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A review of the role of radiology in non-healing granulomas of the nose and nasal sinuses

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SUMMARY

This paper reviews the radiological features of 20 patients with Wegener's granulomatosis and seven cases of lethal midline granulomas. It compairs the findings of plain sinus radiographs and tomography. There are no specific radiological features of either Wegener's granulomatosis or lethal midline granuloma. Plain sinus radiographs underestimate the extent of bony changes and the differences between Wegener's and lethal midline granulomas are one of degree. Computerised tomography will show the extent of the disease. The role of nuclear magnetic resonance is also discussed. Nuclear magnetic resonance does not show bone destruction but the T2 weighted response of the tissues helps to differentiate the condition from neoplasia. The literature is reviewed and compaired with the study.

SINUS RADIOLOGY

Investigations may give information in a number of ways which are not necessarily exclusive. They may give the diagnosis, they may define the extent of the disease or they may monitor either the progress of the disease or the effects of treatment. Each investigation should be seen in this light: serological investigations are complementary with radiology rather than an alternative investigation. A number of radiological procedures are used to assess the nose and the paranasal sinuses and include plain sinus radiographs, hypocycloidal tomography and computerised tomography. Although not a radiological investigation, the new technique of nuclear magnetic resonance (NMR) must be added to these since it can be an additional investigation which is performed in the Radiology Department. Radiology may be used for screening and plain sinus radiographs of the

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sinuses are often used in this manner. A screening investigation should have as few false positives and negatives as possible but sinus radiographs have been shown to fall down in the diagnosis of mucosal disease of the sinuses in patients with suspected chronic sinusitis (Vourinen et al., 1962; Axelsson et al., 1970; Watt Boolsen and Karle, 1977; Pfleiderer et al., 1984).

NON-HEALING GRANULOMAS

Plain sinus radiographs are the first investigation in patients with undiagnosed granulomatous diseases of the nose and the paranasal sinuses. Previously we reported the radiological findings in patients with non-healing granulomas of the nose and paranasal sinuses (Milford et al., 1986). Twenty cases of established Wegener's granulomatosis had their radiographic findings compaired with seven cases of lethal midline granuloma. All the cases of Wegener's had sinus radiographs and in addition three had conventional hypocycloidal tomography and three computerised tomography. All seven cases of lethal midline granulomas had sinus radiographs and these were compaired with hypocycloidal tomography in two cases and computerised tomography in a further case. Further to this study, we report now an additional case of Wegener's who had NMR.

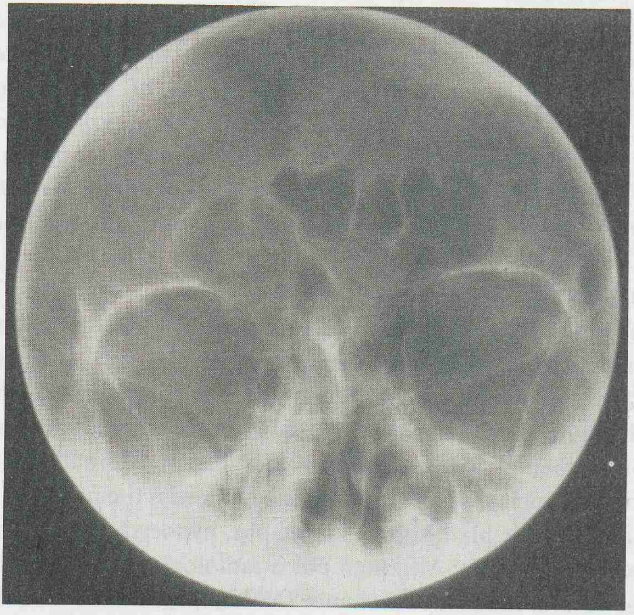

Figure 1. Plain sinus radiograph of a patient with Wegener's granulomatosis which shows non-specific changes involving the frontal sinuses and the ethmoid complex on the right side of the nasal cavity. There is slight destruction of the nasal septum.

Plain sinus radiographs (Figure 1)

The presence of mucosal thickening in the sinuses, fluid levels, sclerosis and bone destruction were noted. The nasal cavity was examined to note the presence of soft tissue masses as well as cartilaginous and bony loss.

Four of the sinus radiographs were completely normal in Wegener's granulomatosis and eleven had minor changes, in contrast, six out of the seven cases with lethal midline granulomas had more extensive changes and in three there was evidence of extensive bone destruction. Bone destruction was found in a total of five cases of Wegener's. It involved the nasal septum in two cases, turbinates in two cases and medial antral wall in one case. Two of these cases had further radiological investigations.

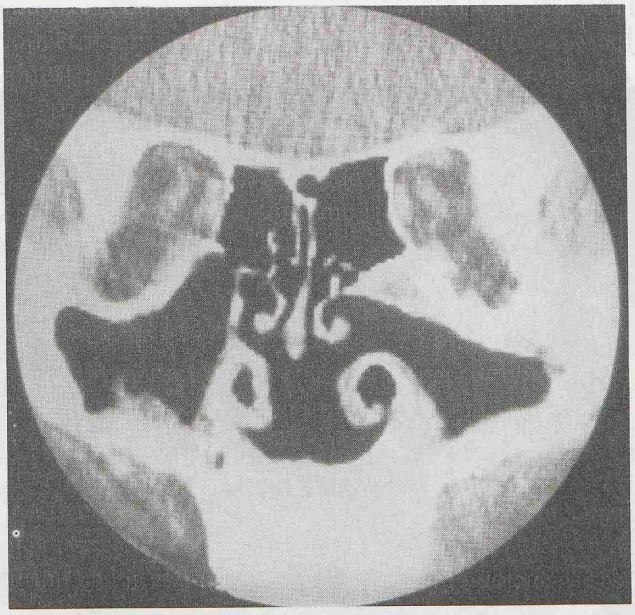

Figure 2. The tomogram of the same case as Figure 1. Bone destruction can be seen involving the nasal septum and the medial antral wall between the middle and inferior turbinate in the left nasal cavity.

Tomography (Figure 2)

All six cases of Wegener's granulomatosis showed some evidence of bone destruction, however, only two of the corresponding sinus radiographs showed any changes. The process involved the nasal septum in five cases, the turbinates (three cases), medial antral wall (two cases) and the ethmoids (two cases). The findings were comparable between the plain radiographs and tomograms in cases of lethal non-healing granulomas because of the more extensive tissue destruction.

Nuclear Magnetic Resonance

Tissue is demonstrated by the recovery to polarisation of water molecules to a strong magnetic field and the T1 and T2 recovery times are compaired to help differentiate tissues. Bone is not shown up by this technique so that it is impossible to show bony errosion. It is possible to differentiate between tissue type in part and between fluid and tissue in the sinuses. T1 weighted signals show up neoplasia whereas inflamed sinus mucosa is shown by T2 weighted signals. Unfortunately the normal vascular tissue of the nose gives a strong T2 signal as well. Two cases of Wegener's have be reported and have been shown to have strong T2 weighted signals (Lloyd et al., 1987). The case presented here has non-specific features in the paranasal sinuses (Figure 3).

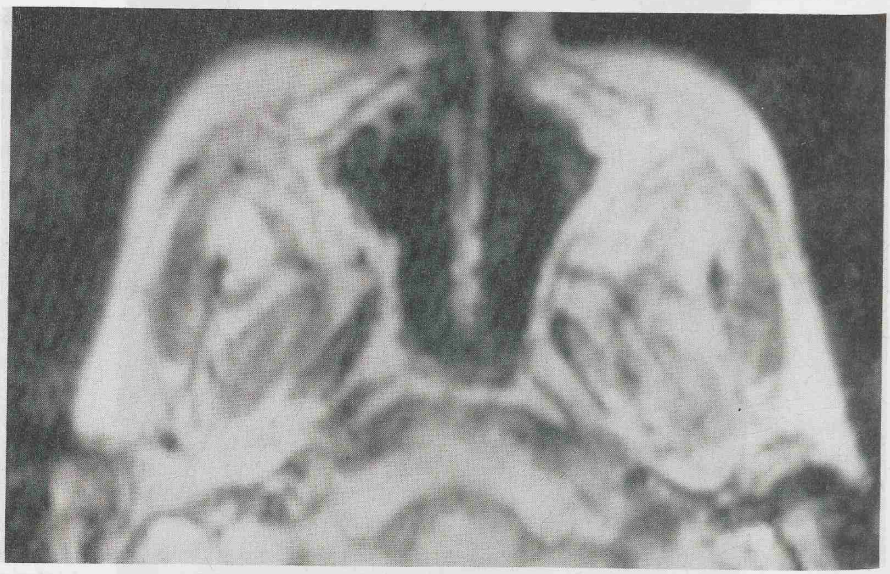

Figure 3. A MRI image of Wegener's granulomatosis. There is little in the way of specific features except some increased uptake in the maxillary sinuses (T2 weighted) which is non-specific.

CLINICAL RELEVANCE

While the clinical features of florid Wegener's granulomatosis make the diagnosis from lethal midline granulomas easy, the condition may start insidiously within the nose and be much more difficult to diagnose since it is a localised condition. The nasal lesions range from mucosal swelling with serous discharge through to destruction of the structures. The most noticable finding is a septal perforation which in its severest

form results in septal collapse (Drake-Lee et al., 1988). Even in untreated and uncontrolled cases the nasal lesion progress slowly and never become as destructive as those found in lethal midline granuloma.

Although radiology has been advocated to diagnose the condition (Paling et al., 1982), there would appear to be little in the way of diagnostic features and the purpose of radiology is to assess the extent of the disease. The absence of soft tissue masses may help to differentiate these conditions from squamous neoplasia. Diagnosis is made by serology which includes anti-leukocyte antibodies and histological examination of the tissues as well as other investigations which rule out the other granulomata.

PREVIOUS STUDIES

The radiographic differences have not been well documented in the two conditions. Although Paling and his colleagues (1982) who reviewed 14 cases of Wegener's with sinus disease, stated that sclerosis of the sinuses with bony trabeculae and thickening were diagnostic pointers for this condition in plain sinus radiographs, this has not been supported by other studies. Some studies do not differentiate between both conditions. Blatt and his colleagues (1959) studied 12 cases with "fatal granulomas of the respiratory tract" and reported bone destruction in nine of the plain sinus radiographs but made no comment on sclerosis. This was confirmed by McGreggor and Sandler (1964) who reported on three cases only and they found bone destruction in a single case. Gohel et al. (1973) reported a study of twenty patients of Wegener's granulomatosis with pulmonary disease and failed to find any evidence of bone destruction in the sinus radiographs in six patients who had nasal disease.

The radiological features of lethal granulomas were not separated by Blatt and his colleagues (1959) from Wegener's but Stanley et al. (1981) presented computerised tomograms of a case report which showed large scale destruction of the bone and soft tissue.

CONCLUSIONS

There are no specific radiological features of either Wegener's granulomatosis or lethal midline granuloma. Plain sinus radiographs underestimate the extent of bony changes and the differences between Wegener's and lethal midline granulomas are one of degree. Computerised tomography will show the extent of the disease. Nuclear magnetic resonance does not show bone destruction but the T2 weighted response of the tissues helps to differentiate the condition from neoplasia.

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