CLINICAL NOTE

TYMPANO DYNAMOMETRY

(A Preliminary Communication)

By A. TUMARKIN (Liverpool)*

INFLATION of the middle ear is probably one of the oldest procedures in rhinology, whether as a therapeutic or a diagnostic measure. Technically it appears to be quite a simple measure to pass a catheter into the eustachian orifice, to insufflate air into the middle ear and to assess the results by auscultation. In actual fact this simple procedure can turn out to be quite difficult. The precise placement of the catheter can be frustrated by septal deviations, adenoids and other abnormalities, although these difficulties can usually be overcome by inserting the catheter under the guidance of a naso-pharyngoscope.

Far more serious is the difficulty of assessing the significance of various sounds heard as the current of air is directed into the catheter. Sometimes there is an unmistakable air entry—but in many cases it is impossible to decide whether air is really traversing the eustachian tube or merely swirling round a closed orifice.

In the course of studying the dynamics of the middle ear we have been frequently irritated and baffled by this difficulty. It is, of course, possible to obtain a certain amount of information by asking a second observer to watch the drum directly—as was done by Zöllner (1935). Indirect information can be obtained by the pneumophone technique of van Dishoeck (1947) and the impedance bridge technique of Metz (1946). Such methods are extremely valuable in the specialized problems for which they were designed—but they are more suitable for the research laboratory than the consulting room or clinic.

During the last year we have been using a method which has the merit of such extreme simplicity that it has completely supplanted the auscultation tube in our routine clinical work. It is nothing more than a piece of glass tubing onto which is fitted the familiar rubber tip of the Medresco hearing aid (Fig. 1). This is inserted into the patient's ear, the aim being to obtain an air-tight seal. Four sizes of rubber tip are available and in the occasional difficult case it helps to smear a little vaseline on the sulcus of the rubber tip. Next a drop of liquid paraffin is inserted into the tube where it forms a meniscus. Inflation *viâ* the catheter is now carried out in the usual way and the behaviour of the meniscus observed.

Fig. 2 shows the simple apparatus as used in routine clinical testing. A cylinder of compressed air (or preferably nitrogen) is led off *viâ* a reducing valve to a Y piece. By closing the free orifice of Y with the thumb the operator can

* From the Department of Otology, University of Liverpool.

https://doi.org/10.1017/S0022215100055560 Published online by Cambridge University Press

roughly regulate the delivery pressure to the catheter. This can be recorded on the manometer. If the meniscus fails to move the tube is not patent. In freely patent tubes it is possible to flick the meniscus to and fro by the most transient closures of the Y piece.

In other cases, however, more persistent efforts must be made with increasing pressures. In a third group the air will not enter until the patient swallows. In many of these cases the meniscus remains in its position of external displacement until the patient swallows once more. Sometimes two or three gulps are necessary before the original position is restored. We have been interested to observe in some cases that under the effect of persistent inflation this valvular action temporarily disappears and the meniscus begins to swing freely as in Group I.

A Simple Tympano Dynamometer.

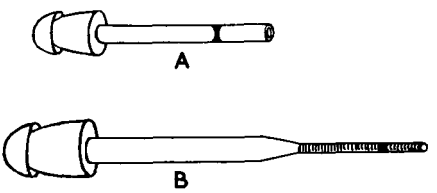


Fig. 1.

This simple device provides visual evidence of the behaviour of the tympanic membrane in response to change of pressure.

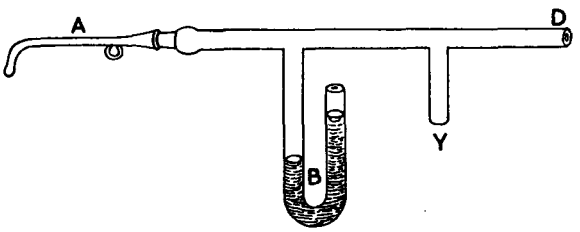


Fig. 2.

For routine clinical work a cylinder of nitrogen is joined *viâ* a reducing valve to D. Finger control at Y provides the required pressure variations which can be read off the manometer B.

The above method is quite adequate for routine clinical testing—but, of course, only gives quantitative information. For more accurate measurements the distal end of the tube can be drawn out and calibrated. Pressure must be applied by nasal olive as originally practised by Zöllner and subsequently by van Dishoeck and others. The pressure must be controlled by suitable valves and we are grateful to Professor Kristenson for enabling us to copy his apparatus (Thomsen, 1957). We are using these techniques to study the valve action of the eustachian tube, the action of the intratympanic muscles, the elasticity of the tympanic membrane and other allied problems. The results of these

https://doi.org/10.1017/S0022215100055560 Published online by Cambridge University Press

investigations will be published in due course. Meanwhile, it is hoped that the simple device of Fig. 1 may prove of interest to clinicians in the course of their routine work.

Since submitting this short notice I have heard from Professor H. K. Kristenson (Rigshospital, Copenhagen) that a similar method has been in use in his department for several years and a preliminary account has already appeared (K. Terkildsen (1957) *Arch. Otolaryng.*, **66,** 484).

"In addition he informs me that Politzer when describing his famous bag actually made use of an identical instrument in 1863. It is difficult to understand why this simple technique has not become established. Possibly the difficulty of obtaining a hermetic seal was responsible. If so it is to be hoped that the Medresco rubber tips—which are ideal for that purpose—will restore tympanomanometry to its proper place as a routine clinical test."

REFERENCES

VAN DISHOECK, H. A. E. (1947) *Acta oto-laryng* (*Stockh.*), **35**, 317.
METZ, O. (1946) *Acta oto-laryng.* (*Stockh.*), Supp. **63.**
THOMSEN, K. A. (1957) *Acta oto-laryng.* (*Stockh.*), **48**, 516.
ZÖLLNER, F. (1935) *Arch. Ohr.-, Nas.-, u. Kehlk.-Heilk.*, **140**, 137.

45 Rodney Street
Liverpool

https://doi.org/10.1017/S0022215100055560 Published online by Cambridge University Press