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(*Founded in* 1887 *by* Morell Mackenzie *and* Norris Wolfenden)

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# Perilymph fistula*

By Ellis Douek (London)

Not long after stapedectomy became generally performed, the existence of poststapedectomy fistula was suspected. Soon it was recognized as an entity and gradually techniques for dealing with it and indications of its presence were discussed more frequently.

In this paper twenty-seven cases are described. This description will be qualitative and no statistical information should be deduced from it. In particular, three specific questions cannot be answered.

1. Whether one technique of stapedectomy is more or less likely to allow fistula formation. All that can be said is that the following techniques have given rise to this complication in this series: polythene strut with vein; Teflon piston (Shea); McGee stainless steel piston; Schuknecht fat-wire and gel-foam wire.

Even a break-down of these into proportions would be misleading as the numbers for each type of operation depend more on what is practised in our part of the world than on the intrinsic nature of a technique. For example, we have no case following platinectomy and interposition, but this could be due only to the rarity of this operation in our region.

2. The quality of the technical performance cannot be judged. These patients have been referred by the surgeons who performed the initial operation and these have varied in ability from the most inexperienced trainee to the most highly skilled and experienced practitioner.

3. It would be difficult to relate the exact symptoms with the exact findings. We have tried to do this unsuccessfully and perhaps again we must wait for much larger numbers to do this.

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The symptoms and signs shown by these patients will be discussed, the operative findings described in detail, and the limited conclusions that can be drawn from the results will be considered.

## Symptoms

1. *Loss of hearing.* This falls into four groups:
   (*a*) The most typical, occurring in seventeen of our twenty-seven cases, is a *fluctuating hearing loss.* The patient is occasionally embarrassed because he is better when he comes to the clinic. It is easy for the surgeon to suggest Eustachian obstruction, and not to pursue the matter.
   (*b*) Sudden deafness is not common, here occurring in only three cases. Usually it is very severe and accompanied by vertigo. One of our cases reported at the second interview that her husband had reminded her that some months before this severe loss she had said that she could not hear her watch. This suggested that there was a fluctuating loss and that the sudden *complete* loss was only the end-result.
   (*c*) Two patients had the conductive type of deafness with actual fluid in the middle ear, so well described by Goodhill (1967). A proper tympanotomy is essential in such cases, which must not be called secretory otitis media and have grommets inserted.
   (*d*) Five patients had no initial hearing loss at all.

2. *Imbalance.* This occurs in many patients, but can also be classified in different types:
   (*a*) Severe vertigo is rare and occurred in only one case.
   (*b*) Intermittent giddiness is common—fifteen patients complained of the symptom in a manner easily labelled as neurotic.
   (*c*) Four patients had positional vertigo. This can be to one side or the other or to both. Usually it is possible to record nystagmus with the electronystagmograph and the eyes shut. In two patients positional vertigo was the only symptom. One, a midwife, led an entirely normal life, but for three years every time she turned sideways to deliver the baby she lost her balance. I did not ask her if any accidents had happened, but the symptom disappeared at once when the fistula was sealed.
   (*d*) Five patients had a bizarre sense of permanent imbalance which they found difficult to detail. The only clear feature, and I do not think it has been previously described in this context, is a vestibulo-ocular disturbance resulting in a difficulty of accommodation from far to near. I suspect that it must be an allied disorder to bobbing oscillopsia.



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3. *Tinnitus*. This occurred in ten patients. It was very severe in those who had severe deafness and was roaring in nature.

The timescale over which these symptoms had arisen extended from the operation itself to six years later.

## Diagnosis

The main problems in diagnosis were:

1. To distinguish a case from endolymphatic hydrops, as they always respond to some extent to the drugs used in Ménière's disease.

2. In patients who have had bilateral stapedectomies and suffer from bilateral labyrinthine hypofunction as a result. Here caloric tests with Frenzel's glasses and walking with eyes shut on a rubber mattress were useful.

3. We have not found Siegalization helpful.

4. The electronystagmograph is very useful, particularly in positional vertigo, and the optokinetic nystagmus was abnormal in all these cases.

## Operative findings

1. *The sieve* (Fig. 1).

Three cases where the oval window area had been completely covered by a thin membrane. A piston had been lying in good position superficial to this. High magnification demonstrated a number of tiny openings in the membrane through which small quantities of perilymph passed. All three patients had given an initially good result so that later thinning and perforation of the membrane is probable.

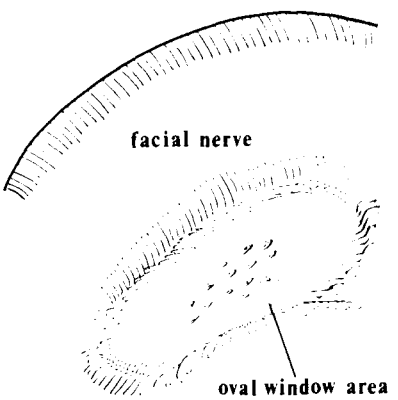



FIG. 1.

2. *The tight ring* (Fig. 2)

This is a relatively common type of fistula, occurring in six cases of this series. All had had a piston operation and were also of relatively late onset.



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What seemed to have taken place is a retraction by fibrous tissue of the ring of tissue round the piston.

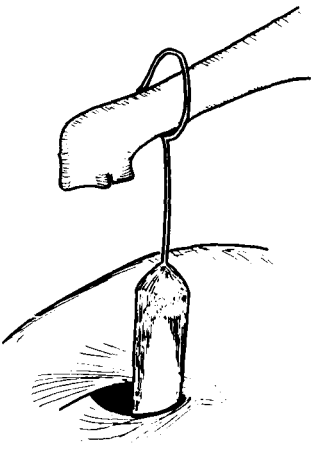


FIG. 2.

3. *Folds* (Fig. 3)

Ten patients had a middle ear full of thin folds. This makes it the most common type and it presents problems at inspection, as the fistula is often only perceptible well away from the region of the strut. It is not possible to

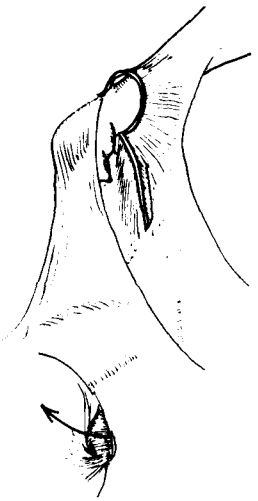


FIG. 3.

suggest whether the formation of multiple folds is associated with the technique of operation or with the nature of the patient. The fistula itself is likely to be created by retraction in the same way as the tight ring. Such a ring may indeed be found when the folds have been separated.



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4. *The sleeved fistula* (Fig. 4)

This occurred in three patients who had had Teflon piston operations. A simple sleeve of mucosa covered the piston and the perilymph emerged at the top.

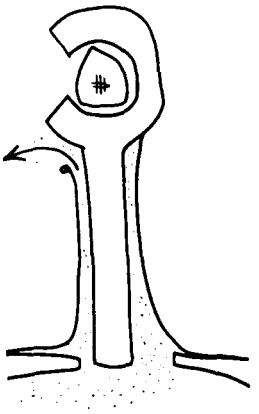


FIG. 4.

5. *The pseudo-fistula or 'tent'* (Fig. 5)

This is a particularly interesting finding in two patients who had had piston operations. The piston had fallen at an angle in a large window. The

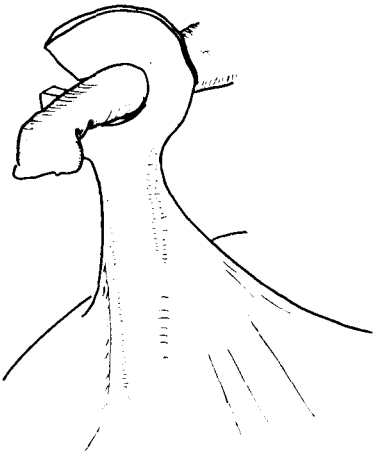


FIG. 5.

raised tissue formed a tent but contained the perilymph so there was no true fistula, but rather an extension of the perilymphatic space.

Both these patients had considerable unsteadiness and a slight fluctuating subjective deafness which could not be recorded audiometrically.



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6. *Broken fragments of footplate* (Fig. 6)

Two cases where a Schuknecht-type operation had been performed resulted in a curious type of fistula. Pieces of footplate had been left attached to the rim of the oval window, but the piece of fat used was greater than the opening. Placing the prosthesis had pushed the pieces down and broken them, the fistula emerging between such piece and the oval window edge.

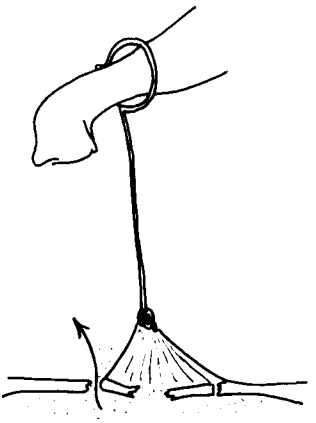


FIG. 6.

7. *Polythene strut and vein graft* (Fig. 7)

Only one such case was seen, but its importance lies in the fact that the polythene tube had eventually perforated the vein. The perilymph found

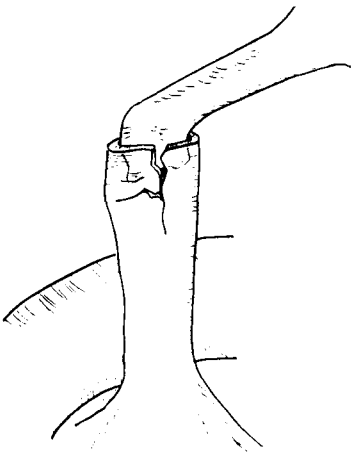


FIG. 7.

its way up the tube and out through a crack at the top. It is often stated that inserting vein grafts can prevent the formation of a fistula but it should



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be remembered that early descriptions of these complications involved this technique (Farrior, 1962; Steffen, House and Sheehy, 1963).

8. *A composite case* (Fig. 8)

One case was very bizarre and is worth describing separately in view of the ways the fistulae occurred. At the first operation, the surgeon dislocated the incus while opening the oval window. The incus was removed completely and a long fat-and-wire prosthesis attached to the handle of the malleus. This was eventually extruded, the patient showing all the signs of a perilymph fistula. At revision surgery a 'broken-bit' fistula was found, but the extruded wire had also left behind an empty 'sleeve' which allowed the perilymph also to rise up to the level of the malleus.

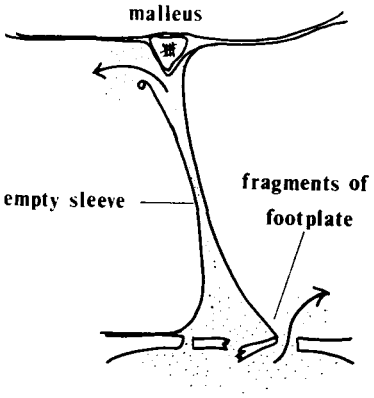



FIG. 8.
Composite case with absent incus and extruded malleus strut. The existence of two types of fistula shown.

The operation we carry out involves undressing the prosthesis from above downwards, cutting a circular flap of mucosa all round the oval window area including the facial nerve surface if necessary (we have had postoperative facial weakness in only one case). These flaps are reversed over the oval window which is not touched in any circumstances, forming a rosette. A vein graft and piston are then placed over it.

## Results

All the patients with fluctuating hearing loss recovered their hearing completely.

Those with a more stable loss of around 50–60 dB improved by up to 20 dB.

None of those with a severe or total loss improved.

Giddiness gave the most successful and dramatic results, with the patient often feeling relief on waking from the anaesthetic.



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Tinnitus did not improve much—certainly not the severe type.

One patient had a recurrence and was successfully done again.

In one case, the piston we replaced was too short.

One patient was generally dissatisfied despite the fact that he had been warned not to expect a restoration of hearing.

In no case, since we used this particular technique, have we made the hearing worse.

There are four patients with symptoms such as these on whom, earlier on, we neglected to operate, mainly in fear of damaging the hearing which was good, or from a reluctance in making this diagnosis. All of them followed up, have since lost their hearing.

## Conclusion

Our series is too small to draw statistical information. Too large a number of factors would have to be considered and juxtaposed in many possible combinations. Aspects of technique would be impossible to evaluate as the initial surgery is performed by many surgeons. The conclusions that can be drawn, however, are of some importance. In the first instance, no technique is likely to exclude fistula altogether. Although there are always dangers in revision surgery, modern techniques make these minimal compared with the dangers of persisting fistula. The symptoms and signs are now sufficiently understood to provide reasonable indications for surgery.

The final point should be to remember the small though growing number of late 'dead ears' that is reported from time to time. These cases are necessarily those which most easily slip from our attention, yet our unease has grown sufficiently to make us doubt the justification for a stapedectomy in the second ear. It is our contention that a number, at least, of those patients suffer from the development of a perilymph fistula and could be saved from deafness by early and courageous surgery.

## Acknowledgement

I am grateful to the many surgeons who, by referring their patients, have made it possible to see this problem in some perspective.

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