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April 1940

NASAL OSTEOMATA

By A. S. HANDOUSA (Cairo, Egypt)

SIMPLE new growths in relation to the nose and sinuses are rarely met with; malignant disease is by far more common.

During the last seven years, out of 840,000 patients treated at the Nose, Throat and Ear Department, Kasr-El-Ainy Hospital, Cairo, I have only come across 37 cases of benign new growths in this region, osteomata holding the first place in frequency as demonstrated by the following table.

Osteomata	18
Fibromata (mostly Naso-pharyngeal) ..	14
Angiomata	2
Papillomata	2
Reticuloma	1
	37

The case notes of these osteomata seem to me worth recording as they clear up some points of interest, particularly their similarity to osteomata of long bones in their site of origin and cessation of growth when the affected bone ceases to grow. These case notes too, throw a flood of light on the causation of these tumours.

In order to avoid repetition may I mention here that:

1. No tuberculous or syphilitic element was found and the Wassermann's reaction was always negative.

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2. There was no similar new growth in other parts of the body or in other members of the same family.
3. Fundi were quite normal.
4. No central nervous system symptoms.

CASE I.

A female, aged 18, kindly referred to me by the Ophthalmologist. She had a gradually increasing painless swelling in the region of the right upper eyelid of six months' duration, associated with diplopia.

No definite history of trauma, no associated frontal headache.

Examination.—Reveals the presence of two swellings in relation to the roof of the right orbital cavity, mainly displacing the right eyeball downwards and slightly forwards and outwards. (Fig. 1.)

The inner swelling has a bony consistency firmly fixed to the deep structures, but not adherent to the skin. The outer is fluctuating.

The right eye movements are limited mainly upwards and slightly inwards. No changes in the sensations of the skin over the forehead.

Intra-nasal examination reveals no abnormality and no similar swellings were found elsewhere.

X-ray.—Shows an extensive lobulated compact osteoma, encroaching on the two frontal sinuses and the right orbital cavity, attached only towards the right side of the roof of the nose. (Figs. 2 and 3.)

The right frontal sinus is greatly dilated and the right supra-orbital ridge and orbital roof are to a large extent absent. The cerebral wall of the right frontal sinus is not affected.

Exploration.—Shows that the tumour is only connected with the right side of the nasal spine of the frontal bone.

A huge mucocele was distending the right frontal sinus and forming the outer swelling. The contents were sterile on culture.

CASE II.

A boy, 20 years of age, with very similar history and complaint.

Examination.—Reveals a hard swelling at the inner angle of the right orbital cavity, displacing the right eyeball mainly outwards and downwards and slightly forwards with limitation of movements upwards and inwards.

Intra-nasal examination reveals no abnormality except that the nasal roof seemed lower on the right than on the left side.

X-ray.—Shows a compact osteoma partially occupying the two frontals and the nasal roof on both sides with a knob in the right orbital cavity. (Fig. 4.)

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Fig. 1.

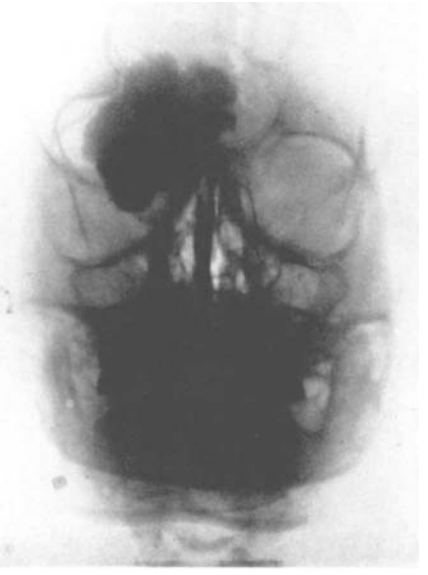


Fig. 2.

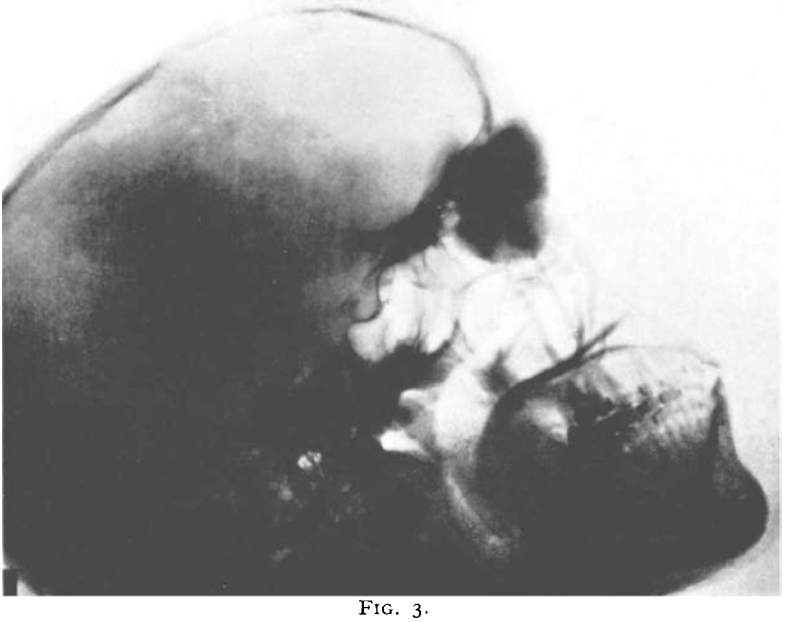


Fig. 3.

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Fig. 4.

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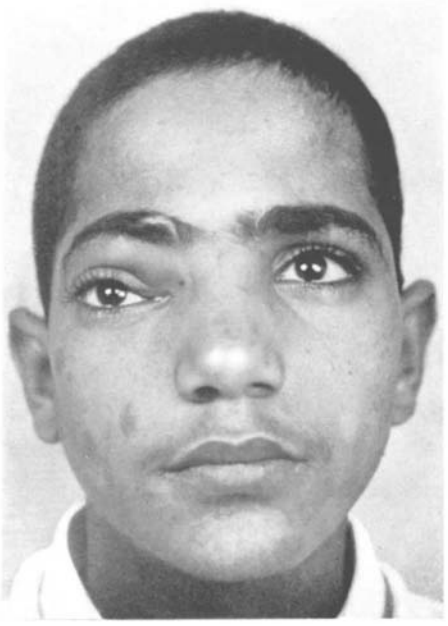


FIG. 5.

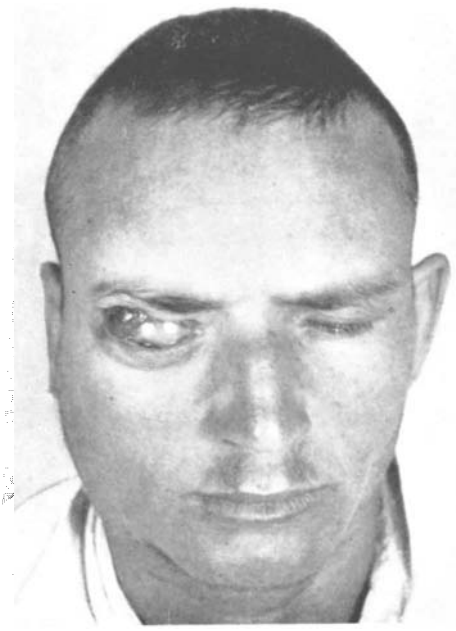


FIG. 6.



FIG. 7.

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Fig. 8.

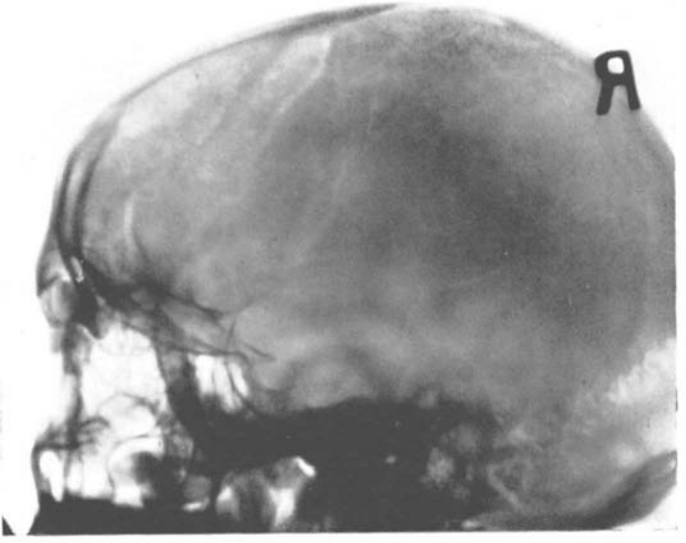


Fig. 9.

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The floor of the right frontal sinus together with the right supra-orbital ridge are absent.

Exploration.—The tumour was found to be definitely attached to the right side of the nasal spine of the frontal bone.

The frontal sinuses contained a fair amount of muco-pus, and the mucosa was polypoid.

CASE III.

A male, 13 years old, with a similar, but smaller swelling to Case I, having the same complaint, but giving a definite previous history of trauma over the right upper eyelid. (Fig. 5.)

Examination.—Reveals a small palpable swelling related to the inner part of the roof of the right orbit, of bony consistency, fixed to the deep structure but the skin is freely movable over it. The right eyeball is displaced downwards and slightly outwards with limitation of movements inwards and upwards.

Intra-nasal examination as well as general examination are free of abnormalities.

X-ray.—Shows a fairly large osteoma in relation to the inner part of the right frontal sinus encroaching on the right orbital cavity. The right supra-orbital ridge is still intact, but there is partial absorption of the right frontal sinus floor.

Exploration.—Proves again that the tumour was only attached to the nasal spine of the frontal bone.

Frontal sinus mucosa was apparently normal and there was no discharge in the sinus cavity.

CASE IV.

A male of 35 years saw me on account of a discharging sinus in the right upper lid. (Fig. 6.)

He had an acute swelling above his right eye, three years ago, associated with severe pain and high temperature, the swelling spontaneously discharged externally with great relief but a discharging fistula persisted in the upper eyelid.

Investigation.—The right upper eyelid was puckered and distorted, having a fistula communicating with the right frontal sinus.

There was no pressure on the right eyeball.

Nasal fossae: looked normal and general examination showed no abnormality.

X-ray.—Revealed an osteoma in the right frontal sinus attached towards the inner and inferior angle.

Exploration.—Showed definitely that the tumour was arising in relation to the right side of the nasal spine of the frontal bone. The right frontal sinus mucosa was thickened and polypoid.

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CASE V.

A boy, aged 17 years, complained of an acute swelling in relation to the left orbital cavity. His temperature was 38·5 C. and had also severe left frontal headache and dimness of vision of the left eye.

No previous history of trauma, but he states that his left eye for two years beforehand was gradually becoming proptosed.

Examination.—There was a tender fluctuating swelling mainly occupying the inner and upper angle of the left orbital cavity. (Fig. 7.)

The left eyelids were œdematous; the left conjunctiva injected; left eyeball proptosed forwards and outwards with limitation of movements inwards and upwards.

Nasal Examination.—Reveals œdema in the region of the anterior end of the left middle turbinate bone.

A diagnosis of a subperiosteal abscess secondary to left frontal sinusitis was made and simple external drainage performed.

After a week, when the patient's general condition improved further investigation was carried out and an osteoma was found by X-ray examination at the inner and inferior angle of the left frontal sinus.

Exploration.—Showed a definite relation to the left side of the nasal spine of the frontal bone.

The mucosa of the frontal sinus was thickened and polypoid.

Bacteriological Examination.—Streptococci and Staphylococci were grown from the pus in the sinus.

CASE VI.

A male, aged 28 years, complains of recurrent nasal obstruction.

He has had an attack of epistaxis (right side) three years previously, but no headaches.

Examination.—The root of the nose looked broadened. Intranasal investigation revealed mild infection of the ethmoid sinuses on both sides.

X-ray.—Revealed a small osteoma of the right frontal sinus.

Exploration.—The osteoma was found in relation to right side of the nasal spine.

The sinus cavity contained a small amount of muco-pus and the mucosa was thickened.

CASE VII.

A male, aged 40, complaining of recurrent pain in the right eyeball for few years.

He has been thoroughly investigated by the Ophthalmologist with negative findings as to the cause.

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Fig. 10.

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FIG. 11.

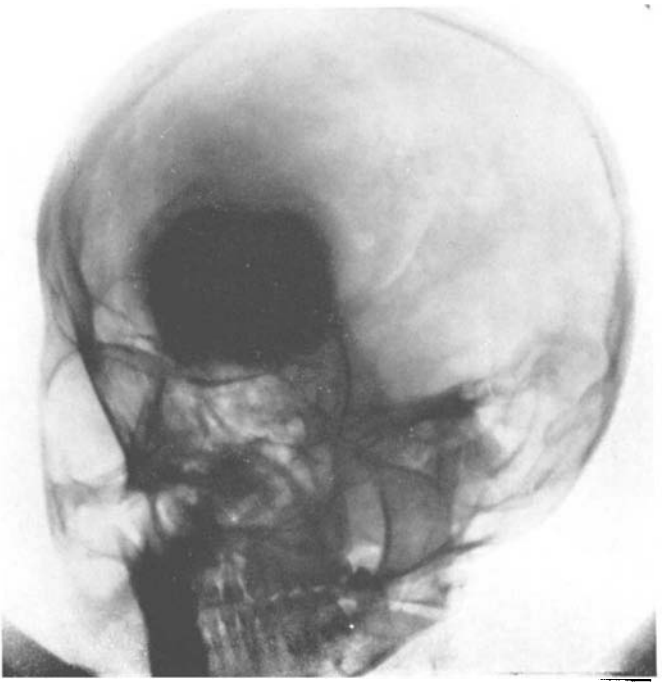


FIG. 12.

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FIG. 13.

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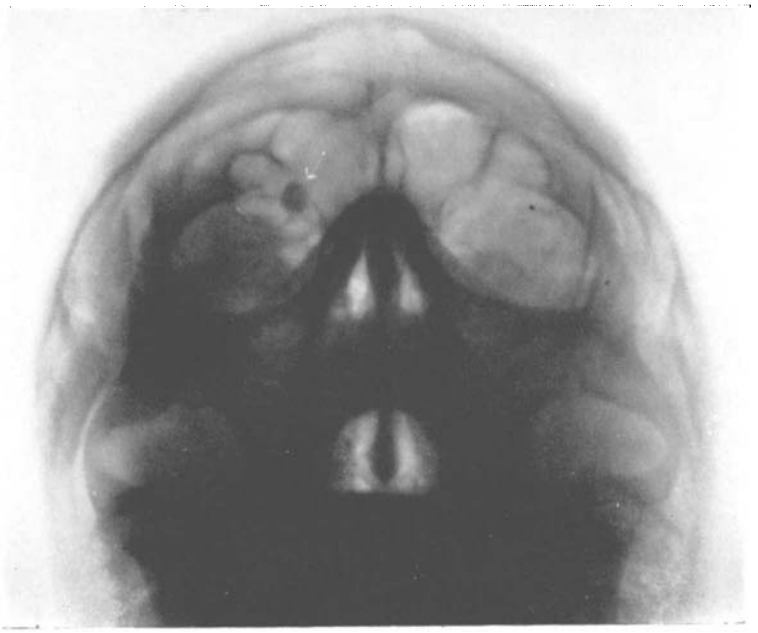


FIG. 14.



FIG. 15.

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He was then referred to me for investigating the sinuses for any probable cause for his complaint.

There was no deformity or history of trauma and he did not remember having frontal headaches.

Examination.—Clinically no extra-nasal or intra-nasal evidence of swelling or suppuration.

Transillumination reveals partial opacity of the right frontal sinus.

X-ray.—Revealed a compact osteoma in the right frontal sinus, only attached near the middle line (Figs. 8 and 9), in relation to the nasal spine of the frontal bone.

On account of the patient's refusal, no operative interference was carried out, and he is kept under careful observation to see if the tumour increases in size or character. He was first X-rayed on 11.10.38. A second X-ray was taken on 15.5.39; it showed no change.

CASE VIII.

A male, aged 22 years, was under investigation for ? septic focus in the nose.

Local nasal examination was negative.

X-ray.—Revealed an oval shaped opaque body in the right frontal sinus. (Fig. 10.)

General examination was negative for other osteomata.

Exploration.—Revealed a flattened osteoma, attached by a thin pedicle to the anterior wall of the sinus.

The sinus mucosa appeared quite normal and the cavity was free from discharge.

CASE IX.

A female of 25 years, suffering from right supra-orbital neuralgia for nearly five years. She was thin, debilitated giving a history of frequent attacks of nasal catarrh.

Clinically the nasal fossae showed chronic hypertrophic changes in the mucosa with a fair amount of post-nasal discharge.

X-ray.—Showed mild opacity of the anterior group of para-nasal sinuses with a small osteoma in connection with the cerebral wall to the right of the septum between the two frontal sinuses.

No exploration was carried out, and the patient is under observation since February 1932.

Repeated X-rays show no change in size or character.

CASE X.

A female of 25 years of age, was seen on account of a deformity mainly affecting the left frontal region, of long duration. (Fig. 11.)

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Examination.—The swelling (Fig. 11) extends from the middle line up to the anterior end of the temporal fossa. It extends also from the hair line downwards to encroach on the left orbital cavity, displacing its contents mainly downwards. It is bony in consistency, and not tender.

The upper eyelid is pushed downwards but not œdematous. The eyeball too although displaced, is quite normal and the patient can move it from side to side but the upward movement is very limited.

X-ray.—Shows a large densely opaque compact osteoma attached to the External angular process of the left frontal bone. (Fig. 12.)

Exploration definitely proved this attachment.

The tumour was microscopically examined and proved to be an osteoma.

CASE XI.

A male, aged 14 years, who was under investigation for the cause of chronic cough.

X-ray of the sinuses revealed an osteoma in relation to the right frontal sinus. (Fig. 13.)

Patient refused exploration, and was not seen again.

CASES XII and XIII.

Are both males, aged 40 and 32, respectively, both were suffering from chronic sinus infection. There were no symptoms that may direct the attention to the presence of osteomata.

Only by X-ray examination during investigation, the presence of these tumours were made out. (Figs. 14 and 15.)

These tumours were not explored. They have been seen during February and March 1939. They will be kept under observation to see if any change takes place in their size or character.

CASE XIV.

A female, aged 17 years, complained of gradually increasing right exophthalmos associated with right-sided chronic nasal obstruction and recurring headaches, for four years, in the right frontal region.

Examination.—The right eyeball was displaced outwards and forwards with limitation of movements inwards only. (Fig. 16.)

Nasal fossae show: Ethmoidal polypi on the right side with excessive mucopurulent secretion in the region of the middle meatus.

Left nasal fossa: clear.

There was a fair amount of post-nasal discharge.

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Fig. 16.



Fig. 17.

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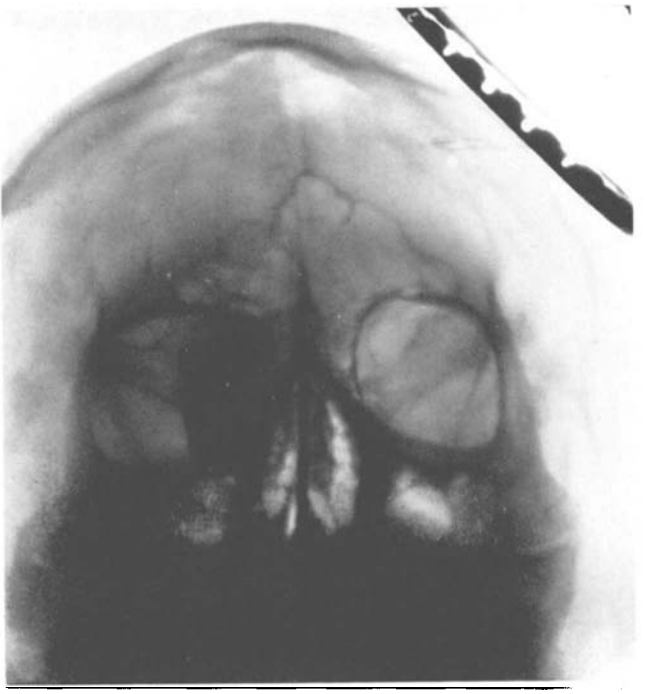


FIG. 18.

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FIG. 19.

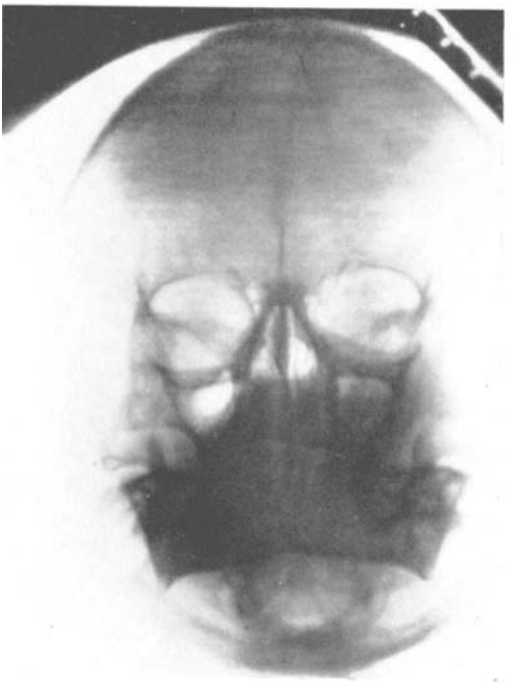


FIG. 20.

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General Examination.—Reveals no abnormality or tumour formation elsewhere.

X-ray.—Opacity of right frontal and both maxillary and ethmoid sinuses, with the presence of an opaque lobulated mass mainly occupying the right ethmoid region but encroaching on the right frontal and the right orbital cavity. (Fig. 17.)

Exploration.—The right ethmoid labyrinth and right frontal sinus were found to be turned into one large cavity communicating with the right orbit and lined by polypoid mucosa.

There was lying free in this large cavity, a big hard lobulated mass covered with polypoid mucosa. When examined, this mass was easily separable into four osteoma with mucosa and minute polypi in between.

CASE XV.

A male, 20 years of age, complains of a gradually increasing painless swelling at the inner angle of the right eye for four years.

No past history of trauma.

Examination.—There is a subcutaneous lobulated bony swelling in the region of the right inner canthus, fixed to the underlying bone, but the skin is freely movable over it. The swelling is displacing the eyeball mainly outwards and slightly downwards.

There is limitation of movements inwards.

Intra-nasal examination is negative for any abnormality.

X-ray.—Shows an intra-orbital osteoma related to the inner wall of the orbit. (Fig. 18.)

Exploration.—Showed that the osteoma is attached to the os planum of the ethmoid bone. It was wholly intra-orbital and not encroaching on the para-nasal sinuses.

The osteoma was cancellous having a thin cartilage covering.

CASE XVI.

A young girl of 12 years of age saw me on account of a swelling of the left side of the face, noticeable for five months. (Fig. 19.)

No history of trauma, pain, epistaxis, or nasal discharge.

Examination.—Revealed a bony, hard swelling in the region of the left canine fossa, not tender. The skin is freely movable over it.

No abnormality detected in the nasal fossae or palate.

X-ray.—Shows a cancellous osteoma in the region of the left antrum of highmore, the bony trabeculae are shown. (Fig. 20.)

Exploration.—The tumour was not separable from the lower part of the anterior wall of the left maxillary sinus.

The other walls were free and covered with intact pale mucosa, which was slightly thicker than the normal. The antral cavity was greatly reduced, and it was free of discharge.

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The tumour was kindly reported on by Professor Bernard Shaw as follows :—

Report

This consists of a cancellous bone covered by a thin layer of cortical bone. There is active formation of appositional new bone in both areas. The interstices of the cancellous bone are filled with a fibrous marrow which is extremely vascular, the vessels being numerous, large and of indeterminate structure so as to produce an appearance not unlike an angioma.

The structure is compatible with that of a simple osteoma. There is no malignancy.

A swab from the sinus cavity and sections from the mucosa were examined, and showed these parts to be free of organisms.

CASE XVII.

A female, 18 years of age, having a large swelling in the region of the right cheek, noticed for several years to get slowly bigger. (Fig. 21.)

The swelling was explored one year ago by a local surgeon, but was not removed.

Examination.—There is a bony swelling firmly fixed to the anterior wall of the superior maxilla in the region of the right canine fossa, covered by a thick pad of firm tissue which is adherent to the skin in the region of the previous operation. The right lower eyelid is œdematous.

The cartilaginous part of the nose is slightly displaced to the left side, with partial obliteration of the right anterior nares.

The inner wall of the right antrum and the right side of the palate are not implicated. The neighbouring teeth are quite normal.

X-ray.—Proved the presence of a cancellous osteoma.

Exploration.—The anterior wall of the right antrum appeared to be the seat of the tumour, which was also bulging into the antral cavity and completely covered by intact mucosa.

There was no discharge or other abnormality inside the antrum, and the ostium was patent.

The tumour was cancellous.

CASE XVIII.

A male of 54 years of age, who was being investigated as to the cause of chronic cough. He was sent to me with a note that the chest was free.

No history suggestive of sinus infection.

Examination.—Showed mild pharyngitis with slight post-nasal discharge.

The nasal fossae were quite normal to clinical examination.

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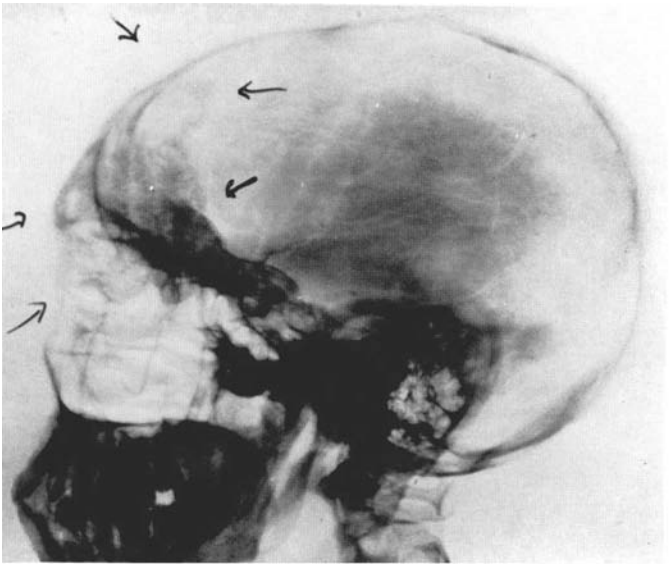


Fig. 22.

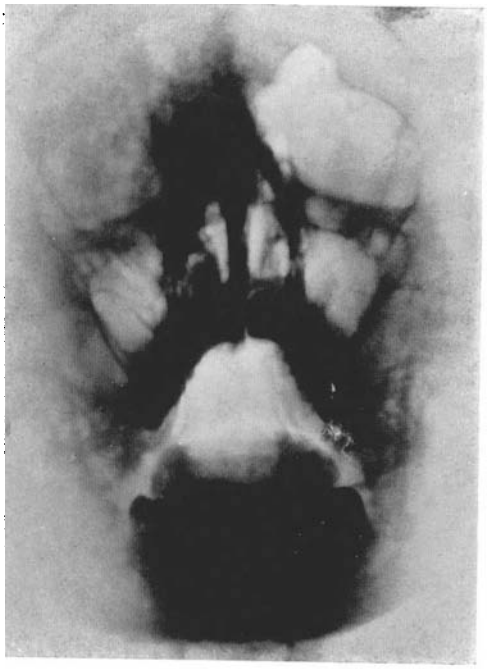


Fig. 23.

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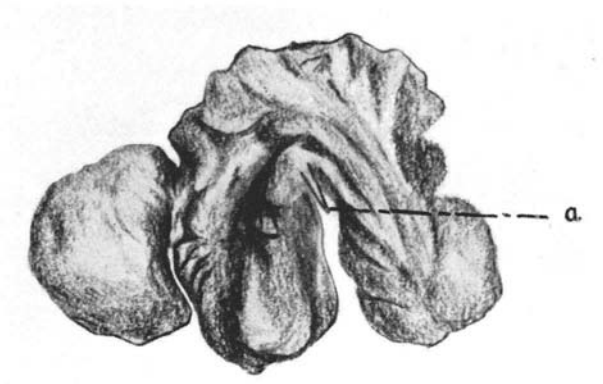


FIG. 24.
a—Nasal Spine of Frontal Bone.

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FIG. 25.

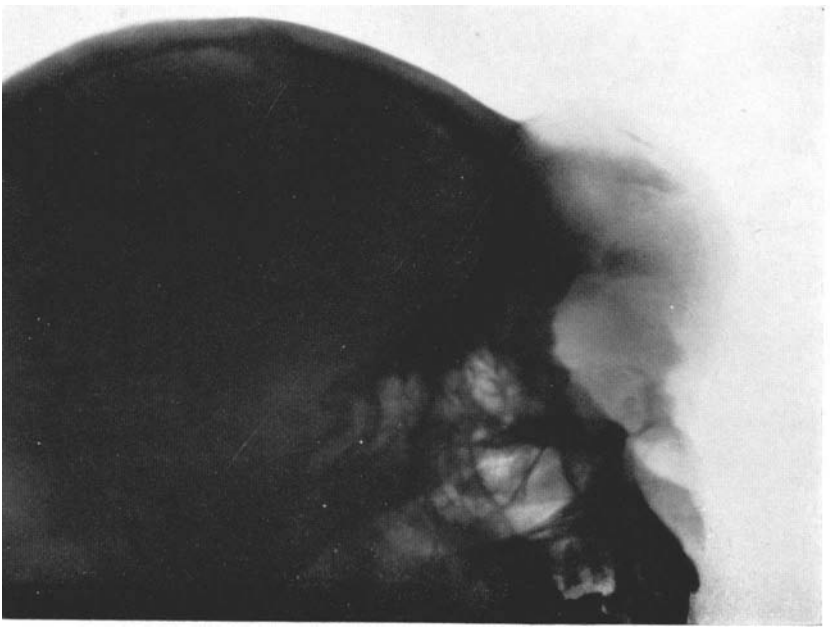


FIG. 26.

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No detectable change in the sense of smell and there was no sign indicating a lesion in the central nervous system.

X-ray.—Shows an extensive osteoma mainly cancellous, but more dense at the presphenoid region. The mass is mainly growing in the anterior cranial fossa and encroaching on the right frontal sinus causing a certain amount of pressure atrophy of the frontal bone. (Figs. 22 and 23.)

The sphenoid sinuses and the left frontal are clear. The right frontal is occupied by the tumour.

No surgical interference was attempted as the tumour was causing no symptoms whatsoever.

This case was first examined in June 1933, and is still under observation—no X-ray evidence of change in size or character.

General Considerations

Careful consideration of the previous cases reveals the following :

1. Males are more commonly affected than females.

2. Age incidence has been between 12 and 54, the majority have been below 28.

This is really the age when the tumour gave rise to sufficient trouble to direct the patient's attention to seek advice.

Taking into consideration the long time these new growths take before they show themselves, it becomes evident that they are essentially an affection of the bones during their period of growth ; *following the same rule as osteomata occurring in relation to long bones.*

3. Except in one case (No. XIV) osteomata have been single, and they were all unilateral.

Reviewing the literature one finds that osteomata may be bilateral, however, these are very uncommon.

4. Out of the cases not operated on, three were seen again at different periods.

All were over 25 years of age when first seen, and the tumours show no change in size or character, indicating that growth had ceased. Most probably osteomata in this region stop growth with the cessation of growth of the affected bone, following the same rule of osteomata of the long bones.

It is likely too that these osteomata do not become malignant.

5. In the previous cases, there has been no associated osteomata in other regions of the body or similar growths in other members of the same family.

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Site of Origin and Causation

The first 13 cases have been definitely attached to the frontal bone.

Case XIV has been found to lie freely in the ethmoid labyrinth, but examination of the X-ray (No. XVII) shows that it is in close proximity to the frontal bone. The osteomata themselves were of the ivory type—denoting that they must have arisen from membrane bone, and as the ethmoid labyrinth ossifies from cartilage it is evident that the osteomata in question have started like the previous ones from the frontal bone.

The frontal bone ossifies in membrane from two centres, one for each half, which appears about the seventh week of intra-uterine life, in the situation of the future frontal eminences.

Three pairs of secondary centres are described, two medially placed for the nasal spine, one at either side in the region of the future trochlear fossa and one for each angular process. Close examination of the site of attachment of Cases I-VI has been definitely proved to be the region of the nasal spine of the frontal bone.

Fig. 24 is a sketch of the tumour removed from Case II, showing the attachment of the tumour to the spine, which had to be removed with it.

Cases VII and XI were not explored, but the X-ray is very suggestive of the same relation.

Case XIV although on exploration was found free in the ethmoid labyrinth, is in close relation to the nasal spine and right trochlear fossa and might have originally started from one of the centres in these regions and later was gradually loosened out from the frontal bone by the pressure of the developing polypi in the related sinuses.

Case X was definitely proved to be attached to the left external angular process of the frontal bone.

According to Choyce's *System of Surgery*, p. 370 : " Osteomata very constantly arise in the immediate neighbourhood of an epiphyseal line. As the growth of bone advances, the distance between the tumour and the epiphysis is proportionately increased."

As each of these ten cases, lies in relation to one of the epiphysis of the frontal bone, it can be deducted that they follow this general rule. The same rule can also be applied to Cases XII and XIII. " *The Sequestrated Rest of Origin,*"

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has shifted a little away from the trochlear fossa (an epiphysis) to the present position during the period of growth.

On the same lines Case VIII can be considered to have started in relation to the nasal spine of the frontal bone and so also Case IX, the latter being separated with the cerebral wall of the frontal sinus by the development of this cavity between the diplöe of the frontal bone.

Exploration showed that Case XV was attached to the right os planum of the ethmoid bone, which, according to the *Manual of Anatomy* (p. 218), has an ossification centre for the ethmoid bone.

So this case too follows the general rule of origin previously stated.

Cases XVI and XVII, conform too with the general rule of origin, as the osteomata there have been shown to arise from the anterior wall of the maxillary sinuses, where according to the *Manual of Anatomy*, p. 225, a centre of ossification lies.

The general teaching is that the superior maxilla develops in membrane, so it would be expected that osteomata arising there would be of the compact type, Cases XVI and XVII are cancellous in nature and it was not easy to explain how membrane bone would give rise to such tumours. But according to Frazer, p. 232, there may be a cartilaginous change here and there in the alveolar condensation of the superior maxilla—so obviating this difficulty.

Case XVIII again is not an exception to the rule.

The osteoma is shown to arise from the presphenoid region, which is the seat of the centres of ossification of this part of the sphenoid bone.

It is evident from careful consideration of these cases that they follow the general rule of origin laid for osteomata of the long bones.

As regards *causation*, I have looked up the literature and found great divergence of opinion on the subject and the following causes were given.

I. *Tuberculosis and Syphilis* have been given by the older authors as important causes; however, this cannot be supported by any of my cases. None of them showed signs of tuberculosis or syphilis.

Further, syphilitic and tuberculous changes in the bones are of the nature of chronic inflammatory hyperplasias and not true tumours.

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II. *Sinus Inflammations* have been noted to accompany most of these tumours, and have been suspected to be the cause ; but out of my collection there are five cases (Nos. III, VIII, XV, XVII and XVIII) that have been free of inflammation of the related sinuses.

In Case XVI, although there was slight thickening of the maxillary sinus mucosa, there was no associated suppuration and sections proved the absence of infecting organisms ; and so it is more likely that this thickening is caused by the tumour irritation.

There is sufficient evidence then, that the tumour is not caused by sinus inflammation but on the other hand it can be a predisposing cause for it.

III. Again some authors have thought that the tumour is an *ossified polypus* growing in the related sinus. There is no support for this theory. Only three cases out of my collection showed associated polypi, Nos. IV, V, and XIV, and in only one of these (No. XIV) there can be some suspicion of such an origin as the tumours were glued together by polypi but there is no reason to believe that the polypi had ossified and turned into osteomata.

IV. The tumour forms as a result of the multiplication of a "*sequestrated rest*" from one of the epiphysis of the affected bone. This theory is supported by the almost constant position of the tumour in relation to the epiphysis shown previously in discussing their origin, and by the fact that those osteomata are essentially an affection of the bones during their period of growth.

Further support is given by the three cases kept under observation and discussed previously as this showed a close correlation between the tumour growth and that of the affected bone.

The " sequestrated rest " is supposed to have been separated from the Epiphysis by trauma. This cannot be definitely proved as the trauma may take place in infancy and cannot be remembered by the patient. Only one of my cases (No. III) had a definite trauma in the site of the tumour.

The previous considerations give enough evidence to show that these osteomata originate from one of the bones in the region of the nose. So in this connection, *may I suggest naming them after the bone from which they arise*, in the same way as they are named everywhere else. So far various

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authors name them after the sinus in which they lie, although this is really secondarily invaded. Further in many cases the osteoma invade more than one sinus and the difficulty arises as to which sinus, the osteoma should be named after.

Some of the osteomata too may be discovered before they invade any of the neighbouring sinuses (Case XV) and so it will be still more difficult to name these if one has to put all these tumours under a general name.

Symptoms

Consideration of the symptomatology of these tumours shows that they may be :

I. *Symptomless*

In Cases VIII, XII, XIII and XVIII the osteomata have been discovered during the routine examination and there were no special signs to direct attention to their presence.

In Case XI the recurrent nasal obstruction was due to the associated sinusitis.

In Case IX the supra-orbital neuralgia is most probably not due to the osteoma, as it is far away from the affected nerve.

Cases IV and V the symptoms were produced by the accompanying sinusitis.

In Case VII, the pain in the right eye is probably not due to the osteoma.

II. Give rise to :

1. Simple swelling, with no other symptoms at all as in Case X.

2. Pressure symptoms. Usually in the nature of gradually increasing exophthalmos, as in Cases I, II, III, XIV and XV.

Such cases usually see the Ophthalmologist first. Reference to the literature on the subject shows too some cases with pressure symptoms on the brain and other important neighbouring structures.

Differential Diagnosis

This is usually easy. The characteristic feel of the tumour as well as the X-ray evidence make the diagnosis definite in the majority of cases.

Certain osseous growths occur in relation to the nose, as

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those described in the *Journal of Laryngology and Otology*, 1925, XL, 165.

The majority of these are bilateral and present quite different clinical manifestations and X-ray appearances.

The only ones that may be difficult to differentiate from osteomata are described under the heading of *chronic hyperplasia of the superior maxilla*; these are limited to that region and are unilateral. This difficulty, if need be, can be obviated by biopsy.

Case XVI, although X-ray evidence makes it practically clear that it is cancellous, the osteoma has been subjected to microscopical examination, which made the diagnosis definite.

Gummata occurring in the region of the nose may have to be differentiated from osteomata associated with mucocele.

Fig. 25 is that of a gumma, which was bony hard on one side and cystic on the other. It simulated an osteoma in association with a frontal mucocele, but X-ray examination (Fig. 26) was enough to clear the diagnosis.

Treatment

Surgical removal is the only method of radical cure.

It is carried out when the tumour gives rise to symptoms or complications.

Symptomless osteomata in adults can be safely left alone, as they are not likely to grow bigger and give rise to symptoms later, or change into sarcomata.

Extra-nasal exploration is the method of choice; good access being essential.

The principles I have followed in dealing with my cases were:

1. To ascertain beforehand the exact site of attachment of the osteoma to the affected bone by X-ray investigation. This simplifies the operation and saves time and mutilation, as cutting through the affected bone slightly beyond the site of attachment leaves the tumour with its cartilaginous covering and pedicle quite free in its cavity, ready for removal. In that way, too, recurrence is avoided.

2. The cavity left, usually a dilated sinus or group of sinuses is carefully examined as regards the presence of pus and the condition of the mucosa and dealt with accordingly, always providing a suitable intra-nasal drainage and closing the wound externally.

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Unusual bleeding does not take place and so previous carotid ligature recommended by some surgeons has not been necessary.

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