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Computed tomography in E.N.T. practice

An evaluation of two years' experience in a British sub-regional centre

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Introduction

RADIOGRAPHIC imaging depends on differential absorption or attenuation of the X-ray beam by body structures. Traditionally this is recorded by a photographic process on X-ray film. An alternative method is the use of detectors to make multiple measurements of attenuation values at various points with computer evaluation of these readings to produce a reconstructed screen image of a section or 'slice' of the body. For convenience this picture is made up of light and dark shades equivalent to a conventional radiograph. Rapid measurement and numerical display of attenuation values for any segment of the reconstructed picture is possible, and in some circumstances a chart of attenuation values can aid the differentiation of tissues. Application is limited, but examples of attenuation measurements for some lesions will be discussed. Intravenous iodinated contrast medium, as used for intravenous urography, increases the density of some brain lesions by passage across the blood-brain barrier or by enhancing their increased vascularity. This 'contrast enhancement' is therefore a usual procedure for brain scans, but has limited application outside the cranial cavity.

Imaging on the earlier scanners was limited to brain and orbits by the need for a water bath and a coarse matrix but, with increasing refinements such as a shorter scanning time and better spatial resolution, as well as the ability to produce sections in both the coronal and axial planes, the general purpose body scanner has become eminently suitable for use in E.N.T. practice.

In May, 1980 there were 22 general purpose scanners in operation in Great Britain (Radiology Advisory Committee, D.H.S.S. 1979) and a further nine were due to be commissioned during the next twelve months. In the future many E.N.T. departments will have access to scanning facilities. We report our assessment of the use we have made of the C.T. scanner and show how the availability of this facility has altered our radiological investigations of patients and how on occasion the improved radiographic resolution has altered clinical management.

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Materials and Methods

The City of Coventry has a sub-regional Neurosciences Unit, a Department of Radiotherapy and Oncology, and an E.N.T. Department for the surrounding districts. A separate E.N.T. Department covers South Warwickshire and refers patients directly for C.T. scans to Coventry. Thus, the catchment population is approximately one million. The majority of C.T. scans for E.N.T. patients are carried out by one Radiologist (P.D.P.) on the basis of one session per week. For the purposes of this survey all patients seen at some time by an E.N.T. surgeon and referred for C.T. examination are included.

In February, 1978 an Elscint 710 general purpose scanner was installed at Walsgrave Hospital, Coventry. This is a versatile machine of the translate rotate type suitable for both head and body scanning. A choice of four scan speeds is available with the option of 5, 8 or 12 mm. section thickness. The reconstruction diameter may be varied and the reconstructed image can be displayed over a full range of C.T. numbers or 'window settings'. The high resolution facility, which improves the quality of the bony detail, was added towards the end of the two-year period and is now used for most scans of the face and skull base region. However, the improved spatial resolution is achieved at the expense of reduced accuracy of attenuation values and an increase in picture grain. The high resolution mode is therefore unsuitable for the demonstration of intracranial structures unless a contrast medium such as air or metrizamide is introduced.

In total there have been 223 scans performed on 216 patients in the two-year period to the end of 1980. The scans fall into three main groups: the first is the peri-nasal group which includes the orbits, nasal fossa, paranasal sinuses, naso-pharynx and pterygoid region; the second is the peri-temporal group which includes scans of the temporal bone and posterior cranial fossa; the final and much smaller cervical group includes oropharynx, hypopharynx, larynx and cervical soft tissues.

Selection of patients for scans was somewhat variable and based upon the known resolution capabilities of computed tomography, previous experience of C.T. for E.N.T. diagnosis, and published experience of other workers (Table I).

Peri-nasal Scans

The majority of patients in the peri-nasal group presented with manifest clinical signs such as nasal obstruction, epistaxis, proptosis, facial swellings, cranial nerve involvement and cervical lymphadenopathy. The yield of negative scans therefore is low. Before C. T. scanning was available the usual radiological investigations were plain views of the paranasal sinuses, oblique views of the orbit, tomography of the paranasal sinuses and occasionally orbital venograms, carotid angiograms, parotid sialograms and radio-isotope scans.

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TABLE I
ANALYSIS OF PERI-NASAL SCANS

Primary orbital lesions		Nasal fossa and paranasal sinus lesions		Nasopharyngeal lesions		Parotid lesion, superficial and deep lobe	
Pseudo-tumour	3	*Infection*		Benign neoplasm	3	Primary	5
Benign neoplasms	5	*Acute*	3	Malignant—new	5	Follow-up	1
Malignant neoplasms	1	with orbital cellulitis	4	follow-up	5	Normal scans	3
Dermoid cyst	1	*Chronic*	6	Normal scan	2		
Thyroid exophthalmus	3	with mucocoele	5				
Vascular lesions	2	Thick bony antral walls	2				
Lymphoma	3	*Neoplasms*					
Normal scans	8	Benign	4				
		Malignant— new	16				
		follow-up	4				
		Normal scans	3				
	26		47		15		9

Primary Orbital Lesions

Harrison (1980) describes how often the E.N.T. surgeon can be involved in the orbit and it is not unusual for cases of unilateral proptosis to be seen primarily in the E.N.T. clinic

The excellent soft-tissue imaging afforded by C.T. can delineate the normal orbital contents and can demonstrate any pathological displacement of the structures. It can differentiate between loculated pus, inflammatory oedema, fat and tumour. This is well illustrated in the case of a patient with a long-standing proptosis. The scan (Fig. 1) showed a well-defined mass in the medial wall of the orbit. The widely different attenuation values within the lesion were indicative of a dermoid cyst and in this case surgical exploration was avoided.

Orbital cellulitis complicating acute fronto-ethmoiditis is discussed in the next section.

Lloyd (1979) finds C.T. now to be the second line of investigation in disease of the orbit, after plain films and conventional tomography.

Nasal Fossa and Paranasal Sinus Lesions

In uncomplicated inflammatory disease of the nose and paranasal sinuses, C.T. scanning is rarely indicated as the conventional views convey adequate diagnostic information (Forbes, *et al.*, 1978). However, spread of infection from the paranasal sinuses into the orbit and anterior cranial fossa is not uncommon and can be well illustrated by C.T. scanning. Information provided in the four cases in this series altered management in three. In one, an unsuspected supero-lateral orbital collection of pus was seen on the scan (Fig. 2); in another, the scan showed the frontal sinus to be air-containing, the source of the orbital cellulitis being the ethmoids

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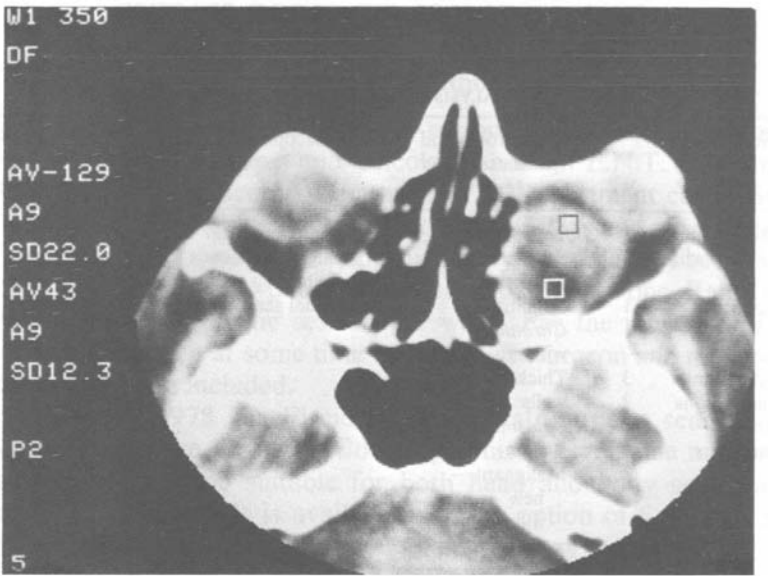


FIG. 1

An orbital scan of a patient with long-standing proptosis. There is a well-defined round mass displacing the optic nerve laterally. Average attenuation values for tissue within the two squares superimposed on the image of the mass are—129 and 43 Hounsfield units. This negative value indicates fat within the tumour and hence a probable dermoid cyst.

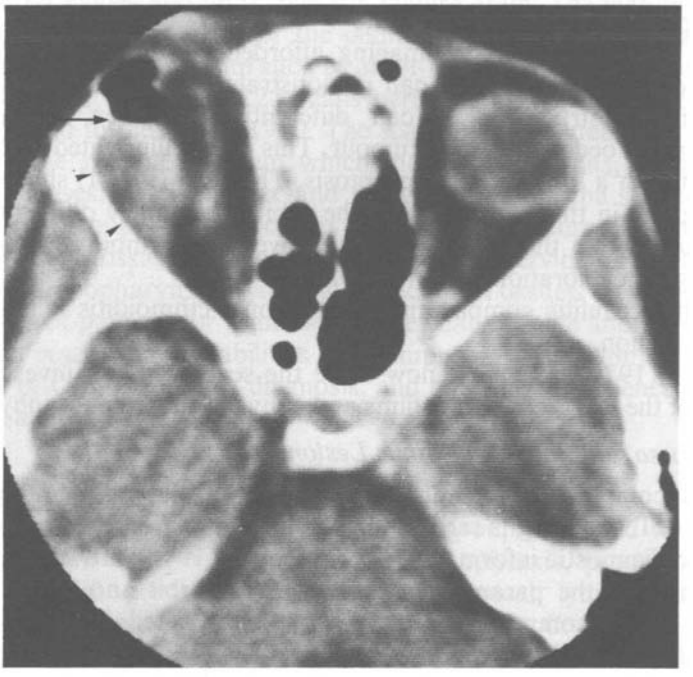


FIG. 2

Orbital scan showing the normal globe on one side. On the other, the globe has been displaced downwards by an inflammatory mass in the upper outer quadrant (arowheads). The arrows point to the associated air/fluid level.

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(Fig. 3) although plain sinus films had seemed to incriminate the frontal sinus. In yet another, the proptosis was shown to be due to inflammatory oedema of the orbital contents with no focal collection of pus, so surgical intervention was avoided and the patient managed medically with confidence.

Fig. 4 is the scan of a twelve-year-old girl who had three epileptic seizures three weeks after an upper respiratory infection. Drainage of her infected right frontal sinus did not produce resolution of her symptoms, and an extradural abscess was drained via a frontal craniotomy.

In chronic inflammatory disease of the paranasal sinuses some initial problems were encountered because areas of mucosal thickening in apparently normal and symptomless sinuses were frequently demonstrated

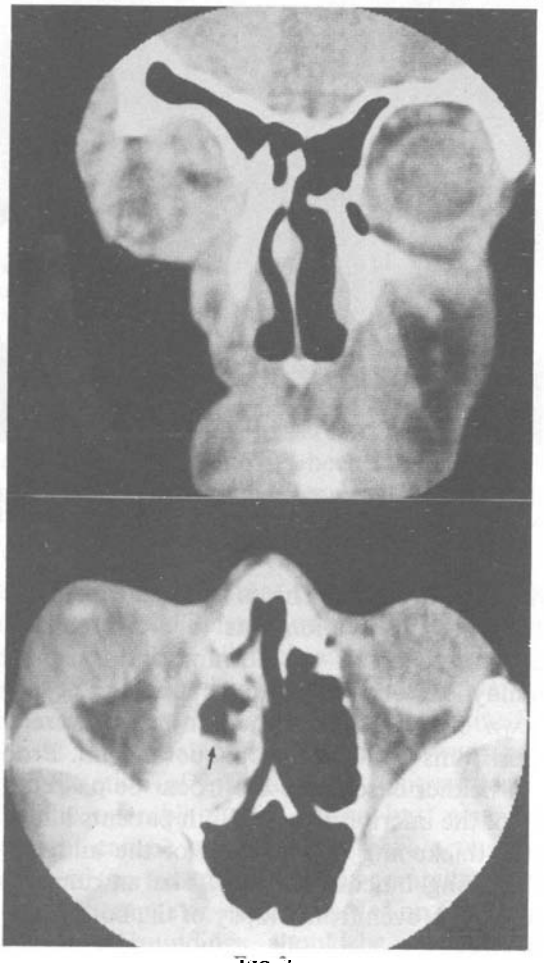


FIG. 3

The upper coronal section shows a mass in the medial aspect of the orbit displacing the globe. The frontal sinus is normal. The lower axial scan shows opacity of the ethmoids with an air/fluid level (arrow) 5–10 ml. of pus were drained from the ethmoid sinuses and orbit.

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FIG. 4

Brain scan showing an area of low attenuation surrounded by a ring of enhancement; the typical appearance of an extra-dural abscess. This would not have been demonstrated by previous neuro-radiological techniques.

and false significance attributed. This is also the experience of Postic *et al.* (1978). An interesting observation was that antro-choanal polyps were shown to occupy only part of the antrum, and the presence of air and normal mucosa may lead one to suspect a more sinister diagnosis.

We report two cases in which the symptoms were those of chronic sinusitis and plain films showed an opaque antrum. Proof puncture was attempted, but in neither case could the trocar be passed through the very thick lateral wall of the inferior meatus. Both patients had C.T. scans which showed unilateral thickening of the walls of the antrum with associated thickening of the lining mucosa (Fig. 5). The antrum was small, but the cause was not apparent, even from biopsy of the bone and lining mucosa.

Benign Neoplasms

The four benign lesions were transitional cell papillomas (Ringertz's tumours), which show as a mass of uniform density within the nose or

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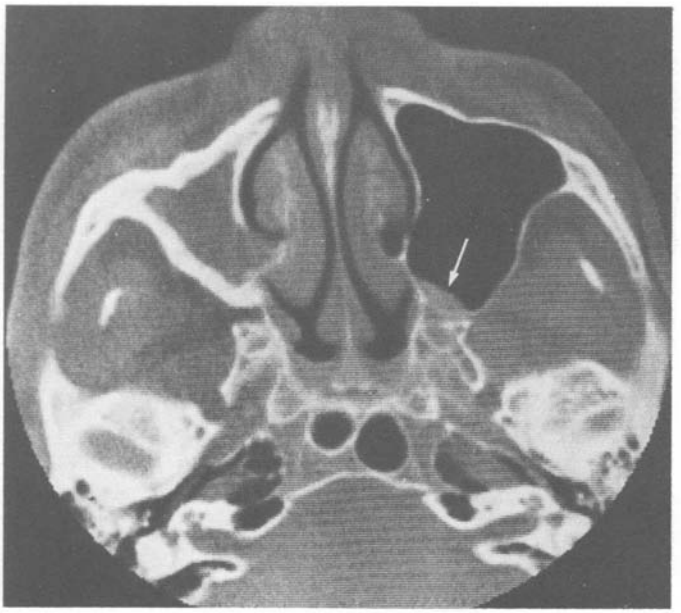


FIG. 5

The right antrum is smaller than the left and there is pronounced thickening of its walls and soft-tissue opacity of its lumen. The left antrum is normal and air-containing, but note the small and non-significant patch of mucosal thickening identified by the scanner on the posterior wall (arrow).

sinuses (Fig. 6) causing the cartilaginous boundaries, such as the septum, to bow and the bony walls to be eroded, but not in the characteristic ragged pattern of malignant neoplasms in this area. The scan gives an accurate guide to the size of the tumour and has been influential in the decision of surgical approach; final diagnosis, however, is still dependent on histology.

Malignant Tumours

Computed tomography is of great potential value in the planning of treatment of patients with malignant tumours of the nose and paranasal sinuses. Whereas in our series all the cases were diagnosed on clinical grounds or conventional radiological information, the scan gave invaluable information as to size and spread into the pterygo-palatine fossa and/or the orbit. In the case of ethmoidal carcinomas it showed spread across the midline and any infiltration of ipsilateral or contra-lateral orbit. This is information as to the operability of a lesion but, when radiotherapy is appropriate, treatment can be planned with more accuracy and we hope efficacy. The advent of the treatment planner computer, which can super-impose planned radio-therapeutic isodose curves on the anatomical display of the tumour and its surroundings, should be particularly useful in this area of tightly packed anatomy of diverse histology.

Should radiotherapy be followed by surgery the original extent of the lesion is accurately known to the surgeon, and his 'en bloc' excision can be

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FIG. 6

Typical appearance of a transitional cell papilloma which has eroded the medial wall of the antrum and extended into the nasal cavity.

planned accordingly. He is less likely to be misled by centripetal tumour regression, so keeping the excision outside the limits of the known pre-treatment tumour extent.

The use of the scanner in follow-up in those treated malignant lesions is somewhat limited, as surgery distorts the anatomy and local recurrences should be apparent within the cavity. The exception to this is late spread or previously undiagnosed spread to the orbit or the pterygo-palatine fossa. The symptom of trismus suggests tumour spread in these post-treatment cases, but may be due to other factors. Infiltration of the muscles of mastication in the pterygo-palatine fossa is readily seen due to the loss of contrast normally afforded by the abundant fat that lies between the muscles (Mancuso *et al.*, 1980).

One hopes that better patient selection and planning of treatment is to be reflected by improved long-term surgical figures and that patients with far advanced disease be spared inappropriate attempts at radical cure.

Nasopharyngeal Lesions

The benign lesions were all juvenile nasopharyngeal angiofibromas. The illustrated case (Fig. 7) shows many of the characteristics described by Levine (1979): in particular, an apparent widening of the pterygo-palatine fossa and a consistent involvement of the pterygoid lamina from which it takes origin. Extension into the nasal fossa, paranasal sinuses and orbit is well shown without contrast, but invasion of the pterygo-palatine fossa is

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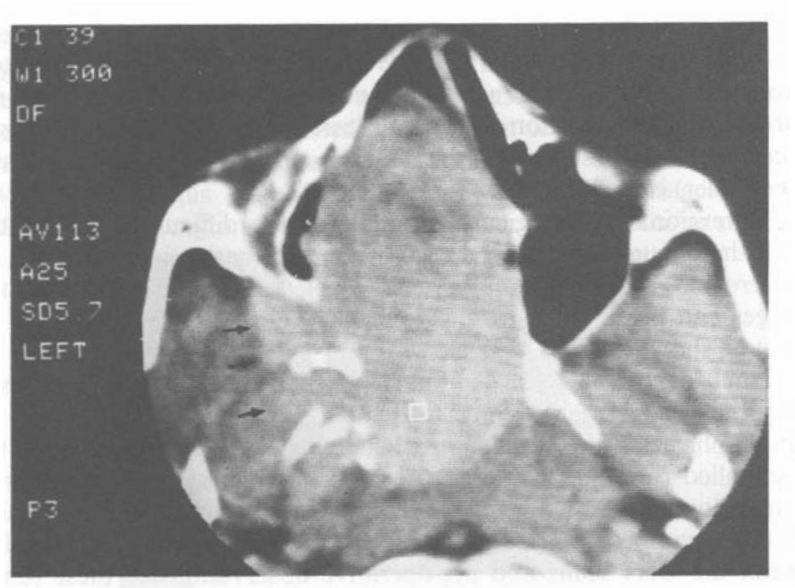


FIG. 7

Axial section showing a typical juvenile nasopharyngeal angiofibroma. The lesion is demonstrated during the vascular phase of contrast enhancement, showing a high attenuation reading of 113 Hounsfield units for the sample square. Extension into the pterygo-palatine fossa is well shown (arrows).

better shown immediately after intravenous contrast injection, when the marked enhancement confirms the presence of a vascular tumour and shows its postero-lateral extension.

A second case of nasopharyngeal angiofibroma had been irradiated elsewhere, thus reducing the tumour in size. However, the patient still had symptoms and a coronal section C.T. scan showed considerable bone erosion above the pterygoid laminae, as the tumour was related to the cavernous sinus and its contents, but not to the optic nerve. No other method of examination gives such accurate pre-operative information.

Carotid angiography has been considered obligatory by many in the management of juvenile angiofibromas not only for diagnosis but for extent, blood supply and pre-operative embolization to reduce bleeding at surgery. We would question the need for angiography for all but embolization.

Malignant Nasopharyngeal Lesions

Malignant lesions of the nasopharynx are often discovered very belatedly and are often bizarre in their presentation so that a high level of suspicion is required for early diagnosis. This is in part due to the often minute size of the initial focus and the insidious nature of its growth in an area relatively inaccessible to direct examination.

Specialized equipment and expertise are required for the direct

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examination of the nasopharynx, yet there is still an appreciable yield of false negative results. This is because any direct examination is limited to mucosal surfaces within which abundant lymphoid tissue can make macroscopic differentation of a small lesion difficult. Direct visualization of certain areas such as the lateral pharyngeal recess (fossa of Rosenmüller) is uncertain.

Conventional radiological examinations are difficult to interpret and even if the pictures are of good quality the information is incomplete. Only bone erosion and hypertrophy of the soft tissues bounded by the air passages can be demonstrated. Extensions into the pterygo-palatine fossa cannot be shown.

Mancuso *et al.* (1980) demonstrated that, despite superficial appearances, the deep structures in this region are normally symmetric, once again emphasizing the point that the radiological hypodensity of the fat in the so-called retromaxillary and pre- and post-pterygoidian bands shows any invasion of the pterygo-palatine space at an early stage by a lack of such deep symmetry. Good anatomical correlations have been established between the C.T. scans and pre-operative observations of these tumours (Elie *et al.*, 1980).

We agree with Robin *et al.* (1980) that C.T. is diagnostically imperative in nasopharyngeal neoplasms and is an essential component when devising a radiotherapy protocol. John *et al.* (1980) and Robin *et al.* (1980) make the point that patients with even advanced disease may have long-term survival, but that accurate staging will further enhance the results. Any patient with malignant cervical lymphadenopathy from an unknown primary may deserve a scan of his nasopharynx, and Robin *et al.* (1980) showed nodes to be present in 72 per cent of the cases in their series. The prognosis in nasopharyngeal carcinoma of those with local nodal metastases may be much better than other head and neck tumours.

It is apparent from our small series that the only satisfactory way to follow up local recurrence of nasopharyngeal neoplasms is by serial scanning, although this may do little to influence the management of recurrent disease.

Parotid Lesions—Superficial and Deep Lobe

There were six C.T. examinations for malignant lesions of the parotid gland. Two of these related to one case of deep lobe carcinoma and clearly showed tumour regression following fast neutron radiotherapy. In another case the extent of a recurrence was well delineated and a further superficial lesion was seen to have no deep extension.

Computed tomography was at its most valuable in the case of an elderly lady who had been examined many times over several years because of a persistent facial pain. When she developed involvement of V, IX, X, XI, XII cranial nerves three direct examinations of the nasopharynx were undertaken without positive result. Conventional base-of-skull

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radiography was reported as normal, but a C.T. scan showed a mass in the pterygo-palatine fossa and erosion of the skull base (Fig. 8). The scan showed that the best approach for a biopsy was through the posterior wall of the antrum and this confirmed a malignant lesion presumed to have originated in the deep lobe of the parotid gland.

We feel that this case exemplifies the great advantages of C.T. examination in this region. First, it gives a view of the soft-tissue structures



FIG. 8

Squamous carcinoma probably of parotid origin. The upper section shows a large soft-tissue mass eroding the skull base (arrows). The lower section shows resultant atrophy of the pterygoid muscles from involvement of the trigeminal nerve.

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in the pterygo-palatine fossa which are otherwise inaccessible to examination. Secondly, because of the excellent soft-tissue imaging, it shows lesions before they have eroded bone and our experience shows that even severe osseous destruction may be missed by conventional radiographic examination in such an anatomically complex area. It may prove that, in the management of patients with atypical facial pain without obvious cause, especially if there are trigeminal nerve signs, their investigation is incomplete without a C.T. scan of the pterygo-palatine fossa and deep lobe of the parotid gland.

Peri-temporal Group

Introduction

This peri-temporal group of scans, including those of the temporal bone and posterior fossa, were undertaken in patients with less evident pathology than the peri-sinus group. By the nature of the anatomy direct visual examination is limited and the majority of these tests were ordered on the basis of the patients' history and indirect examination such as audiological and vestibular testing. In a sense, therefore, C.T. in this region is used as a screening test, so that negative findings may be as valuable as positive, and this is exemplified in the investigation of cerebello-pontine angle lesions.

TABLE II
ANALYSIS OF PERI-TEMPORAL SCANS

Temporal bone		Posterior fossa	
Chronic otitis and cholesteatoma	3	Meningiomas	4
Neoplasms		Cerebral infarcts	3
Benign	—	Cerebral atrophy	1
Malignant		Metastasis	1
External ear	1	Acoustic neuromas	4
Middle ear	1	Facial neuroma	1
Metastases	1	Normal scans	69
Glomus tumours	2		
Normal scans	3		

Chronic ototis and cholesteatoma

The diagnosis of most cholesteatomas of the middle ear is made by direct examination of a perforated ear-drum. There is some variation of views on the use of radiology for the diagnosis of acquired cholesteatomas and the radiographic appearances do not generally affect the surgical approach or the course of the operation which must be exploratory.

However, high resolution computed tomography has certain advantages over conventional methods for the demonstration of acquired cholesteatoma. In particular, the soft-tissue mass of cholesteatoma is better demonstrated and in some instances the presence of low or negative attenuation values within the mass may help to confirm the diagnosis.

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For primary congenital cholesteatoma of the petrous bone with a normal ear-drum, tomographic studies are essential to show the extent of the bone erosion, and these changes may be demonstrated equally well, or better, by high resolution C.T. than by multi-directional tomography. The characteristic appearance of the cavity and the low attenuation value of the contents after contrast enhancement may be pathognomonic (Phelps and Lloyd, 1980).

Neoplasms

A secondary deposit from carcinoma of the breast was well shown on coronal section C.T. (Fig. 9). A carcinoma of the external auditory meatus had spread anteriorly into the parotid gland with little bone destruction. This extension was not demonstrated by C.T., but the presence of a normal air-containing middle ear shown on the scan was useful pre-operative information.

Carcinoma of the middle ear is a rare disease and our limited

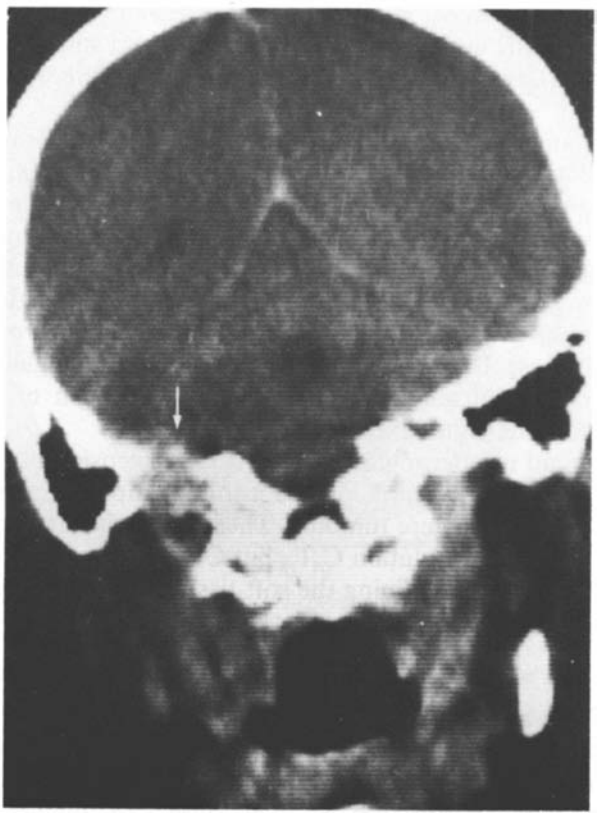


FIG. 9

Secondary deposit in the petrous pyramid from carcinoma of the breast. A coronal section showing erosion of the central portion of the petrous bone and extension of the soft-tissue mass into the cranial cavity (arrow).

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experience is typical of many centres. In a recent series of 47 aural neoplasms (Phelps and Lloyd, 1981) C.T. was used to investigate six cases. It was evident that high-resolution C.T. gave a good demonstration of bone erosion, especially of the anterior wall of the external auditory meatus and middle ear. It was found to be the optimal method of demonstrating tumour spread in the axial plane, and extension of tumour as a soft-tissue mass down the axis of the Eustachian tube into the infra-temporal fossa was well shown.

There were two glomus tumours in the present series. A small glomus jugulare tumour in the middle ear was diagnosed at tympanotomy after indifferent plain films had failed to reveal any abnormality. The small soft-tissue mass was shown by a carotid angiogram, but not by standard resolution C.T. The other glomus jugulare tumour was a large one that had destroyed much of the petrous temporal bone. It had been fully demonstrated by angiography and multi-directional tomography three years previously. The patient had been treated by radiotherapy and her clinical state remained unchanged. High resolution C.T. not only gave a very good demonstration of the destruction of the labyrinth and surrounding temporal bone, but also showed the extent of invasion into the cranial cavity (Fig. 10).

Although angiography is required for full assessment and for demonstration of blood supply to aid surgical planning, encroachment into the posterior fossa is better shown by C.T. than by angiography (Spector, 1979). Inferior extension into the neck can be shown by C.T. in the vascular phase of contrast enhancement, as with a continuous intravenous infusion. However, the extent of involvement of the jugular bulb and sigmoid sinus can only be truly assessed by study of the carotid angiogram in the venous phase. If the tumour occludes the internal jugular vein precise localization of the intraluminal inferior tumour margin can be achieved only by a retrograde jugulogram.

Plain film and tomographic demonstration of erosion of the margins of the jugular foramen remains of the utmost importance for the early diagnosis of glomus jugulare tumours. These bone changes are equally well demonstrated by high resolution C.T., but C.T. with contrast enhancement is the optimal method of defining the soft-tissue mass in the middle ear and extension into the posterior cranial fossa.

Posterior Fossa

None of the acoustic neuromas were unsuspected, there having been sound clinical suspicion for them all. One was a typical extra-canalicular lesion and another had a very long history, but gross erosion and expansion of one auditory meatus was shown by plain films. Another patient consulted us with increasing deafness in one ear, the other having been deaf for years, and the already deaf ear was found to contain a small intra-canalicular tumour by air/C.T. meatography (Fig. 11).

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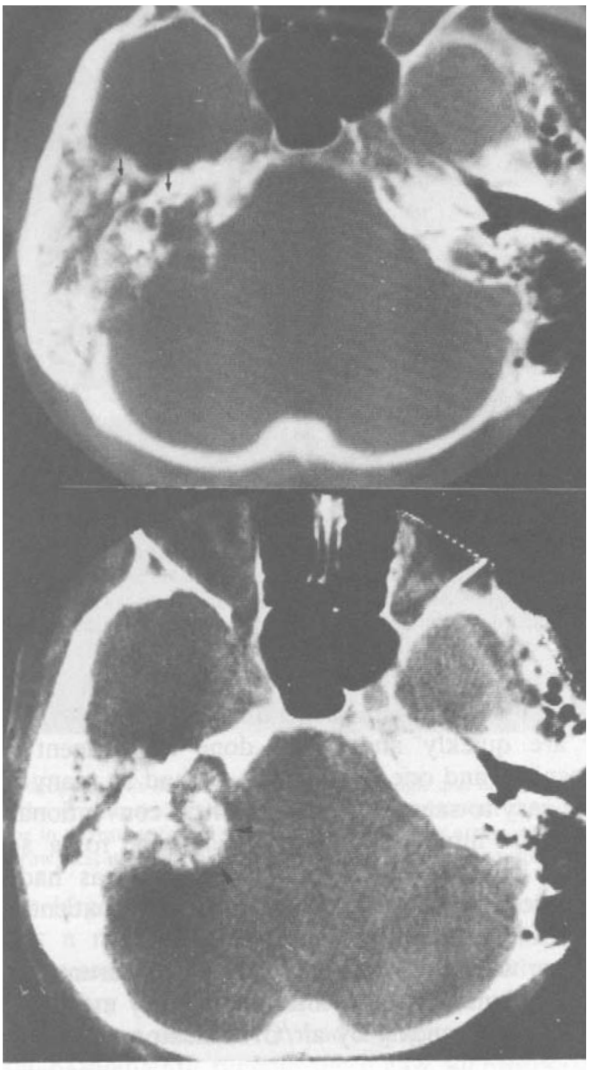


FIG. 10

Large glomus jugulare tumour. The upper high-resolution scan section on a bone setting demonstrates the extensive ragged erosion of the petrous pyramid. The ossicles and basal turn of cochlea, however, can still be identified (arrows).
The lower section after contrast enhancement shows the extension of the mass with some bone fragments into the cranial cavity.

One of the most disappointing features of our survey has been the low yield of acoustic neuromas. Tumours 2–4 cms. in size often have symptoms and signs limited to the VIII nerve, and so patients with appropriate VIII nerve deficit were sometimes referred for a limited enhanced posterior fossa scan at the same time as full assessment of the internal auditory meatuses by multi-directional tomography. To some extent the regime for

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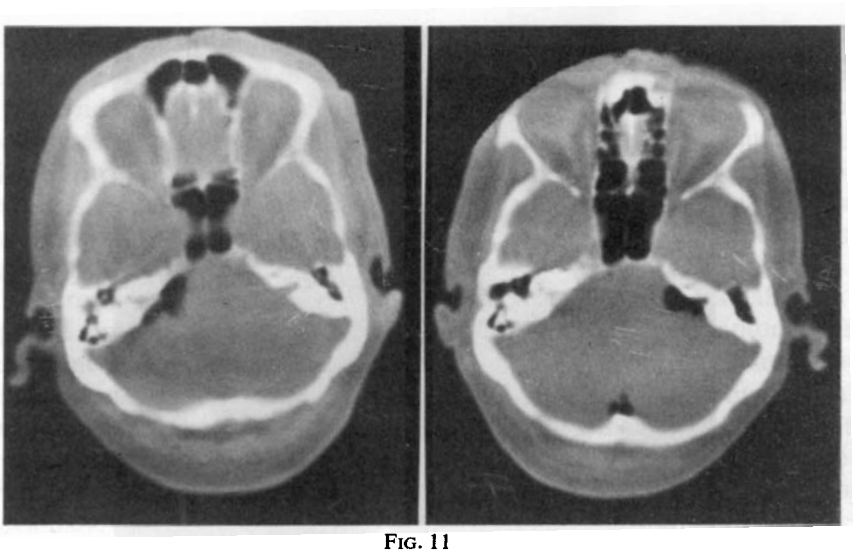


FIG. 11

Bilateral air/C.T. meatograms, showing a small acoustic neuroma on the right. Air was shown to fill the cerebello-pontine angle on each side in succession. On the left air can be seen within the I.A.M., but air fails to enter the right I.A.M. and a small soft-tissue mass can be seen protruding from the porus. This is a standard resolution scan picture; compare with the high resolution normal examination of the I.A.M. in Fig. 12.

investigating accoustic neuromas depends upon available facilities. The two examinations are quickly and easily done in adjacent rooms at the Walsgrave Hospital, and one reason why we had so many negative scans was that it was easy to scan at the same visit as conventional tomography. The expected large number of normal posterior fossa scans was not justified by any relatively unexpected neuromas, as had been hoped. Moreover, the presence of small tumours in these patients has not been disproved.

The only sure way of excluding an acoustic neuroma at present is to show contrast medium within the internal auditory meatus. This can now be achieved easily and quickly by air/C.T. meatography. Although this is an invasive procedure for which our patients are admitted, it is done in the U.S.A. on an out-patient basis and is no more unpleasant or hazardous than a simple lumbar puncture. The whole examination is done with the patient on his side on the scanner table and it takes about 20 minutes. Introduction of 3 ml. of air by lumbar puncture demonstrates the cerebello-pontine angle, internal auditory meatus and the VII and VIII nerves (Fig. 12).

Our present policy is to demonstrate the I.A.M. fully by multi-directional tomography in two planes, when initial radiographic investigation suggests that it is abnormal. The likelihood of a neuroma from the clinical and tomographic findings is then carefully assessed, before deciding whether to proceed to C.T. Computed Tomography will reveal

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FIG. 12

Normal air/C.T. meatogram. Air fills the cerebello-pontine angle and has extended into the internal auditory meatus. The seventh and eighth cranial nerves can be seen crossing the angle (small arrows) and running in the rather funnel-shaped I.A.M. The large arrow points anteriorly, and the open arrow indicates air in the middle-ear cavity on this high resolution scan.

most acoustics larger than 1 cm. and other types of posterior fossa pathology. It is a necessary safeguard against the hazards of lumbar puncture in the presence of a large tumour and obstructive hydrocephalus. There was a salutory demonstration of the value of C.T. for posterior cranial fossa lesions in a patient who had a large meningioma arising from the petrous ridge and causing obstructive hydrocephalus (Fig. 13). She complained only of deafness and some slight ataxia was present, but there were no clinical features to suggest raised intracranial pressure; moreover, no abnormality was apparent on plain skull or temporal bone radiographs.

Relative indications for a simple enhanced posterior fossa scan are: (i) normal I.A.M.s, (ii) an old and frail patient. However, if the examination is negative and the suspicion of an acoustic neuroma is high, it is illogical to exclude only a large tumour. We therefore proceed immediately to air/C.T. meatography in such cases. Analysis of the cerebrospinal fluid may suggest an alternative diagnosis such as demyelination, but lumbar puncture alone, without an accompanying posterior fossa contrast study, is no longer justified for the investigation of acoustic neuromas.

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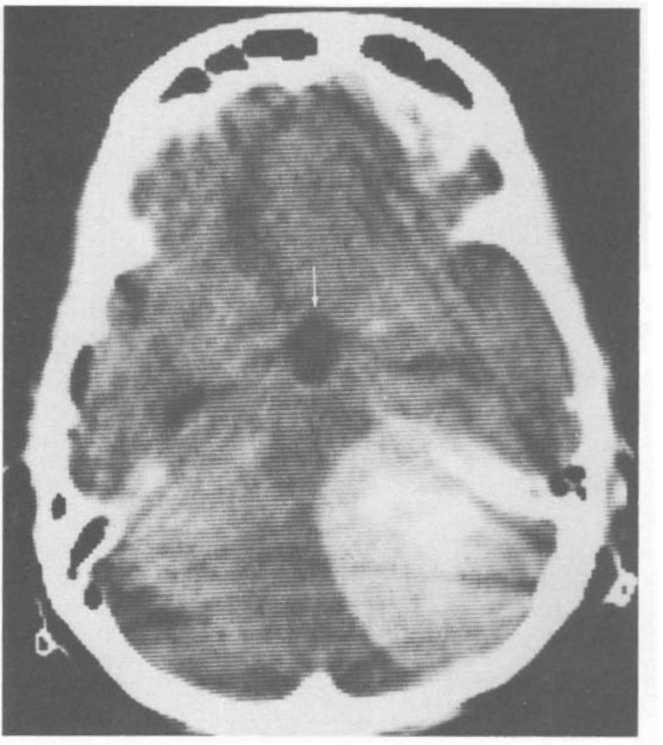


FIG. 13

Brain scan after contrast enhancement showing a well-defined partially calcified meningioma arising from the petrous ridge. Note the dilated third ventricle (arrow).

Cervical Group

Introduction

This cervical group includes the mouth, hypopharynx, larynx and cervical soft tissues. This is the smallest group, reflecting the ready direct examination afforded to most parts of this area. Apart from two cases we found the C.T. scan provided no additional information that could not be obtained by more conventional methods of examination.

TABLE III

ANALYSIS OF CERVICAL SCANS

Mouth		Pharynx-Hypopharynx		Larynx	
Malignant neoplasms	3	*Tonsil*		*Trauma*	2
Lymphoma	1	Malignant neoplasm	1	*Neoplasms*	
		Hypopharynx		Malignant	8
		Ganglioneuroma	1	Normal scans	2
		Pyriform fossa			
		Malignant neoplasm	1		

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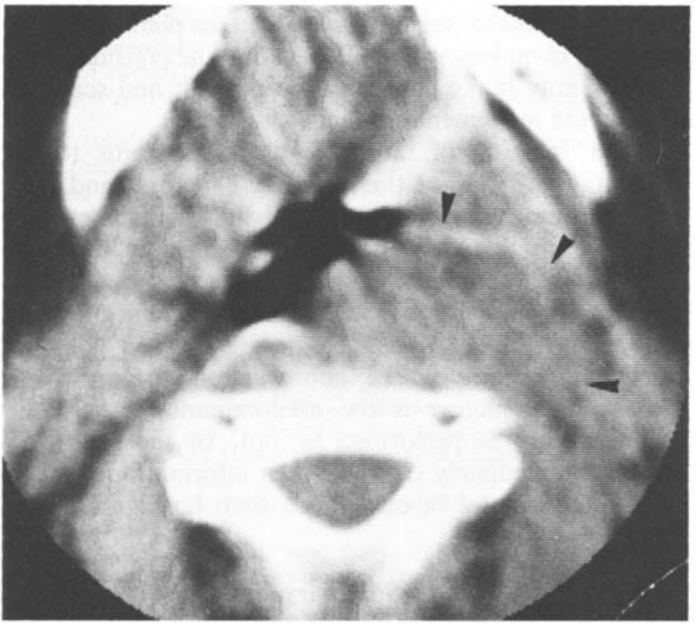


FIG. 14

A mass bulging into the postero-lateral aspect of the pharynx. This did not enhance, so that the pulsations papable through it were known to be transmitted. It proved to be ganglioneuroma taking origin from the sympathetic chain.

The oral lesions involved the upper alveolus and maxillary sinus, and the scan was helpful in the same way as with other sinus neoplasms.

The deep extension of the tonsillar lesion was well demonstrated, and the clear indication of its posterior margin afforded the radiotherapist a wide margin of his fields around the lesion without compromising the spinal cord.

The lesion in the hypopharynx (Fig. 14) was in a child aged seven years who was about to undergo tonsillectomy when the surgeon noted a firm retropharyngeal mass. The attenuation values after enhancement indicated that this was not a vascular lesion and that there was no deep extension. The lesion was a ganglioneuroma taking origin from the sympathetic chain.

In our two cases of laryngeal trauma, one was of subglottic stenosis following partial removal of a fractured cricoid cartilage and the other of a fractured thyroid cartilage. C.T. demonstrated the lesions well, but did not affect patient management.

Recent enthusiastic reports of the use of scanning in malignant disease of the larynx (Ward *et al.*, 1979) have not been realised in our small series.

In malignant neoplasms of the larynx, information was mostly unhelpful and sometimes misleading. The extent of some lesions was not accurately predicted on scans of poor quality. Although subglottic extension of a tumour can be shown by C.T., conventional tomography is

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probably better, but as the images are in different planes, the two methods are to some extent complementary. We feel that the considerable oedema in laryngeal lesions may make interpretation difficult and scans are still not fast enough to avoid movement artefacts.

The superior imaging of laryngeal cartilage seems to be the only practical advantage of C.T. at the moment. Fractures and displacements from laryngeal trauma can be shown and may influence any attempted surgical intervention. Similarly, cartilage erosions by malignant disease before or after radiotherapy may favour laryngectomy, although the scans must be interpreted with caution, as false positive and negative assessments have been made.

In British laryngology where conservation surgery is not widely practised, the clinical picture is the predominant factor in determining whether laryngectomy is performed or not. In those cases where the decision was not immediately obvious, then information from the scanner has not been more helpful in our hands than laryngeal tomography or Xerography.

Summary

The radiological service for otorhinolaryngology in a British sub-regional centre has been altered by the availability of a general purpose C.T. scanner. Two years' experience with the scanner is reviewed with an attempt to assess how aspects of the improved imaging affected management of patients.

The greatest benefit has been in the demonstration of lesions in the perinasal region and C.T. is now the next investigation of choice after plain sinus films, virtually replacing conventional tomography. Computed tomography seems to have little to offer at present for the management of laryngeal lesions, and multidirectional tomography is still the most important means of investigating the temporal bone, despite the difficulty in interpreting the thin low-contrast sections. A simple protocol for the investigation of acoustic neuromas, and a means of certainly excluding the presence of one by demonstrating the structures within the internal auditory meatus, is described.

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