ENDOLYMPHATIC SAC SURGERY FOR MENIERE'S DISEASE

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SUMMARY

This paper analyzes 50 consecutively performed endolymphatic mastoid sac shunts. Regardless of method used, vertigo was controlled in approximately 52% of the cases.

It is suggested here that, regardless of the method employed, there remains a high likelihood that the symptoms will recur, and the question is raised as to whether sac surgery may merely induce a temporary remission of the disease process. Consequently, it is hereby proposed that there is a need to devise a method to permanently drain the endolymph in order to more effectively control the disease on a permanent basis.

Key words: Meniere's disease, Endolymphatic sac surgery.

INTRODUCTION

Since Portmann (1) first introduced endolymphatic sac surgery in the treatment of intractable Meniere's disease in 1927, the physiological basis of such surgery has remained controversial. The endolymphatic duct and sac, however, are considered to be the main area into which endolymph is absorbed, despite the theory that endolymph flows both radially and longitudinally (2). Furthermore, animal experiments and histopathologic studies have verified that endolymphatic hydrops is caused by an absorption deficiency in the endolymphatic sac, due to perisaccular fibrosis and hypovascularity (3-5). Based on the aforesaid assumption, many methods have been devised to shunt the endolymphatic sac with the intention of draining the endolymph and restoring the inner ear function, thus controlling the symptoms of Meniere's disease.

The primary therapy for Meniere's disease is medical (6). We use a combination of medication in addition to a low salt diet for Meniere's disease. These measures will control symptoms in the majority of patients. Less than 20 per cent of patients with Meniere's disease ever require surgical intervention. Despite a most intensive medical regimen, however, some patients will continue to have vertiginous attack frequently enough to cause disability. Surgical therapy should be considered for these patients (7).

The first operation recommended if hearing remains is an endolymphatic sac procedure (8).

In this study we have analyzed 50 endolyphatic sac operations putting particular emphasis on the consideration of the following two points: first, an analysis of the efficacy of the surgery; second the findings in revision surgery.

MATERIALS and METHODS

For those patients with episodic vertigo, progressive and fluctuating hearing loss, tinnitus, and or fullness of the ear, a thorough history and ENT examination are performed. In order to both exclude conditions mimicking Meniere's disease and to discover the etiology of the disorder, each patient undergoes the following routine work-up: 1. Spontaneous, gaze and positional nystagmus, eye tracking, optokinetic nystagmus, and bithermal water caloric test: 2. An audiometric profile including pure tone and speech audiometry, SISI, tone decay: 3. Should a retrocochlear lesion be suspected an auditory brain stem response (ABR) and special audiometry including stapedial reflex decay with impedance audiometry: 4. Radiological studies using Towne's and Stenvers' projections, and if necessary, polytomes of internal auditory canals (IACs), computed tomography (CT), or air contrasted CT scan: 5. Blood examinations including blood sugar, triglyceride, T_3, T_4 and 6. Glycerol testing on all surgical candidates. Allergy studies are not routinely conducted.

Patients become candidates for surgery when the symptoms are incapacitating and there has been no response to medical treatment.

A total of 50 cases underwent endolymphatic sac mastoid procedures between 1977 and 1990. Of the patients, 26 were male and 24 female. The average age was 39 years with a range of 24 to 67 years. Meniere's pure tone average ranged from 35 dB to 80 dB, with an average of 62 dB. The duration of symptoms prior to surgery, and elapsed time between episodes, was on the average 28 months and 2 weeks respectively. The postoperative follow-up period averaged 40 months, with a range of 8 months to 10 years.

Surgical Techniques and Drainage Methods:
The patients were operated on under general anesthesia. A simple mastoidectomy was accomplished by exenteration of mastoid air cells, especially the retrofacial ones. The bony plate overlying the dura of posterior fossa between the posterior semicircular canal and the lateral sinus was removed. The endolymphatic sac was identified anteriorly and inferiorly to Donaldson's line as a whitish, dense thickening in the dura. The superior edge of sac was opened with a sickle knife. The lumen of the sac was explored bluntly. The drainage methods employed included a simple incision, 16 cases, a polyethylene tube shunting from sac into mastoid, 20 cases. When the sac could not be identified, the dura around the assumed sac area was widely decompressed, 14 cases, (Table I). The wound was closed without a drain. No major complication, either during surgery or postoperatively, were encountered in this series.

All patients were invited to attend follow-up sessions 1, 3, and 6 months after surgery, and annually thereafter. Subjective symptoms such as tinnitus, fullness, and hearing were asked. In addition an audiogram was documented.

RESULTS

The results of 50 endolymphatic sac operations are shown in Table II.

Six cases underwent sac revisions. Among these, three cases were polyethylene tube shunting. The period between primary surgery and the sac revision ranged from 6 to 30 months, with median of 19 months. In all the sac revision cases the opening of the mastoid cavity revealed that a fibroproliferative response had occurred. Extrasaccular fibrosis was discovered in five cases, and in three cases there were fibrotics bands like tent. In all polyethylene tube shunting cases, there were displacement of tube and in two cases there were granulation tissues in the tubes. Four patients who had revision surgery were symptoms free, the periods of postoperative follcw-up were 6 to 36 months.

DISCUSSION

Since the combination of symptoms now known as Meniere's disease was first described by Prosper Meniere in the 19th century, the etiology of this disease has remained unknown and the treatment, therefore, empirical. Data suggests however, that sac surgery is rational, particularly as the sac is located far from the inner ear thus enabling the most approachable and safe procedure, even though there is considerable controversy in respect to the pathophysiological basis of such procedure. There are numerous theories as to why sac surgery is appropriate and/or successful in the control of Meniere's disease (6,9).

Patients with Meniere's disease always receive medical therapy prior to the recommendation for surgery. We first prescribe diuretics, vasodilators, and a low-salt diet. Despite a most intensive medical regimen, however, some patients will continue to have vertiginous attacks frequently enough to cause disability. Surgical therapy should be considered for these patients.

An analysis of our results supports the use of such surgery, although the follow-up data evidenced a recurrence rate which became noticeable between one to three years after primary surgery and was sustained thereafter. Up to date, the sac revisions performed in this series, four cases (66.6%) have been successful in controlling vertigo and preserving hearing. Sac revisions have been advocated by Arenberg (10), succeeding in reducing the revision rate from 13.9% to 6.7%. House (11) and Paparella (12) noted in their revision surgery that the main reason for the recurrence of symptoms was possibly the occlusion of the tube by glial tissue or extrasaccular fibrosis. The same findings were observed during our revision operations.

The rationale for the endolymphatic sac procedure is prevention of excess of endolymph by draining it into the mastoid. Whether this actually occurs has not been proven. The fact remains that many patients benefit significantly from endolymphatic sac surgery. This coupled with the very low morbidity of the operation still makes it the first procedure to be recommended for patients with disabling Meniere's disease who do not respond to medical therapy.

Table I: Surgical procedures for Meniere's disease.

	Number of patients
Endolymphatic sac drainage (with insertion of polyethylene tube)	20
Endolymphatic sac drainage	16
Decompression of sac	14

Table II: Summary of results of endolymphatic sac surgery in patients with Meniere's disease.

Symptoms	Number of patients (%)
Vertigo	
Improved	52
Same	40
Worse	8
Tinnitus	
Improved	15
Same	80
Worse	5
Hearing	
Improved	12
Same	78
Worse	10
Fullness	
Improved	60
Same	40
Worse	0

REFERENCES

1. *Portmann, G. Vertigo surgical treatment by opening the saccus endolymphaticus. Arch Otolaryngol 1927; 6: 309-319.*
2. *Kimura RS, Schuknecht HF. Membranous hydrops in the inner ear of the Guniae pig after obliteration of the endolymphatic sac. Pract Otol Rhinol Laryngol 1965; 27: 343-354.*
3. *Gussen R. Meniere's disease: New temporal bone findings in two cases. Laryngoscope 1971; 81: 1695-1707.*
4. *Schindler RA. The ultrastructure of the endolymphatic sac in Meniere's disease. Adv Otol Rhinol Laryngol 1979; 25: 127-133.*
5. *Schuknecht HF, Northrop C, Igarashi M. Cochlear pathology after destruction of the endolymphatic sac in the cat. Acta Otolaryngol 1968; 65: 479-487.*
6. *Snow JB, Kimmelman CP. Assessment of surgical procedures for Meniere's disease. Laryngoscope 1979; 89: 737-747.*
7. *Brackmann DE, Nissen RL. Meniere's disease: Results of treatment with the endolymphatic subarachnoid shunt compared with the endolymphatic mastoid shunt. Am J Otol 1987; 8: 275-282.*
8. *Bretlau P, Thomsen J, Tos M, Johnsen NJ. Placebo effect in surgery for Meniere's disease: Nine-year follow-up. Am J Otol 1989; 10: 259-261.*
9. *Paparella MM, Goycoolea M. Endolymphatic sac enhancement surgery for Meniere's disease. Ann Otol Rhinol Laryngol 1981; 90: 610-615.*
10. *Arenberg IK, Balkany TJ. Revision endolymphatic sac and duct surgery for recurrent Meniere's disease and hydrops: Failure analysis and technical aspect. Laryngoscope 1982; 92: 1279-1284.*
11. *House WF, Fraysse B. Revision of endolymphatic subarachnoid shunt for Meniere's disease. Arch Otolaryngol 1979; 105: 599-600.*
12. *Paparella MM. Pathogenesis of Meniere's disease and Meniere's syndrome. Acta Otolaryngol (Stockh.) (Suppl.) 1984; 406: 10-25.*