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Radiological changes associated with benign nasal polyps

by

VALERIE J. LUND and GLYN A. S. LLOYD (London)

Introduction

The characteristic radiological features of benign nasal polyposis are familiar to ENT specialists. However, in a proportion of patients the changes are much greater and include widening of the ethmoid labyrinth and nasal cavity, bone thinning and expansion, and mucocele formation. These changes are not well documented even though they occur quite frequently and may at first suggest a malignant condition to the clinician.

A study is presented to establish the incidence of these more extensive radiological changes. The gross effects of this benign condition on the paranasal sinuses are described when the condition is neglected.

Material and Results

The incidence of expansion of the ethmoid labyrinth was established by reviewing a consecutive series of X-rays from 100 patients who presented at the Royal National Throat, Nose and Ear Hospital between 1970 and 1972.

All the patients had been sent for plain sinus X-ray views with a presumptive diagnosis of benign nasal polyposis.

The histological diagnosis of benign nasal polyps was subsequently confirmed in all the patients and all suffered from bilateral disease.

In the series of 100, there were 71 men and 29 women. The ages ranged from 13 to 79, with an average of 47.5 years, and the majority were between 50 and 69 (43). The length of history prior to presentation is very difficult to assess as the polyps may have been present for much longer than they produced obvious symptoms. However, the length of symptoms prior to presentation ranged from one month to over 20 years, with the majority suffering for longer than five years.

Thirteen patients had undergone an ethmoidectomy procedure prior to the X-ray investigations (six intranasal ethmoidectomies, six transantral ethmoidectomies, and one external ethmoidectomy).

The X-ray examination consisted of occipito-mental, postero-anterior and lateral projections; in some cases axial hypocycloidal tomography was employed.

All patients demonstrated generalized loss of translucence in the maxillary antra, ethmoidal labyrinth and to a lesser extent frontal sinuses. This was often associated with decalcification of the sinus walls and thinning of the ethmoid septa.

In 20 per cent of patients there was evidence of expansion of the ethmoids on plain X-ray. This was bilateral in 19 patients and unilateral in one patient (Fig. 1). In this group of patients, the average age of onset of symptoms was 29.25 years, whereas in the patients who did not show ethmoid expansion the average age of onset was 38 years (t significant at the 0.05 level). The average length of history in patients showing ethmoid expansion was 6.9 years,

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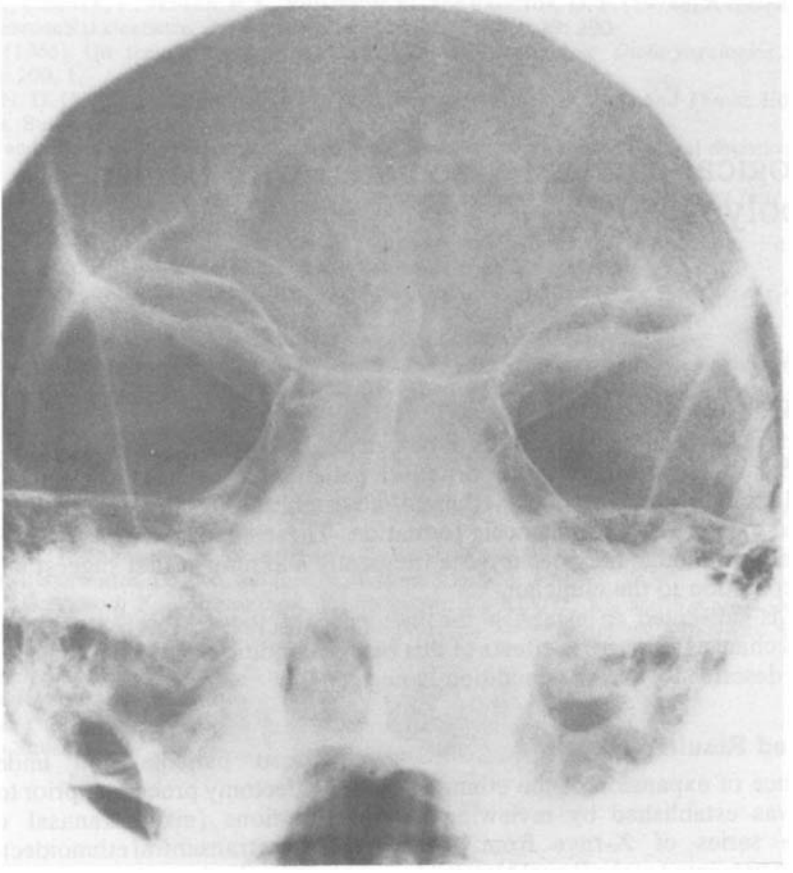


FIG. 1

Plain X-ray showing ethmoidal widening and generalized loss of translucence associated with benign nasal polyposis.

as compared with 4.2 years in the rest of the patients. (This is not significant at the 0.05 level.) In the group of patients showing ethmoid expansion, 10 per cent of patients had had ethmoidectomies prior to the X-ray investigation, and in the rest of the patients 13 per cent had had previous ethmoidectomies.

In addition to the patients with a generalized change in the ethmoid labyrinth, a series of 11 patients have been observed in whom there was mucocele or pyocele formation in the paranasal sinuses in association with proven nasal polyposis. All except one of these patients had been referred from ophthalmic surgeons, mainly from Moorfield's Eye Hospital. Standard sinus X-rays and in some cases axial tomography and CT scanning were performed on these patients.

There were 10 men and one woman and their ages ranged from 21–56, with an average of 44 years (Table I). Mucocele formation was single in nine patients and multiple in two. The patients suffered from nasal polyps for 2–50 years and had presented to ophthalmic surgeons with unilateral proptosis which had been present for one month to one year.

Seven patients had frontal mucoceles, one had an ethmoidal mucocele, one had a sphenoidal mucocele and two patients had mucoceles in the frontal and ethmoid sinuses. In addition to mucocele formation,

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TABLE I

TABLE SHOWING DETAILS OF PATIENTS WHO DEVELOPED MUCOCELES IN ASSOCIATION WITH BENIGN NASAL POLYPS

Patient	Age	Sex	Length of history of proptosis	Previous operations	X-ray appearances
1	44	M	5 years	None	L frontal mucocele. Generalized loss of translucence. Mass in L side of nasal cavity. Erosion of medial wall of L antrum.
2	52	M	1 year	4 ethmoidectomies: 2 transantral, 2 external.	R frontal mucocele. Loss of translucence in nasal cavity and ethmoids.
3	28	M	1 year	2 polypectomies, 1 transantral ethmoidectomy on R.	L frontal mucocele. L ethmoid expansion with erosion of orbital roof.
4	36	M	2 months	3 L frontal sinus drainage procedures.	L frontal mucocele. Soft tissue mass in nasal cavity and ethmoids. Loss of medial wall of antrum on L.
5	44	M	3 months	13 operations for nasal polyps, including intranasal ethmoidectomies.	L frontal mucocele eroding roof of orbit.
6	49	M	9 months	Bilateral external ethmoidectomies.	L frontal and ethmoidal mucoceles.
7	56	M	5 months	10 intranasal polypectomies and R/L transantral ethmoidectomies.	L sphenoid mucocele eroding orbit. Ethmoidal expansion and bone erosion.
8	46	M	4 months	R Caldwell-Luc and transantral ethmoidectomy.	R ethmoidal mucocele with bone erosion.
9	54	M	1 month	3 intranasal polypectomies L intranasal ethmoidectomy.	L frontal mucocele. Loss of ethmoid septa. Erosion of medial wall of orbit.
10	55	M	—	15 procedures—intranasal polypectomies and ethmoidectomies and frontal sinus drainage.	Bilateral frontal and ethmoid mucoceles. Loss of translucence and bone erosion.
11	21	F	9 months	2 intranasal polypectomies.	L frontal mucocele. Ethmoid expansion and bone erosion.

there was gross ethmoidal expansion with bony erosion in seven, two showing erosion of the medial wall of the antrum and six showing destruction of the orbital wall. These changes were evident on plain X-rays but were demonstrated even more dramatically on CT scan (Figs. 2 and 3).

All except one developed the mucocele following surgery to the nose and sinuses, though the length of onset of symptoms after surgery ranged from one month to 30 years.

The most gross and grotesque example of the effect of neglected nasal polyps was in a 64-year-old man who, because of his progressive facial deformity, led a totally withdrawn existence. He had suffered from severe nasal obstruction for 20 years and had had no surgical procedures whatsoever.

The hypertelorism produced by enormous ethmoid expansion and bony destruction is seen in Fig. 4. A biopsy confirmed the diagnosis of benign nasal polyps.

Management

In the consecutive series of 100 patients, all patients underwent conservative nasal polypectomy on one to seven occasions, and 20 ethmoidectomies were performed subsequent to X-ray investigation. There

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FIG. 2

Axial CT scan showing a sphenoidal mucocele in a patient with long-standing nasal polyposis.

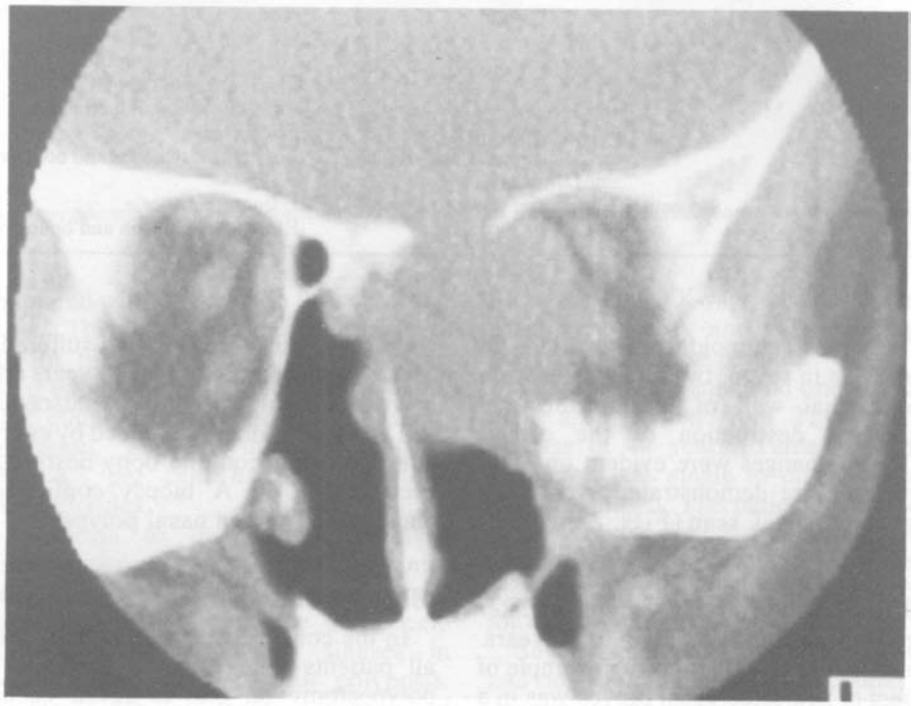


FIG. 3

Coronal CT scan showing sphenoidal mucocele, as seen in Fig. 2.

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FIG. 4

Photograph of patient with long-standing nasal polyps, producing gross nasal deformity and hypertelorism.

were 11 transantral ethmoidectomies, six intranasal ethmoidectomies, and three external ethmoidectomies. In the 11 patients with mucocele formation, Lynch-Howarth fronto-ethmoidectomies were performed.

Discussion

Polypi are hyperplastic swellings of the mucous membrane of the nasal cavity and paranasal sinuses. They may completely occlude the nasal cavity and may prolapse through the posterior choana into the nasopharynx where they may be seen on lateral radiographs (Fig. 5). However, nasal polyps are seldom recognized individually on plain X-rays and more usually the whole nasal cavity shows an homogenous loss of translucence, and the normal outline of the nasal cavity may be obliterated.

Long-standing nasal polypi can enlarge to such a degree that they produce expansion of the walls of the nasal cavity and ethmoid labyrinth. This usually affects the whole of

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FIG. 5

Lateral X-ray of post-nasal space showing benign nasal polyp hanging in nasopharynx.

the labyrinth, but the general form of it is largely retained. This expansion may cause lateral displacement of the eyes and increase the interpupillary distance. Typically this is accompanied by a generalized loss of translucence in the paranasal sinuses, decalcification and thinning of the bony walls, and erosion of the ethmoid septa. The essential feature of typical nasal polyposis, with or without ethmoid expansion, is the bilateral nature of the changes which distinguishes it from sinus malignancy, in which the changes are usually unilateral, even when the disease is far advanced.

The changes described above are, in a small minority of patients, associated with a local expansion of the sinus or mucocele formation. In some patients this may be multiple and in children is usually a complication of mucoviscidosis (Fig. 6). Polyps in children are rare but are estimated to occur in 6.7 per cent of patients with cystic fibrosis. Microscopically they resemble benign nasal polyps and exhibit the same tendency to recur and produce similar X-ray changes (Fonsman, 1970; Toma and Stein, 1968).

Paranasal bone destruction associated

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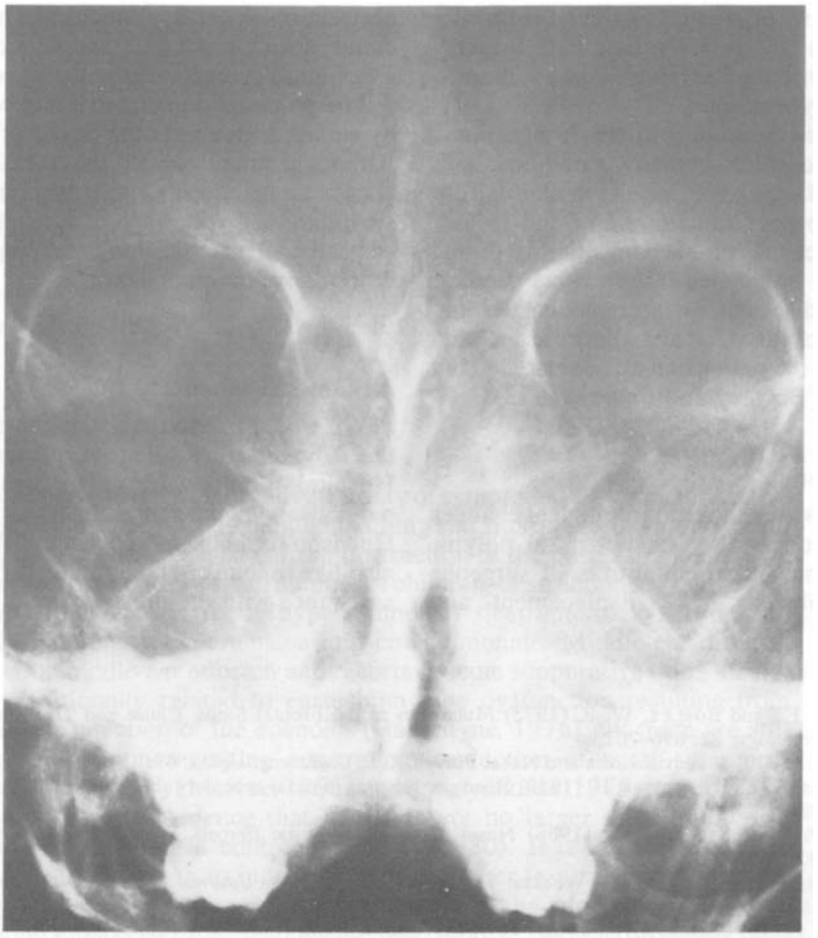


FIG. 6

Plain X-ray showing changes due to benign nasal polyps associated with mucoviscidosis.

with benign nasal polyps was described in 1885 by Edward Woakes though it may have been recognized as early as 1628 (Wentges, 1972). The bone erosion is usually completely asymptomatic, without evidence of infection (temperature, pain or infected discharge), and is therefore unlikely to be due to frank osteomyelitis.

The mechanism is probably one of passive bone erosion in a similar fashion to that produced by mucoceles. Once the nose or sinus cavity has filled with polypoid tissue, any further increase in tissue bulk is likely to lead to expansion, with thinning of bony septa and widening of the bridge of the nose leading to an increase in interpupillary distance (Wilson, 1976).

Mucoceles are dilated mucus-containing sacs lined by sinus epithelium. They have been reported in association with infection, trauma, tumours and cystic degeneration of the mucosa (Palubinskas and Davies, 1959) and it has been suggested that they are caused by continuing fluid secretion into an obstructed air cell. Hypersecretion of mucus may be an important aetiological factor, as an increase in the number of secretory cells in lining epithelium is often found. However,

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it is probably of greater significance that 19 out of the 20 patients had had surgery, usually involving the sinuses, in addition to simple polypectomies.

Mucocele formation in the frontal sinus has been described in many conditions, both benign and malignant, all of which interfere with the proper functioning of the fronto-nasal duct. Frontal sinusitis is most commonly implicated but previous surgery, either on the sinus or intranasally, trauma, osteomas of the sinus and allergy associated with polyp formation can all be related to the condition (Bordley and Bosley, 1973).

Conclusion

A very wide range of radiological changes can be produced by benign nasal polyps, most of which are familiar to ENT surgeons and radiologists. The displacement and destruction of nasal, ethmoid and maxillary bones are not so well known nor is the association of mucoceles with this condition.

The potential damage that can be caused by such a common pathology is of interest. Although expansion of the ethmoid cells occurs more often in patients who develop symptoms at a young age, it remains obscure why all patients with long-standing disease do not develop complications.

Acknowledgements

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Address for correspondence:
Miss Valerie J. Lund,
The Royal National Throat, Nose and Ear Hospital,
Gray's Inn Road,
London WC1X 8DA.

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