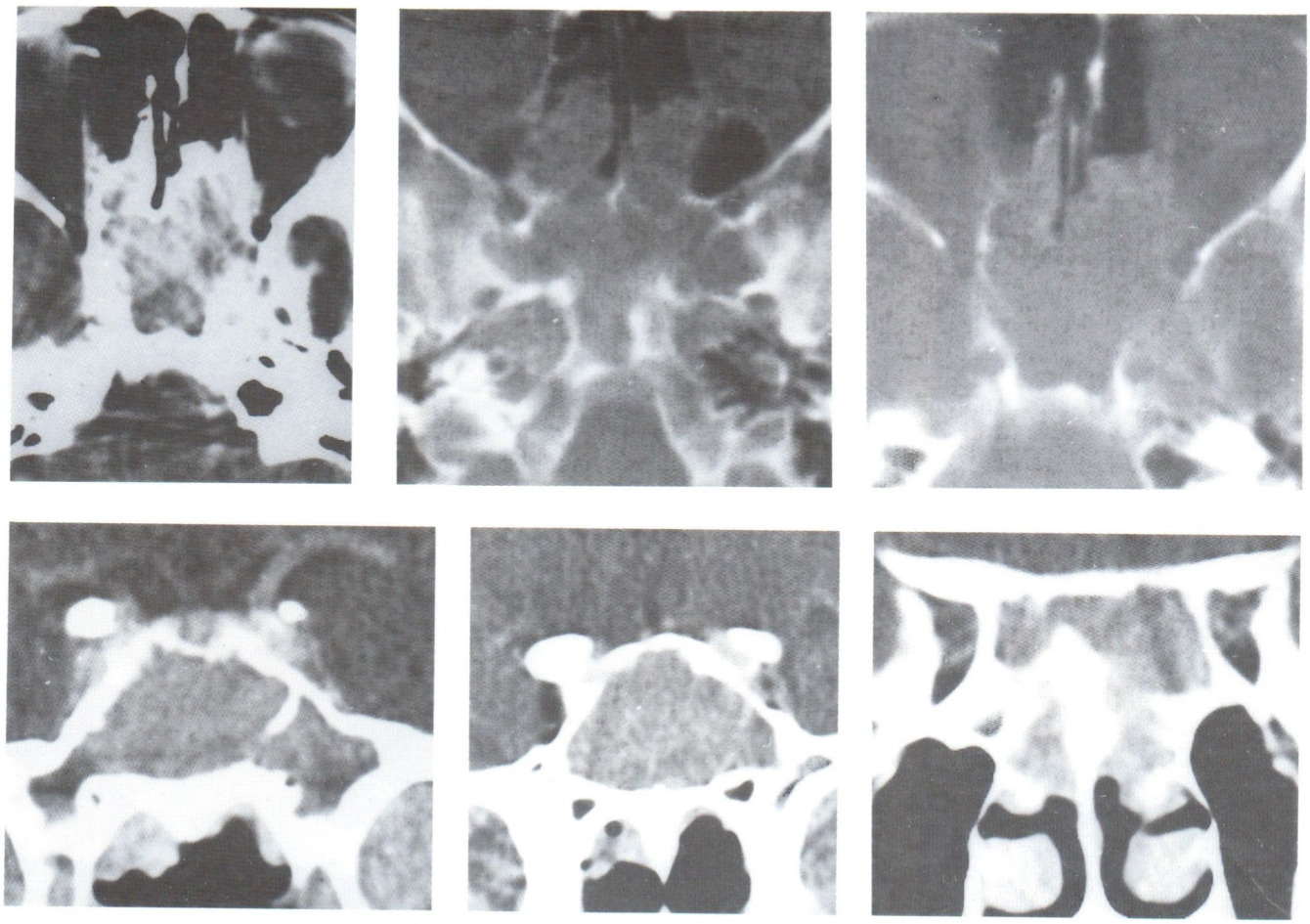


Fig. 1B. Case 1. Axial and coronal views enhanced CT scan of the paranasal sinuses showed soft tissue lesion of rather homogeneous density in the expanded sphenoid sinus and posterior compartment of both ethmoid sinuses. The intersphenoid sinuses septum disappeared. The cavernous sinuses and the pituitary gland were normal.

perception to light at right eye and finger count at 1.5 feet of left eye. Right pupil was 6 mm fixed and left pupil was 3 mm reacted to light. The pinprick sensation was decreased at right cranial nerve V. The Babinski's response was positive on both sides. Visual field defect at medial half of left eye was noted. The Marcus Gunn was positive at right side. Optic disc atrophy of both sides were seen. Non contrast enhancement CT scan of the brain and base of the skull in axial view showed a hyperdense soft tissue lesion in the sphenoid sinus. Post contrast enhancement axial and coronal CT scan of the base of the skull and brain revealed a homogeneous hyperdense soft tissue lesion in the expanded sphenoid sinus. The lesion extended to both sides of the cavernous sinuses (Fig. 4). Bony destruction was noted at clivus, superior part of left pterygoid plates, walls of the sphenoid sinuses and bony parts of the skull base.

DISCUSSION

Mucoceles involving the frontal and anterior ethmoid sinuses are relatively common, but those arising in the sphenoid and posterior ethmoid sinuses are rare. The terms " sphenoid sinus mucocele" and sphenoethmoidal mucocele" have been used interchangeably in describing these lesions (6,7). Mucoceles of the sphenoid and ethmoid sinuses gradually expand, resulting in resorption and eventual erosion of the bony walls of the sinus. The clinical and radiographic manifestations of sphenoidal mucoceles are usually related to sinus expansion and extension of the lesion beyond the

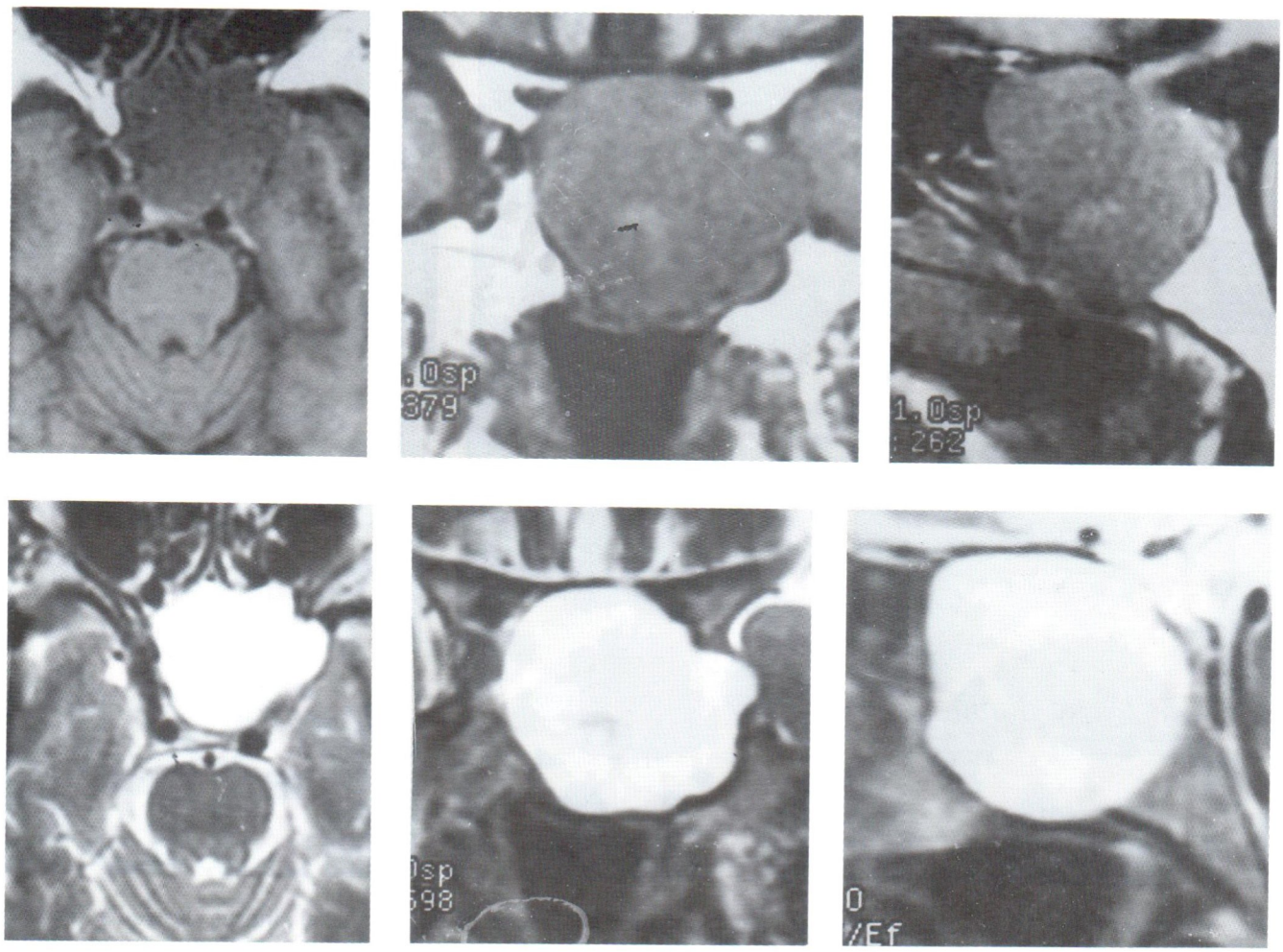


Fig. 2. Case2. T1WI and T2WI-axial, coronal and sagittal view MRI study of the sphenoid sinus showed an expansion of the sphenoid sinus with pressure erosion to the anterior clivus, floor of the pituitary fossa, left cavernous sinus and medial left orbital apex. Left optic nerve was compressed at the apex. The lesion has a homogeneous signal, grey on T1WI and fluid bright on T2WI.

confines of the sinus (8). Symptoms result from involvement of structures in the area. Sphenoid sinus enlargement will compress the upper six cranial nerves (9,10), the carotid arteries (11), and even the brain, together with erosion of the skull base.

The patients presented with headache due to stretch of the basal dura covering the planum sphenoidale and floor of the frontal fossa (12). The sphenoid sinus mucosa is supplied by the posterior ethmoidal branch of the ophthalmic division of the trigeminal nerve (13), so referred pain could be anywhere in the head. Anosmia and nasal symptoms were reported (11,13). Opthalmologic manifestations included bilateral visual failure (11), field defect (14), oculomotor nerve palsy (15), bilateral exophthalmos and conjunctival injection (16). Spontaneous pneumocephalus (17) and panhypopituitarism was also observed (10).

On plain films, most sphenoid mucoceles expand anterolaterally into the posterior ethmoids and the orbital apex. Less commonly, expansion may occur upward into the sella turcica and cavernous sinuses or downward into the nasopharynx and posterior nares. Intracranial extension in rare cases can even result in areas of brain necrosis (1,7,18). Rarely, they may extend into the sphenoid sinus recesses in the greater wings and the pterygoid processes (19).

On CT scans a mucocele usually appears as an expanded sinus cavity that is filled with a fairly

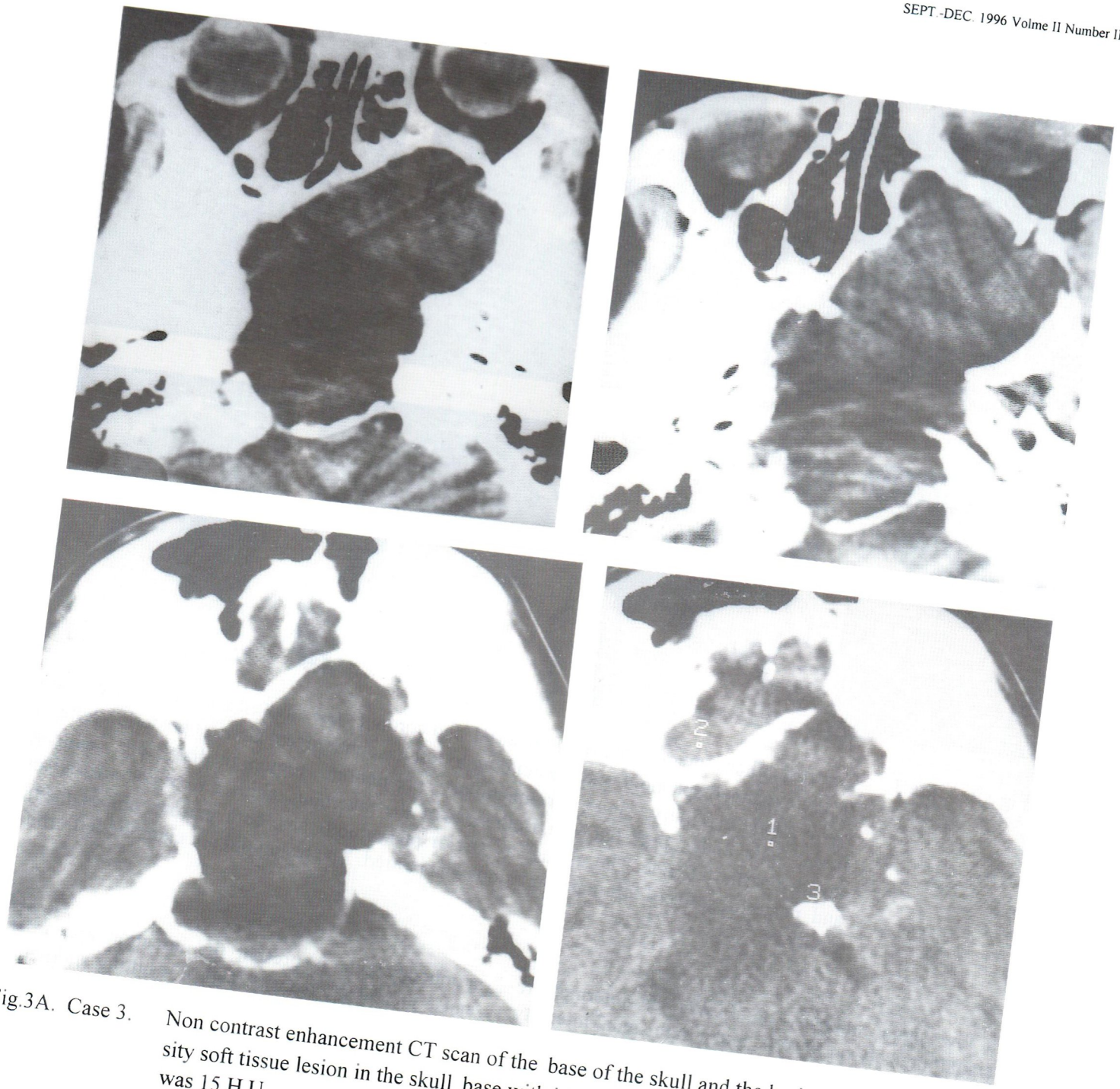


Fig.3A. Case 3. Non contrast enhancement CT scan of the base of the skull and the brain revealed a low density soft tissue lesion in the skull base with intracranial extension. The density of the lesion was 15 H.U.

homogeneous material of mucoid attenuation (10 to 18 HUs). In a few cases the mucocele secretions may be particularly viscid and proteinatious, and the attenuation may be in the 20 to 40 HU range. However, most mucoceles have an attenuation in the mucoid range less than that of muscle (1,20). The sinus walls are remodelled and may be either of almost normal thickness, thinned, or eroded. If a mucopyocele is present, the sinus mucosa surrounding the central mucous secretions is seen as a thin zone of enhancement just inside the bony sinus walls. This signifies the presence of an infected mucocele (1,21).

On MRI, the signal intensities are dominated initially by the high water content of the mucous secretions (about 95% water). Thus, there usually is

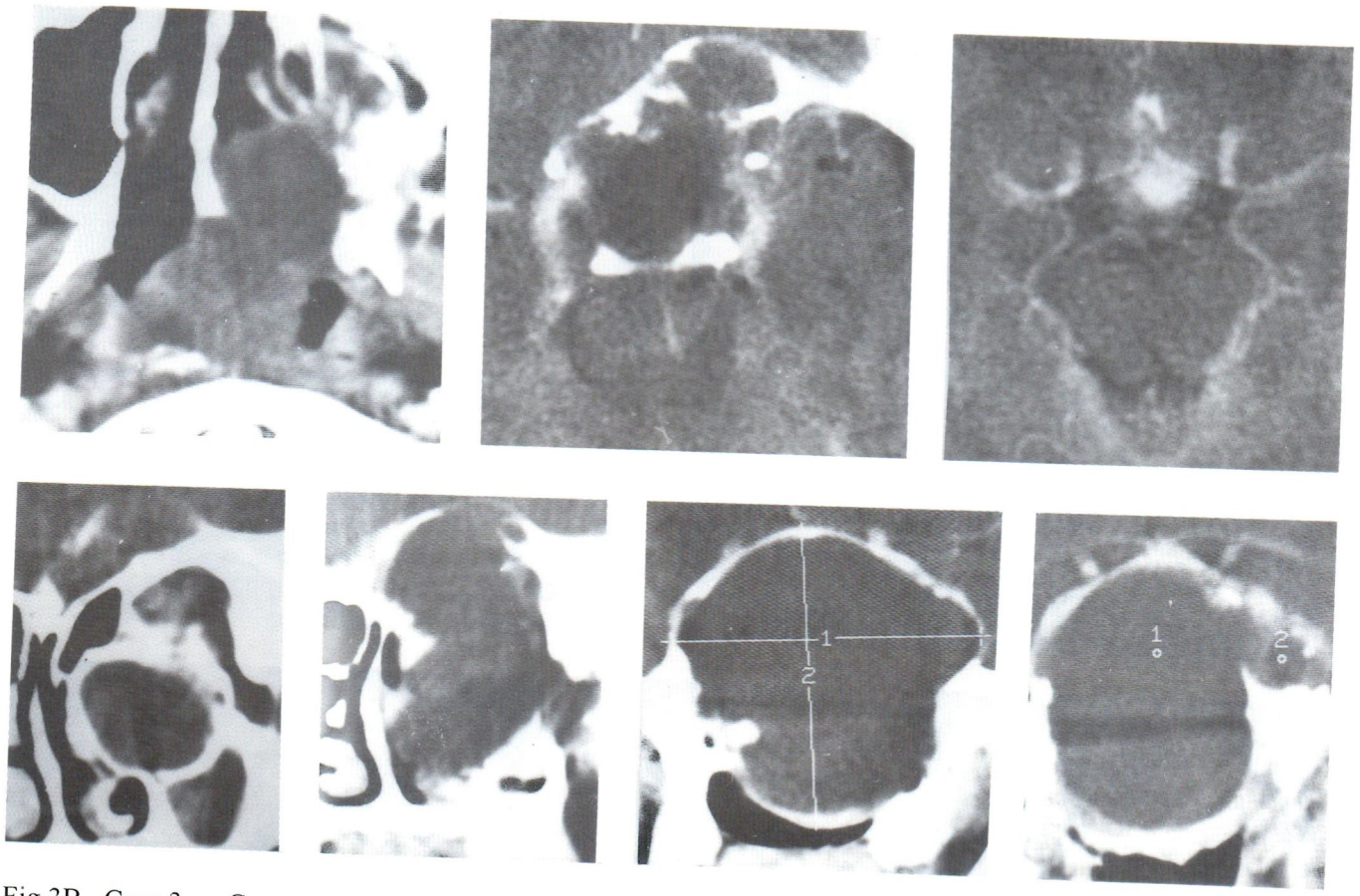


Fig.3B. Case 3 Contrast enhancement of the lesion in axial and coronal view showed a non enhanced lesion in the expanded sphenoid sinus extending to left nasopharyngeal airway, posterior leftnasal cavity, left maxillary sinus, pre-medullary, pre-pontine region, medial left temporal fossa, sella and suprasellar area. Both sides of the cavernous sinuses were compressed and invaded at the left side. The clivus, a part of pterygoid bones, both petrous apices, medial and posterior walls of left maxillary sinus diappeared. The lesion did not enter the left orbital cavity.

a low signal intensity on T1WIs, an intermediate signal intensity on PDWIs, and a high signal intensity on T2WIs. If the mucocele has been present for a long time (many months), the T1-and proton density-weighted signal intensities become higher. The primary causes appear to be a concentration of the proteinatious secretions, a slow resorption of water through the mucosa, and an increased viscosity of these secretions. When enough free water is resorbed from the mucocele and the protein concentration reaches about 25% to 35%, first the T2WI signal intensity and then the T1WI signal intensity become low (1,23). Thus, mucoceles can have the following progressive MRI appearances: low T1, high T2; intermediate T1, high T2: high T1, high T2; intermediate-to high T1, low T2; low T1, low T2. If a mucopyocele is present the infection appears to cause increased viscosity with a resulting shortening of the T1 signal.

Our first case, the lesion was confined in the expanded sphenoid sinus. The density of the lesion was high due to prolonged retention and was corresponded with the surgery which only thickened mucosa was found.

Our 2nd case, the lesion was also confined within the expanded sphenoid sinus. The signal character was of the classical rather clear fluid content.

Our 3rd and 4th cases, the lesions were quite extensive with intracranial involvement. There were wide skull base destruction. The concentration of the fluid in the 3rd case was less than the 4th case.

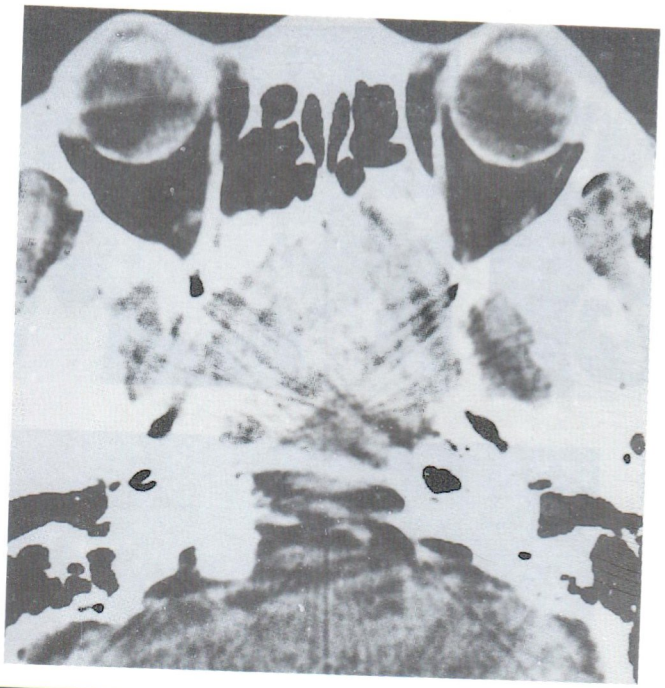
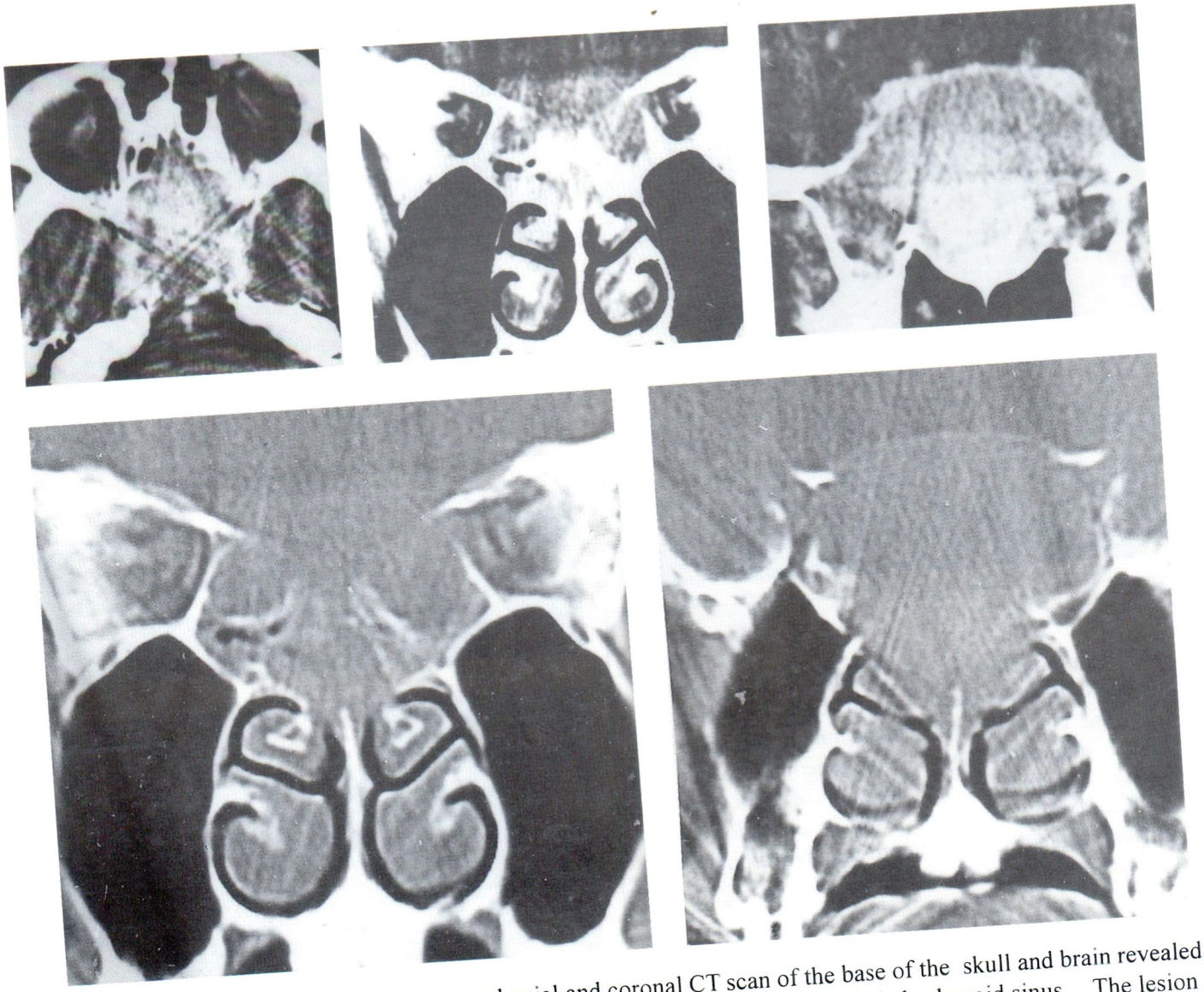


Fig. 4 Case 4. Non contrast enhanced CT scan of the brain and base of the skull in axial view showed a hyperdense soft tissue in the sphenoid sinus.

In conclusion, the lesion of the sphenoid mucocele demonstrated in our cases showed the following characters: 1) expansion of the sphenoid sinus 2) the content was hemogeneous, the density was low or high on CT images and dark grey on T1WI and fluid bright on T2WI 3) extension to the adjacent organs was of smooth manner, though bony destruction was present.

REFERENCES

1. Som PM, Bergeron RT. Head and neck imaging. 2nd ed. Mosby Year Book: St Louis, 1991:154.
2. De Juan EE, Green WR, Iliff NT. Allergic periorbital mucopyocele in children. Am J Ophthalmol 1983;96:299.
3. Finn DG, Hudson NR, Baylin G. Unilateral polyposis and mucoceles in children. Laryngoscope 1981;91:1444.
4. Sizmor J, Noyek AM. Cysts, benign tumors and malignant tumors of the paranasal sinuses. Otolaryngol Clin North Am 1973;6:487.
5. Rogers JH, Fredrickson JM, Noyek AM. Management of cysts, benign tumors and bony dysplasia of the maxillary sinus. Otolaryngol Clin North Am 1976;9:2330.
6. Nogent GR, Sprinkle P, Bloor BM. Sphenoid sinus mucoceles. J Neurosurg 1970;32:443-51.



Fib. 4B. Case 4. Post contrast enhanced axial and coronal CT scan of the base of the skull and brain revealed a homogeneous hyperdense soft tissue lesion in the expanded sphenoid sinus. The lesion extended to both sides of the cavernous sinuses. Bony destruction was noted at clivus, superior part of leftpterygoid plates, walls of the sphenoid sinuses and bony parts of the skull base.

7. Close LG, O'Conner WE. Sphenoethmoidal mucoceles with intracranial extênsion. Otolaryngol Head Neck Surg 1983;91:350-7.
8. Gore RM, Weinberg PE, Kim KS, Ramsey RG. Sphenoid sinus mucoceles presenting as intracranial masses on computed tomography. Surg Neurol, 1980;13:375-9.
9. Johnson LN, Hepler RS, Yee RD, Bartzodorf U. Sphenoid sinus mucocoele (anterior clinoid variant) mimicking diabetic opthalmoplegia and retrobulbar neuritis. Am J Opthalmol 1977;9: 259-66.
10. El-Fiki ME, Abdel-Fattah HM, El-Deeb AK. Sphenoid sinus mucopyocele with marked intracranial extension: A more common phenomenon in the third world ? Surg Neurol 1993;39:115-9.
11. Bregear P. Ophthalmic manifestations of sphenoid mucoceles. Ann Ophthalmol 1977;9:259-66.
12. Nugent GR, Sprinkle P, Bloor BM. Sphenoid-sinus mucoceles. J Neurosurg 1970;32:443-51
13. Classen AJ. Empyema of the sphenoid sinus. A case report. S Afr J Surg 1983;21:55-60.

14. Alba AA, Maroon JC, Wilberger JE Jr, Kennerdell JS, Deeb ZL. Intrasellarmucocoele simulating pituitary adenoma. Case report. Neurosurgery 1986; 18:197-9.
15. Fody EP, Biner EF. Sphenoid mucocoele causing hyperprolactinemia:radiologic/pathologic correlation. South Med J 1986;79:1017-21.
16. Wilberger JR Jr, Alba A, Kennerdil J, Maroon JC. Mucocele of the pterygoid recess treated by laser surgery. Case report. J Neurosurg 1985;63: 970-2.
17. Breaget P. Ophthalmic manifestations of sphenoidal mucoceles. Ann Ophthalmol 1997;32:259-66.
18. Osborn AG, Johnson L, Roberts TS. Sphenoid mucoceles with intracranial extension. J Comput Assist Tomogr 1979;3:335.
19. Chut MC, Briant TDR, Gray T, et al. Computed tomography of sphenoid sinus mucocele. J Otolaryngol 1983;12:263.
20. Perugini S, Pasquini U, Menichelli F, et al. Mucoceles in the paranasal sinus involving the orbit: CT signs in 43 cases. Neuroradiology 1982;23:133.
21. Torjussen W. Rhinoscopical findings in nickel workers, with special emphasis on the influence of nickel exposure and smoking habits. Acta Otolaryngol (Stockh) 1979;88:279.
22. Som PM, Dillon WP, Fullerton GD, et al Chronically obstructed sinonasal secretions observations on T1 and T2 shortening. Radiology 1989;172: 515.