Intubation macrodacryocystography

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Approximately 20 per cent. of patients presenting with epiphora have obstruction of the lacrimal drainage apparatus involving the upper part of the sac or canalicular system, (Campbell, 1964a). These lesions may occur in isolation or may be associated with more distally located pathology. Many surgical procedures for the relief of epiphora are now available and accurate preoperative localization of the site of obstruction is essential if appropriate surgery is to be performed.

Various investigations have been suggested to determine the site of obstruction before surgery. Probing, syringing, and the injection of coloured fluids have been used. Some authors have maintained that the information gained from these tests is sufficient in itself (Lyle, 1956), whilst others have recommended preoperative contrast radiography of the ducts and have emphasized the useful information to be obtained therefrom, (Campbell, Carter, and Doub, 1922; Rycroft, 1960). The conventional method of dacryocystography introduced by Ewing (1909) consists of cannulation of the inferior or superior canaliculus, and injection of contrast medium into the duct system, followed by postero-anterior and lateral films taken after the removal of the cannula. Campbell (1964b), using this method of injection, introduced a radiographic enlargement technique and showed the advantages of the enhanced detail on the radiographs by macrodacryocystography. Iba and Hanafé (1968) described a method of distension dacryocystography, drawing attention to the advantages of making the x-ray exposure while the contrast medium was being injected. The technique to be described is a combination of these two methods and is, in our experience, the best way of demonstrating the lacrimal duct system radiographically. The greater detail of the canalicular system is of critical importance in deciding the surgical approach to abnormalities of the common canaliculus. In addition, it is not uncommon to find abnormalities in the canalicular system in patients who have more distally located obstructions. Preoperative knowledge of this is invaluable if both abnormalities are to be dealt with simultaneously and disappointing surgical results avoided.

Technique

The technique is based on a continuous injection method originally described by Jones (1959) particularly to show the common canaliculus. The advantages of this method have been emphasized before (Lloyd, 1969), and this technique has been combined with radiographic enlargement. Our technique has been modified from that of Campbell (1964b), in that the patient is placed supine using a standard skull table. Geometrical enlargement of the radiographic image is obtained by placing the x-ray film some distance from the patient's head. A specially-made cassette holder, attached to the undersurface of the skull table, is used for this purpose (Fig. 1), and by using an x-ray tube fitted with a 0.3 mm. focal spot linear magnification of $\times 1.6$ to $\times 1.9$ of the image can be achieved.

FIG. 2 Introduction of catheter into dilated lower punctum

FIG. 1 Arrangement of skull table for macrodacrycystography

The exposure of the film is made during the actual injection of contrast medium through the catheter. This is important if optimal filling of the duct system is to be obtained and in most instances will produce an image of the contrast medium which is continuous throughout the duct system. Before catheterization of the inferior canaliculus, a drop of amethocaine is instilled into the conjunctival sac and any mucus in the duct system is expressed by pressure over the inner canthus. A non-viscous contrast medium is used, since the bore of the catheter is too small to allow a brisk injection of the more viscous variety of Lipiodol generally used in dacrycystography. 2 ml. Lipiodol ultrafluid are drawn up into a syringe which is then connected to a 12" intravenous catheter (outside diameter 0.63 mm.) and any air bubbles are expressed. The punctum is first dilated with a Netteship dilator and the tip of the catheter is introduced into the canaliculus. This manoeuvre is greatly facilitated if the punctum is drawn laterally and the tip of the catheter is rotated between the finger and the thumb as it is introduced (Fig. 2). In order to obtain the best radiographs, it is essential not to advance the tip of the catheter more than 3-4 mm. into the canaliculus. The catheter is held in place by sticking plaster applied to the cheek at the outer canthus. Slight pressure is applied to the loop of the catheter so that it is under tension and thereby held in position during the injection (Fig. 3). The lower canaliculus is usually chosen as this is more convenient and functionally more important. The upper canaliculus is normally outlined by reflux of the contrast medium. In special circumstances the upper canaliculus can be catheterized and injected either individually or simultaneously.

The narrow lumen of the catheter and the low viscosity of the medium allows only a small positive pressure to be created even if considerable force is applied to the syringe and, in order that sufficient

medium can circulate in the system, an interval of 3 seconds is allowed after starting the injection and before exposing the films. The macrograms are exposed in the antero-posterior plane during injection of the contrast medium and a lead rubber screen is therefore needed to protect the operator from scattered radiation (Fig. 4).

FIG. 3 Catheters in position and secured by plaster

FIG. 4 Operator protected from x-ray tube by lead and rubber shield during exposure

Because of the high incidence of bilateral abnormalities and the useful information that can be obtained by comparison with the normal macrogram, it is our usual practice to carry out bilateral intubation macrodacrycystograms simultaneously (Fig. 5). It is wise to take an upright lateral film subsequently to make sure that the contrast medium has had an opportunity to reach the nasopharynx and so to confirm the patency of the system. If bilateral macrodacrycystograms have been carried out, the same information can be obtained from an oblique film.

FIG. 5 Macrogram, showing bilateral common canaliculus obstructions

Summary

A technique for dacryocystography is described which combines radiographic enlargement with a continuous injection method. The technique is considered to be superior to those previously described and gives optimal demonstration of the lacrimal drainage system. The method is particularly useful for demonstrating lesions of the canaliculi preoperatively.

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