STAPES MOBILIZATION

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FOLLOWING the example of Dr. Rosen, many surgeons in different countries have found that in otosclerosis it is often possible to improve the hearing by breaking through the bony adhesions binding the footplate of the stapes, usually at its anterior end, to the adjacent rim of the oval window.

Why this bony bond does not usually, or even often, re-unite and the deafness return has been a pleasant surprise, and in many circumstances stapes mobilization is now regarded as the operation of first choice in the surgical treatment of otosclerosis.

It has the great attraction from the patient's viewpoint of being a slight, one might almost say trivial, operation. It is but rarely followed by dizziness or by infection and if it fails to improve the hearing, a fenestration operation still has the usual chance of succeeding.

On the other hand it does not as yet offer as good a chance of restoring hearing as the fenestration operation, and an initial improvement in hearing is less likely to be maintained after mobilization than after fenestration; though it is possible to restore hearing again by re-mobilization.

Before giving you my own experience, such as it is with this delicate and interesting operation, I would like to offer a few observations on the stapes itself. Besides being the smallest bone in the body it is also the most fragile, and it does not need much force to break through either the neck, the crura, and, in particular, the slender anterior crus, or through the footplate.

I have taken the opportunity of studying and manipulating the normal and unimpeded stapes in the living in the course of removing it so as to reach and remove the membranous labyrinth *viâ* the oval window and to destroy cochleo-vestibular function disordered by Ménière's disease. Afterwards the oval window is closed by replacing the intact stapes. To do this without damaging the stapes has made me appreciate the meaning of the phrase "Handle with care". As, however, the stapes moves freely to the touch it is not so easily damaged as when it is partly fixed by otosclerotic bone. It is interesting to see quite a wide space in front where the anterior crus is quite free of the rim of the oval window and the anterior edge of the footplate itself can be seen through the annular ligament when slight backward pressure is made on the neck.

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In otosclerosis, however, the appearance at the anterior end of the oval window is usually quite different. The anterior end of the oval window is narrowed so that its lips appear to embrace the anterior crus and there is no free space at the depth of which the anterior margin of the footplate can be seen.

I should say, of course, that what I have just described can best be seen using the Zeiss microscope with 16 diameters of magnification.

Furthermore, the stapes in otosclerosis can become set so to speak at different angles, but in most of the cases I have studied so far the main, if not the only, bony bond between the oval window and the stapes seems to have been at the anterior end and it is at this point that the mobilizing force should first be applied in order to loosen the footplate.

I think that all who have tried mobilizing the stapes started by applying traction on the neck in the way so ably described by Dr. Rosen. As he has repeatedly said, not only the amount of force but the direction of the traction as well needs to be watched in order to avoid fracture of the crus, the crura or the neck of the stapes. If then traction is applied properly it is a tug-of-war between the otosclerotic bone and the ability of the stapes to stand up to traction. Of course the stronger always wins, sometimes it is the otosclerotic bone which gives way, sometimes the stapes. Another and possibly safer way is to push on the head of the stapes, the pressure usually being applied through the incus. Here again the stapes may give way before the bony adhesion.

Fowler deliberately cuts through the anterior crus and cracks across the footplate, thus separating the fixed from the mobile part of the bone. That it works I know because I have done it accidentally and the patient eventually heard better; though I must confess that I was apprehensive about the result particularly as the patient was very dizzy indeed for some days. I still would hesitate to do this deliberately.

Heerman uses very fine gouges and chisels the bone free. I have seen Schuknecht do this and have discussed it with him and he believes it to be a good method. Certainly I think that it is likely to be useful in advanced cases where the footplate is more likely to be firmly fixed.

My own preference is to try and mobilize at the level of the footplate using Rosen's curved needle and trying not to touch the footplate or the crura except at the very beginning and the end when I test the mobility of the stapes by the lightest pressure on the incus. In this way it is usually possible to avoid damaging the stapes and the proportion of cases showing significant improvement in hearing has increased from 45% when working at the neck to 72% when working at the level of the footplate.

Against this I must say that there is a slight but definite increase in the tendency to relapse the more one actually works on the otosclerotic bone. For that reason I am trying to work down just in front of and on

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either side of the anterior crus rather than through the bone in front of the anterior crus.

There is usually no doubt when the stapes has been successfully mobilized. It bobs up and down like a cork in water in response to the lightest touch on the long process of the incus. It is often helpful to check the hearing for pure tones at the time of operation; though there is usually no doubt when the hearing has been properly restored.

If the stapes can be mobilized without actually touching it either by applying pressure through the incus in early cases or by pressure with the needle or curved seeker near where the anterior crus joins the footplate the chance of damaging the stapes is reduced to a minimum. Sometimes, in addition to pressure at the anterior end, it is also necessary to apply pressure near where the posterior crus joins the footplate before there is a satisfactory hearing improvement.

I find it helpful to use the microscope for all stages of the operation, working at 10 diameters of magnification for the incision and reflection of the flap and removal of the bony meatal margin which I do with fine and shortened Jenkins gouges. Once the middle ear has been opened and the ossicular chain exposed the magnification is increased to 16 times.

Hearing is checked with a pure tone audiometer and the flap back in position; this may have to be done two or three times before the operation is finished. No case is regarded as improved unless there is more than an average of 10 decibels improvement over the pre-operative hearing for pure tones between 500 and 2,000 c.p.s.

I have done 25 fenestrations after unsuccessful mobilizations and 22 have been successful. Seven cases have been remobilized with a satisfactory improvement in five.

These results encourage me to believe that stapes mobilization is an important advance in the surgical treatment of otosclerosis.

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