EQUIPMENT REVIEWS

Rotational panoramic zonography

X-rays of the facial bones and skull can often be difficult to interpret due to the complex structure of the region. The sinuses, buttresses and thin plates of bone produce many intersecting and overlapping lines, thus increasing the risk of missing any given abnormality.

Being aware of this problem we were interested in the appearance of some new X-ray equipment which it was suggested might provide radiographs which were more 'legible', particularly to the average casualty officer who may be inexperienced in the interpretation of X-rays. The apparatus, which was developed in Finland, is known as the Zonarc, and specializes in producing radiographs of the facial bones, various areas of the cranium and the cervical spine.

The Zonarc makes use of the technique known as rotational panoramic radiography in which the film and X-ray tube rotate synchronously around the subject. The narrow beam scans, and focuses on, only a narrow part of the subject at any one time, producing a sharp image of the appropriate area. The use of the narrow beam also means that there is minimal scatter and a low radiation dose. There are obvious similarities in this technique to that of conventional linear tomography and indeed panoramic radiography itself has been widely used in dental radiographic practice for many years.

The standard equipment consists of the radiographic stand, the control tube, beam collimator, patient's support, X-ray tube, transformer and control (Fig. 1). It comes equipped with five standard X-ray programmes which are stored in microprocessor memory. These are:

- upper cervical vertebrae;
- middle third of the face;
- the temporo-mandibular joints (lateral view);
- optic foramina; and
- upper and lower jaw.

Two additional, optional programmes are available, one for the middle and inner ear and the other to produce a lateral view of the cervical spine.

Local adaptation also allows a designated programme to be used for another area, for example the middle and inner ear programme can produce good pictures of the pituitary fossa, and we have also experimented with some useful views of the scaphoid.

The chief advantage of the equipment as far as we are concerned is that it produces X-rays in which fractures of the facial bones are more easily detected by our junior staff. Over the first 6 months of use, we decided to take not only the relevant zonograph but also 'conventional' views (OM 10 and OM 30) for comparison. We have detected several fractures on the zonographs which had not been visible on the conventional films and have not to date found any on the OMs which were not visible on the films produced by the Zonarc.

As shown in Fig. 2, the pictures produced are very different from conventional views

Fig. 1 The Zonarc apparatus.

of the facial bones; the anatomy is 'opened up', which in our experience makes picking up fracture lines rather easier. However, there is no doubt that one or two of our faciomaxillary surgical colleagues prefer a more 'anatomically correct' view when they are undertaking reconstruction of badly damaged facial bones.

This is of course a different problem from the one we face. We are looking for what is usually a single fracture line in a patient in whom there is a suspicion of a fracture, while in the patients who need reconstructive surgery the presence of fractures is clinically very obvious.

There is no doubt that a low radiation dosage is also advantageous, it being only one-third of that inflicted by conventional views. Indeed, this is particularly important where frequent repeats are necessary. For instance, in a complete facial series the dose of radiation to the lens itself is reduced to as little as 20% of that received using previously available techniques.

We have made most use of the instrument for diagnosing facial trauma though it has also proven useful where there are problems with regard to the upper four cervical vertebrae, particularly the odontoid peg. As shown in Fig. 3, it gives particularly good views of the peg.

There is no doubt that at £30 000 the equipment is expensive. However, such has been its success that our local sister hospital is considering installing one for use on its elective patients. The radiology staff are rapidly trained in its use, producing good quality films, and we have certainly found it a useful addition to our diagnostic

Fig. 2 The middle third view.

Fig. 3 View of odontoid peg and associated structures.

armamentarium, particularly as it covers an area where missed fractures are not uncommon.

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