Ultrasonic labyrinthectomy

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Introduction

THE most alarming symptom of Menières disease is vertigo. Fear of attacks may keep the patient away from all social contact.

Selective labyrinthine destruction, leaving cochlear function intact, became feasible with the use of ultrasound.

This is a description of fifty cases performed in Newcastle General Hospital between 1965 and 1970.

Selection

Examination of all patients referred with vertigo is carried out in the Section of Neuro-otology. Complete studies of cochlear and laryrinthine function are performed. Radiology is by the department of Neuro-radiology. All this is contained within the Regional Centre for Neurology and Neuro-Surgery. Between 1965 and 1970, 1,240 patients were examined in the Neuro-otology clinic.

Twenty-six patients had Acoustic Neuromas. Six patients were submitted to permeatal labyrinthectomy. Only fifty cases fulfilled my criteria for Ultrasonic labyrinthectomy. Detailed analysis of all the 1,240 patients is being presented in a later paper.

Since the vertigo of Menières disease can be relieved by conventional oval window labyrinthectomy, any other measure, less predictable in its destructive effect, must have definite advantages. It would not be sufficient to quote hearing retainment if this lasted only a few months. The object of this paper is to assess labyrinthine destruction, and the quality and duration of hearing preservation in the operated ear. Only if both these factors have been attained in a reasonable percentage of cases can ultrasonic labyrinthectomy remain as a useful operation.

In this series (Tables 1, 2, and 3), all the following criteria had to be present before a patient was submitted to ultrasonic labyrinthectomy.:

Proven Menières disease.
Uncontrolled vertigo.
Useful hearing in the affected ear.

Uncontrolled means that all forms of medical treatment have been tried. Eight patients had already had insertion of a Grommet tube. No sympathectomies had been performed.

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TABLE I.

Age	Male	Female	Total
20—30	4	2	6
30—40	4	4	8
40—50	7	2	9
50—60	11	7	18
60—70	5	4	9
Total	31	19	50

Average age: Males 50 years
Females 53 years

TABLE II.

Year of operation	
1965	7
1966	10
1967	9
1968	8
1969	7
1970	9
Overall	50

TABLE III.

PRE-OPERATIVE (Refers to operated ear)

Symptom	With	Without
Deafness	50	–
Tinnitus	49	1
Vertigo	50	–
Nausea and vomiting ..	47	3

Surgery

No patient should be submitted to surgery without being in possession of as much relevant information as may be considered reasonable. This will depend on the disease and the operation. Ability of patients or relatives to understand has also to be considered.

In my experience the majority of patients with Menières disease seem to have reasonable insight into their condition. I have not been impressed that this disease has a psychosomatic basis, but many patients develop considerable anxiety even after one attack of vertigo.

I explain that the operation should relieve vertigo, without if possible, causing further hearing loss. Since, as far as we know, the disease process is not cured, deafness may progress in later years, but without further vertigo. Very few of my cases have found any relief from tinnitus in the operated ear. The operation is carried out under local anaesthesia. Originally, premedication was with Phenergan, total dosage of this drug

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throughout the operative period was often as much as 75 mgs. It did not prove entirely satisfactory, restlessness, and involuntary movements by the patient impeded the operation. One man became so uncontrollable that he had to have a general anaesthetic. In 1966 we changed to SPARINE 50 mgs. two hours before operation, and OMNOPON 20 mgs. one hour before operation. This combination seems completely satisfactory.

Access to the labyrinth has been by a post-auricular incision, and cortical mastoidectomy. The canal wall is thinned until the blue colour of the membranous labyrinth is visible. This means that, as far as we can judge, all patients can receive the same dosage into the canal.

Post-operative vertigo is treated with STEMETIL. Patients are ambulant on the second day, and this drug is discontinued. Oral penicillin 250 mgs. 6 hourly is given for six days. Sutures are removed on the sixth day, and the patient goes home the following day. Caloric tests and audiometry are performed after two months, and then annually. In none of the operated ears has any residual labyrinthine activity been demonstrated. Positional testing has also proved negative. Dosage is now established at 2,000 joules.

Complications

One patient developed a lower motor neurone facial paralysis a few minutes after completion of ultrasonic transmission. Treatment with A.C.T.H. did not demonstrate any improvement. Conduction studies showed a complete nerve block. After discussion it was decided not to explore the nerve, but to allow the patient home. The A.C.T.H. was discontinued after 21 days. It is fortunate her progress has been satisfactory and no residual deformity is apparent. Twelve months elapsed before maximal recovery.

There is no doubt this is a most disastrous complication, especially in this case, when it affected an attractive lady. It is my policy to maintain a watch on the face during the operation. Even so, no sign of twitching or lack of movement was apparent. Only after the wound had been sutured did the paralysis appear.

The cause is difficult to determine. Dosage had been established by that time. A small dehiscence in the facial canal, with transmission into it of ultrasound via the coolant, seems most feasible.

No bone damage due to heat had occurred. I have not seen a patient in whom complete deafness has been produced during the operation. Wound infection has not been a complication. In one patient, not in this series, the forward position of the lateral sinus prevented completion of the operation. The opening down to the lateral semi-circular canal would have been too small to allow application of the ultrasonic probe.

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I. Frew

Case reports

Case 1:

Mr. A. Aged 45 years. Referred by a neurologist.

History

Gradual deafness in the left ear for the past four years. Attacks of rotational vertigo with nausea for five years. Increasing tinnitus left ear. When seen on 13 March 1969 was losing a great deal of work. The attacks of vertigo, which were at one time reasonably controlled by labyrinthine sedatives, had become much more severe and intractable.

Investigations

No visible abnormality of ears or respiratory tract.

Audiometry showed a 20 decibel perceptive loss in the right ear, and a 50 decibel perceptive loss in the left ear in all frequencies. Recruitment was present in both ears. S.I.S.I. score in the right ear was 10 per cent, in the left ear 60 per cent. Skull X-ray, including internal auditory meati, was normal. Caloric reactions were normal.

Discussion

This patient was suitable for ultrasonic labyrinthectomy. He agreed, and was submitted to operation on 2 April 1969. A dose of 2,000 joules was given, via the left lateral semi-circular canal. Progress was satisfactory, and he went home on 9 April 1969. Although he had no further attacks of vertigo, it proved difficult to restore his confidence. He was referred to a Consultant Psychiatrist, and made a rapid recovery with TRYPTIZOL.

Progress

Returned to work in June 1969 and has remained free of symptoms to date. Hearing in both ears remains at pre-operative level. No response from left labyrinth June 1971.

Case 2:

Lady aged 40 years referred by an E.N.T. colleague on 21 October 1965.

History

Gradual deafness in her left ear for ten years. Attacks of rotational vertigo with sickness for ten years, and increasing left tinnitus. Recently confined to her house. The attacks, which were at one time reasonably controlled by medical therapy, had become more severe and intractable.

Investigations

No visible abnormality of ears or respiratory tract.

Audiometry showed an overall perceptive deafness of 20 decibels in the right ear, and 50 decibels in the left ear.

Recruitment was present in both ears.

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Skull X-ray including internal auditory meati was normal. Caloric reactions were normal.

Discussion

This patient was suitable for ultrasonic labyrinthectomy. Submitted to operation on 11 November 1965. Dosage 4,650 joules.

Progress

She now leads a normal life. Her hearing has gradually improved in the operated ear, and shows only a 20 decibel overall deafness.

No response from her left labyrinth by caloric tests in June 1971.

Vertigo

Complete freedom from attacks of vertigo has been achieved in thirty-five patients (70 per cent).

The remaining fifteen patients form two distinct groups.

First, nine describe mild rotational attacks lasting only a few minutes. Maximum incidence two to three times per year. All these patients are much improved, and have returned to full employment or domestic and social activities.

The second group of six patients all relapsed within one year of operation. Minimum relapse time was three months. Two of this group have been submitted to oval window labyrinthectomy, without improvement. The remaining four patients are on medical treatment, being unwilling to undergo surgery.

None of these patients can work or carry out domestic duties.

Conclusion

With the criteria described, I regard this as an excellent operation. Return to work or domestic and social activities has been obtained in 88 per cent of cases (Table IV).

Hearing conservation at pre-operative level has been obtained in 60 per cent of patients. Actual improvement of hearing in another 16 per cent. All these assessments have been made in May and June 1971 (Table V).

The high rate of hearing conservation and actual hearing improvement suggests that in some patients the ultrasonic procedure has indeed resulted in a cure. The aetiological factor responsible for Menières disease appears to have been neutralized.

These results encourage me to continue with this operation. No longer is it necessary to leave patients with vertigo for long periods before submitting them to surgery. Waiting until someone is incapacitated may produce great mental and financial stress.

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I agree that many people will respond rapidly to medical treatment in the first instance, and this should always be tried. If, however, no improvement is achieved, and the patient is becoming handicapped, then I would now suggest ultrasonic labyrinthectomy.

The success rate is acceptable.

TABLE IV.

	Successful*		Unsuccessful		Total
Overall	44	(88%)	6	(12%)	50
Vertigo	44	(88%)	6	(12%)	50
Deafness	44	(88%)	6	(12%)	50
Tinnitus	7	(14·28%)	42	(85·7%)	49
Nausea and vomiting ..	43	(91·5%)	4	(8·5%)	47

* Return to work or domestic and social activities.

TABLE V.

DEAFNESS

Improved	Unchanged	Worse due to operation failure	Worse due to other causes*	Total
8	30	6	6	50

* Includes: Noise trauma in past occupation
Increasing age
Continuation of Menières without vertigo.

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