Clinical records

Tympanic membrane repair

By A. G. Kerr (Belfast, Northern Ireland)

Tympanic membrane repair by temporalis fascia has become a routine part of otology; successful closure of perforations is expected in over 90 per cent of cases. Despite the day-to-day nature of this procedure, some surgeons, especially trainees, still find difficulty with subtotal perforations, particularly when working through a speculum. The method described in this paper is one where the size of the perforation does not influence significantly the ease or difficulty of the procedure and where wide exposure makes the operation particularly suitable for the otologist in training.

Principles

The principles behind this method of repair already have been advocated many times. They require that there is an adequate view of, and access to, the entire tympanic membrane; that tympanosclerosis is removed unhesitatingly from the drum remnant; that sound transformer reconstruction is possible if required, and that the graft is placed in the middle layer of the drum between middle-ear mucosa and squamous epithelium. Furthermore, if ingrowth of squamous epithelium is found in greater degree than suspected preoperatively, so that transcanal removal is not possible, the method must be compatible with progression to the combined mastoid and canal approaches for the removal of disease.

Technique

The technique is based on those described by House and Sheehy (1961) and Plester (1963). House and Sheehy worked through a speculum, but much easier access is obtained by combining a partial endaural incision with a modification of their bony meatal skin incisions, in an approach similar to that described by Plester.

Incisions (Fig. 1)

An endaural incision is continued into the ear canal as far as the annulus, approximately along the line of 10 o'clock in the right ear (or 2 o'clock in the left ear). At this stage a self-retaining retractor is positioned and, before proceeding, a temporalis fascial graft taken. Following the removal of fascia a second smaller retractor is positioned giving wide exposure and good access to the meatus and tympanic membrane (Fig. 2). An anterior meatal incision is made with a roller knife, approximately along the squamo-tympanic suture line (1 o'clock in the right ear and 11 o'clock in the left ear) extending from the outer

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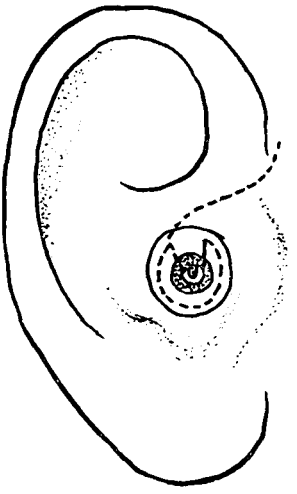


FIG. 1.
Diagrammatic representation of the endaural and meatal incisions.

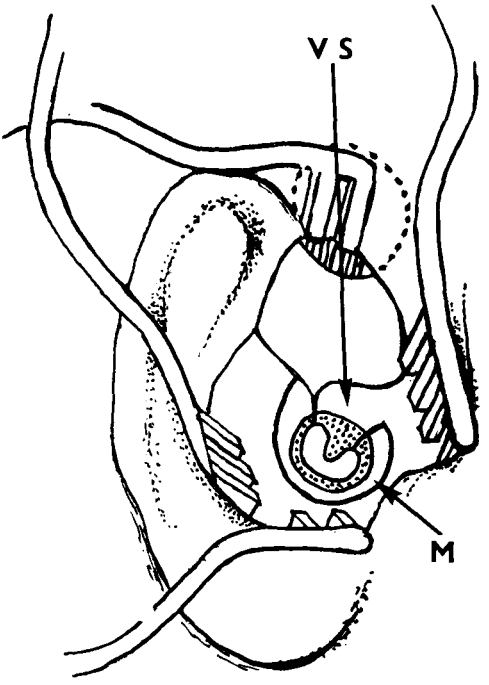


FIG. 2.
The retractors in position after the incisions have been made, but before the meatal skin is removed.
VS—vascular strip. M—meatal skin to be removed.

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end of the bony meatus to the annulus. A circumferential meatal skin incision connects inferiorly the outer end of the anterior incision with the extended endaural incision, just medial to the junction of the cartilaginous and bony meatal walls.

Exposure of tympanic membrane

The skin included within the two longitudinal and the circumferential meatal incisions is now elevated and removed, if possible in continuity with the squamous epithelium of the drum remnant. This is stored in normal saline solution until replaced at the end of the operation. The so-called vascular strip, in the superior quadrant of the meatus between the two vertical incisions, is now elevated, 'whirly-bird' dissectors being an advantage, although not essential, for this step.

Having thus removed the skin from the bony meatus one is in a position to remove any anterior bony overhang, or widen the bony meatus, using a polishing burr on an angled drill handle. This drilling brings the whole of the fibrous annulus and drum remnant into view. The opportunity is taken at this stage to inspect carefully, ensuring that squamous epithelium has not been left behind either along the edges of the perforation or in the anterior recess of the meatus.

Management of the middle ear

The ossicular chain is inspected, either directly through the perforation if this is possible, or if not, after elevation of the posterior fibrous annulus and drum remnant. Ossicular chain defects are dealt with in the manner described in previous publications (Smyth, Kerr and Goodey, 1971).

If the perforation is greater than about 25 per cent of the tympanic membrane, silastic sheeting is used to line the Eustachian tube orifice and the middle ear, thus decreasing the possibility, in the early post-operative stages, of adhesions developing between the graft and the medial wall of the middle ear.

Graft procedure

Temporalis fascia is placed over the drum remnant ensuring overlap of a few millimetres all around the edges of the perforation. Before inserting the graft it is my practice to excise a small segment from the area that will be opposite the handle of the malleus. The edges of the excised segment are laid anterior and posterior to the exposed handle, and at the same level, thereby reducing the risks of lateral healing of the grafted drum.

The superiorly based vascular strip of meatal skin is replaced over the superior part of the graft, and the meatal skin returned to its original position in the meatus, again overlapping the edge of the graft.

Meatal packing and wound closure

The inner half of the meatus is packed lightly with gelfoam moistened with normal saline, and the outer end of the meatus with 2 to 3 centimetres of ototrane ribbon gauze. The endaural incision is sutured with mersaline without drainage.

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Postoperative care

Postoperatively, systemic antibiotics are not given routinely. On the third day the ototrane gauze is removed and antibiotic/steroid ear drops are instilled twice daily for one week. Autoinflation of the middle ear is encouraged from the tenth day, or earlier if there is doubt about Eustachian tube function.

Results

Of the first thirty-nine cases operated on in this manner, thirty-eight are available for follow-up six months or longer after surgery. The thirty-ninth was seen four months after surgery with an intact tympanic membrane but since then has emigrated.

Every one of these thirty-eight cases has an intact tympanic membrane. Since the size of the perforation has little bearing on the success rate details are not recorded in this paper but after removal of tympano-sclerosis over 60 per cent had subtotal perforations.

Twenty-five of the thirty-eight cases had intact and mobile ossicular chains, and one had no inner ear function, preoperatively, leaving only twelve cases with varying ossicular defects. Consequently, an analysis of the varying methods of ossicular reconstruction would be of little value. However, the overall hearing results show closure of the air bone gap to 10 dB or less in 75 per cent, and to 20 dB or less in 92 per cent. Since the procedure just described is repair of tympanic membrane perforations, the hearing results in those cases with intact ossicular chains is more significant. Here, closure of the airbone gap to 10 dB or less was obtained in 92 per cent and to 20 dB or less in 100 per cent.

Complications

The most frequent complication was the development of cholesteatomatous cysts in the meatal skin or the grafted drum. This occurred in seven cases and appears to have been due largely to faulty replacement of the meatal skin as the cyst was superficial to the fascial graft in six of these. In the seventh it was seen through the graft and in relation to the malleus handle, but easily dissected out in one piece under general anaesthesia via a tympanomeatal flap; further drum repair was unnecessary. In two of the other six cases, a child and a nervous adult, a general anaesthetic was necessary to enucleate each cyst dispite its superficial position, but in the remaining four it was enucleated quite simply in the outpatient department during the course of the clinic.

The other common complication has been anterior blunting of the tympanic membrane, despite drilling down any anterior bony overhang. Visual evidence of some degree of blunting was seen in almost one-third of the cases, although, surprisingly, this has not been reflected in the hearing results.

In one case the conchal skin was burned by contact with an overheating drill handle, when taking down the anterior bony overhang. This healed without sequelae.

Discussion

While a graft take rate of 100 per cent has been recorded this is probably because of the small numbers and one would be surprised if failures do not

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occur in the future. Better results than achieved by other methods are not being claimed, but I feel that this method of drum repair is technically easier than most that have been described. Many trainees in ear surgery find difficulty in working through a speculum. This method overcomes the problem, giving at the same time good exposure of the middle ear, and as an incision has to be made in any event to obtain fascia, it is quite reasonable to place this endaurally.

The presence of a discharge from an ear is not seen as a contra-indication to surgery. However, as exposure of the mastoid is usually necessary in such ears, a postauricular incision is used, thus excluding these cases from this series. However, five of the ears now being reported had a scanty mucoid discharge at the time of surgery.

In three cases operated on during the course of this series, but not included in it, unexpectedly deep ingrowth of squamous epithelium was detected during the course of the operation, and a combined approach tympanoplasty therefore carried out. This necessitated combining the endaural with a postaural incision. The application of retractors with such a combination of incisions resulted in considerable reduction of blood flow in the auricle with gross cyanosis. However, on the release of the retractors, normal colour and circulation returned promptly to the auricle without any ill effects.

The complications of cholesteatomatous cysts and anterior blunting of the tympanic membrane do not appear to occur with any greater frequency with this approach than the method described by House and Sheehy (1961). Careful replacement of the meatal skin and adequate packing of the anterior meatal recess are important preventive measures.

Summary

Using a combination of an endaural incision, with a modification of the meatal skin incisions advocated by House and Sheehy (1961) and Plester (1963) easy access is obtained to the whole tympanic membrane and the use of a speculum is rendered unnecessary. Placing temporalis fascial grafts in the layer between the middle-ear mucosa and squamous epithelium, there were no graft failures in thirty-eight cases followed-up for six months or longer. In the presence of an intact ossicular chain the airbone gap was closed to 10 dB or less in 92 per cent of cases. The main complications were cholesteatomatous cyst formation in the meatal skin or tympanic membrane, and anterior blunting of the tympanic membrane.

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