A Clear View of the Neglected Mastoid Aditus*

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SUMMARY

The aditus is the central link between the attic and the mastoid antrum. Its patency determines the course of middle ear infections.

By placing the head with the aditus vertical to the casette an X-ray tomographic cross-section of the aditus can be produced, which also allows the integrity of the middle fossa floor to be judged with more accuracy than has been possible in the past.

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It is possible to make a transverse tomographic 'cut' through the aditus of the ear and at the same time to

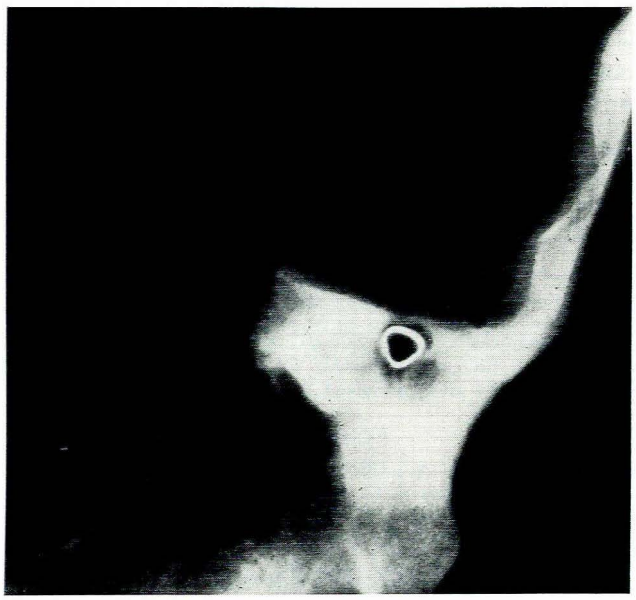

Fig. 1. Tomographic cross-section of the skull, labelled with a wire coil insert in a dry skull.

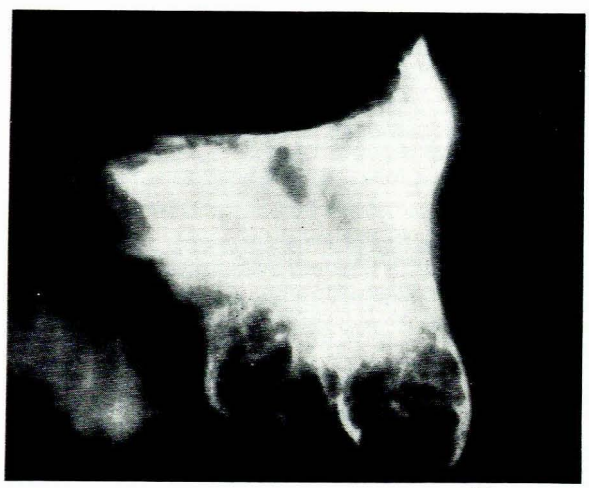

Fig. 2. Tomographic cross-section of the aditus in a dry skull.

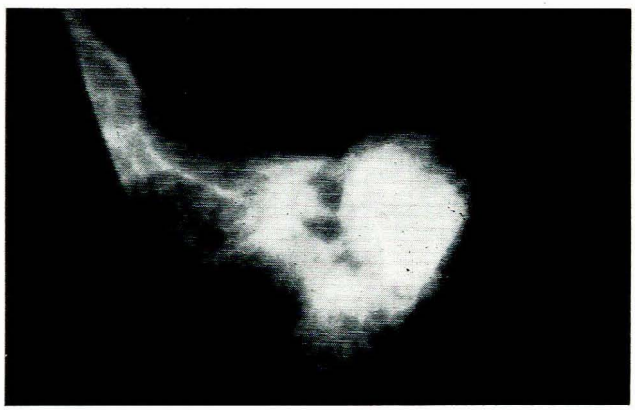

Fig. 3. Tomographic cross-section of the tympanic cavity with incus in position in a dry skull.

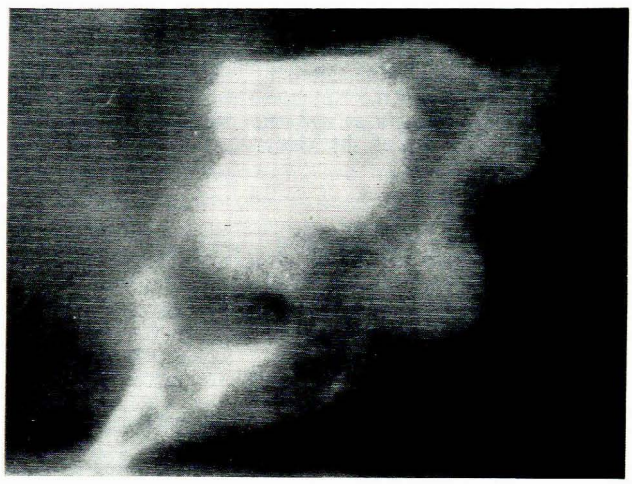

Fig. 4. Tomographic cross-section of aditus in a patient.

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demonstrate the thin bony layer which separates it from the middle cranial fossa (Figs. 1 - 4).

One would hesitate to add yet another one to the long list of radiographic views of the mastoid, but the aditus is, after all, the passage which controls the course and outcome of every inflammatory assault on the middle ear and mastoid. Radiology has been strangely silent about this central connection of the 'key area' of the mastoid. In our whole array of standard views and sophisticated tomographs we have not a single glimpse of the shape of the aditus. We continue to worry over the integrity of the middle cranial fossa without the advantage of ever seeing its floor in true tangent.

ANATOMY

An accepted authority on anatomy describes the aditus as 'a large irregular aperture which leads backwards from the epitympanic recess into the upper part of an air-sinus named the tympanic antrum.'[1] The aditus is, of course, not a mere opening but a passage of quite 3 - 4 mm in length,

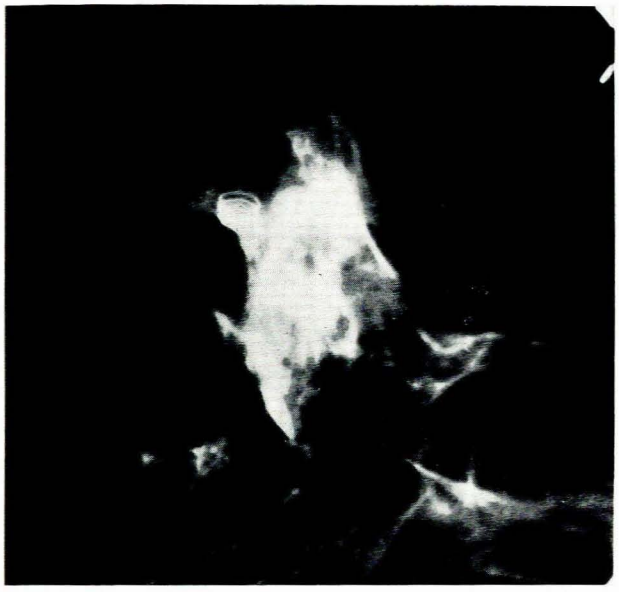

Fig. 5. Owen's view of a dry skull with wire coil insert in the aditus.

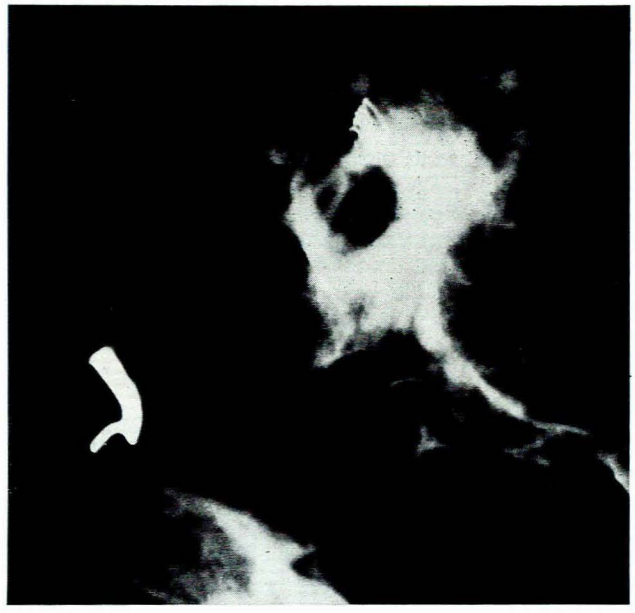

Fig. 6. Schüler's view of a dry skull, with wire coil insert in the aditus.

Fig. 7. Submento-vertical view of a dry skull with wire coil insert in the aditus.

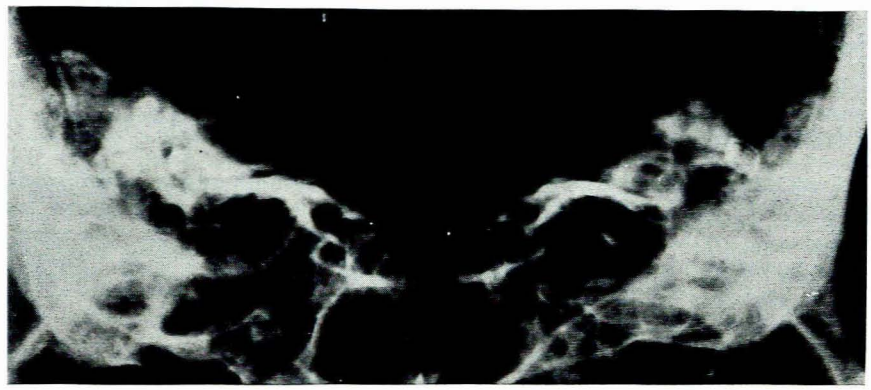

Fig. 8. Towne's view of a dry skull with wire coil insert in the aditus.

with corticated walls throughout. Triangular in section, the roof also forms a small part of the floor of the middle cranial fossa. The medial wall is formed by the dense bony capsule of the labyrinth, with the lateral semicircular canal making a horizontal, longitudinal ridge in it. Laterally are the superficial mastoid cells.

TECHNIQUE

Owen, nearly 20 years ago, realized the importance of what he called the 'Key Area' (attic-aditus-antrum).[2] Owen did not have the advantage of our refined tomographs. He did well with the techniques available to him, but the Owen's view failed to gain universal popularity because the appearance was distorted and the interpretation thus troublesome.

No non-tomographic view can possibly demonstrate the aditus end-on, nor do the conventional tomographs attempt it. The aditus roof, indeed the whole upper surface of the petrous bone is an inclined plane, sloping downwards and forwards by 25° - 30° with the base line. In addition, as it runs backwards the aditus inclines laterally at an angle of 25° - 30° with the sagittal plane. It is possible to obtain a tomographic cross section by extending the supine head by 25° and rotating it 25° to the side being examined. Centre to the base of the nasal septum where it meets the upper

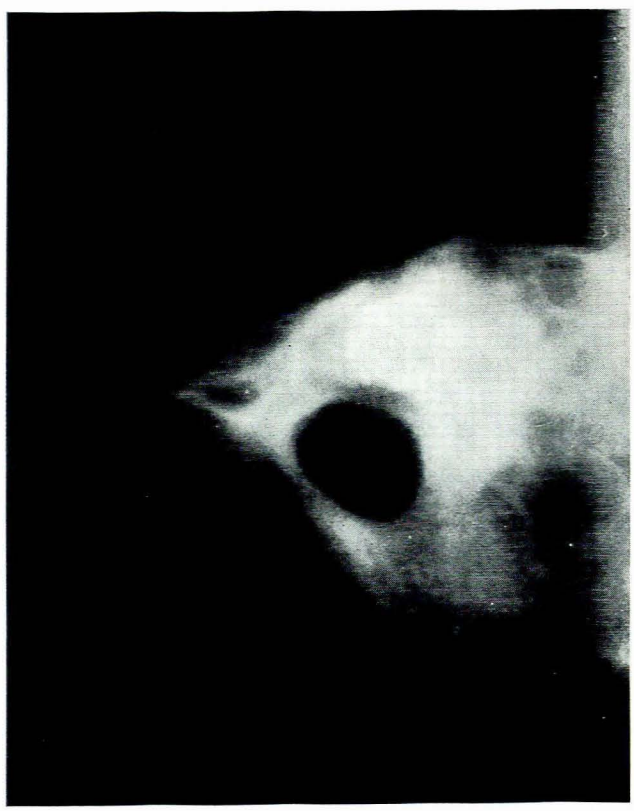

Fig. 9. Lateral tomogram of a dry skull with wire coil insert in aditus.

Fig. 10. AP tomogram in dry skull with wire coil insert in aditus.

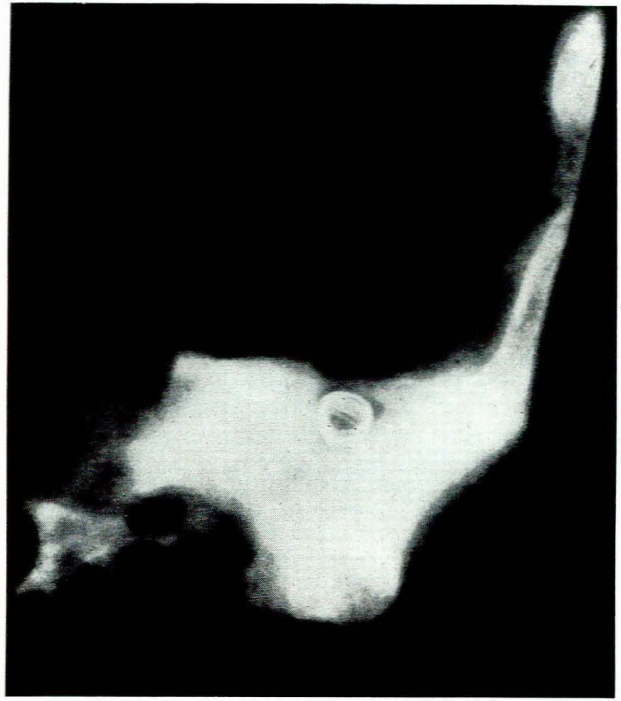

Fig. 11. Semi-axial tomogram in dry skull with wire coil insert in the aditus.

lip. The anterior tomographic cut, at the level of the base of the tragus not only shows the tympanic cavity as clearly as the semi-axial views, but demonstrates the incus and its long process which now lies parallel to the casette (Fig. 3). More posterior cuts at 2 - 3 mm apart show the aditus in cross section and its walls in clear-cut tangent. The roof, which is also the middle fossa floor, is at last seen for the thin layer it really is.

I have attempted to determine the position and direction of the aditus as it is projected in the various conventional views, by placing in the aditus of a dry skull a small coil of wire prior to radiography. The results are shown in Figs. 5 - 11.

Using the new cross-cut, we hope to be able to study the anatomical variations of the aditus, the possible influence of its size on cellular development of the mastoid and the clinical significance of radiological demonstration of the aditus.

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1. Davies, D. V. and Coupland, R. E. (1960): *Gray's Anatomy*, 34th ed., p. 1322. London: Longmans Green.
2. Owen, G. R. (1951): Trans. Amer. Otol. Soc., xxx 189.