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Craniocorpography in the Diagnosis and Therapeutic Indication of Endolymphatic Hydrops

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The glycerol test helps to establish the differential diagnosis between Ménière's disease and other vertigo disturbances, but the test becomes very long and in its primary form informs us only about the cochlear response to the osmotic changes produced by glycerol in the inner ear, and tells us nothing about the vestibular response. In patients with unilateral endolymphatic hydrops we have performed simultaneously the glycerol test with audiometric and craniocorpographic (CCG) control. The response of the vestibular apparatus to the glycerol becomes evident in 84.5% of cases on average in 30 min. By contrast, the variation in the hearing-threshold appears in only 54% of cases and required on average 60 min. At the same time, CCG is easier and shorter to perform than audiometry, showing five different types of response to glycerol. The combined use of audiometry and CCG allows us to predict with sufficient accuracy the response of the endolymphatic hydrops to the treatment, simplifying the therapeutic indication and the choice of the surgical technique. *Key words: Ménière's disease, glycerol test, surgical management.*

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The diagnosis of endolymphatic hydrops is not always easy and its medical treatment often fails. A long-term improvement of all symptoms is only achieved by means of pharmacological therapy, in 20.73% of cases (1). For this reason it is frequently necessary to perform a surgical treatment, but at present there is not a unanimous criterion about this question (2). In order to make diagnosis and therapeutic indication easier, the glycerol test, described by Klockhoff & Lindblom in 1966, is employed together with other methods. Its efficacy has been confirmed by several authors. This test helps to establish the differential diagnosis with other vertigo-disturbances and to separate the reversible from the irreversible forms of hydrops, making possible the indication of medical or surgical treatment (3–6).

As is well known, the glycerol test is evaluated by measuring the hearing threshold by air conduction before and after the ingestion of glycerol. However, the clearest results, when the test is positive, appear between 2 and 3 hours after the ingestion. This examination must be repeated several times at regular intervals, making this test very long. On the other hand, the pure-tone audiometry only informs us about the cochlear response to the osmotic changes produced by glycerol in the inner ear, and tells us nothing about the vestibular response. For this reason, in this paper we have studied comparatively the effects of glycerol on the cochlear by means of audiometry and on the vestibular apparatus by using the Craniocorpography (CCG) during Unterberger's test.

MATERIAL AND METHOD

We have studied 13 patients with unilateral endolymphatic hydrops, aged between 22 and 61 years. Eight patients were female and 5 male. The glycerol test was always performed in the morning, following the guidelines given by Sauer, Kaemmerle & Arenberg (6).

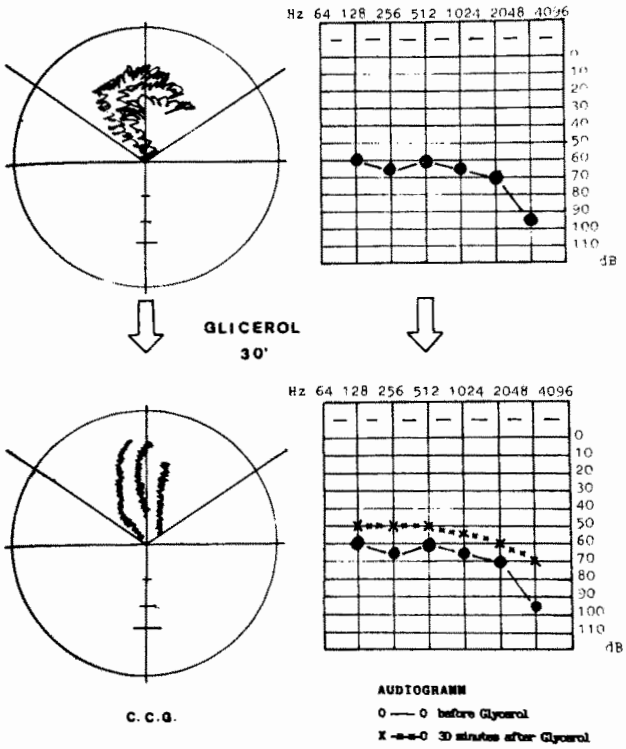

Fig. 1. (*Above*) On the left, CCG during Unterberger's test in a patient suffering from endolymphatic hydrops before glycerol ingestion. On the right, pure-tone audiometry pre-ingestion. (*Below*) On the left, CCG, 30 min after glycerol ingestion. On the right, audiometry 45 min after ingestion. In this case, both audiometry and CCG improved.

Before glycerol was ingested, hearing threshold by air conduction was measured for the frequencies between 128 and 8192 Hz and the Craniocorpography was done during Unterberger's test. Immediately after 75 cc of a glycerol solution to 55% were given, corresponding to a dosis of 0.5 to 1 g/kg of body weight. Both explorations were repeated 30, 60 and 120 min later.

RESULTS

The results obtained are shown in Table I. Only one patient complained during the test of sickness and headache. In all cases in which the CCG was modified, the change was evident 30 min after the ingestion of glycerol and it always preceded the variation in the pure-tone audiometry and its duration was longer.

Table I

Glycerol test	No. of cases	%
Improvement of audiometry and CCG	4	30.76
Improvement only of CCG	4	30.76
No change	2	15.38
Impairment only of audiometry	1	7.69
Impairment of audiometry and CCG	2	15.38

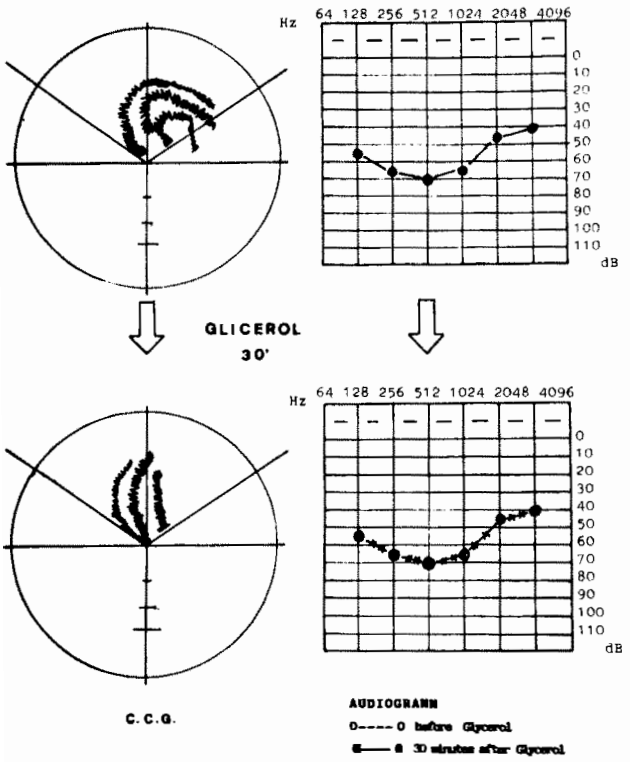

Fig. 2. (*Above*) On the left, CCG preingestion of glycerol. On the right, the corresponding audiometry. (*Below*) CCG and audiometry 30 and 45 min respectively after glycerol ingestion. As can be seen, the CCG improved, while the audiometry remained unchanged.

DISCUSSION

As we can see, there exist five different responses to glycerol in patients suffering on hydrops. An improvement in hearing and CCG (Fig. 1) was found in 30.76% of all patients, the improvement in CCG being the first. It is difficult ot interpret these results, but in our opinion in these cases of hydrops there is probably a slight lesion of the sensorineural cells, so that during osmotic changes, induced by glycerol, a rapid functional recovery occurs. In these cases, according to Klockhoff & Lindblom (5), we are able to predict with a certain margin of error the hearing improvement and the disappearance of vertigo by means of a pharmacological treatment and, when this fails, by means of a pathogenic surgery of hydrops, namely with an endolymphatic–mastoid shunt of the saccus or similar.

When only the CCG improves (Fig. 2) and hearing remains unchanged, which occurs in 30.76% of cases, we can assume that the lesions of the more delicate cochlear hair cells are greater than in the above-mentioned case, so that they do not respond to the variations in the endolymphatic osmotic pressure. In this category of patients, pharmacological treatment may be tired, but if it fails, combined surgery seems advisable, performing and endolymphatic–mastoid shunt together with a retrolabyrinthine vestibular neurectomy as the only means of curing vertigo and recovering hearing. In 15.38% of cases, no variation occurred after glycerol, which allows us to state the presence of an irreversible lesion of the hair cells, both cochlear and vestibular (Fig. 3). In these cases it seems reasonable to perform a transtemporal vestibular neurectomy as symptomatic treatment, as pathogenic surgery is not very promising. When both audiometry and CCG deteriorate we are able to assume a perilymphatic hypertension and it would be interesting to as certain experimentally what happens after the intravenous injection of bidistilled water.

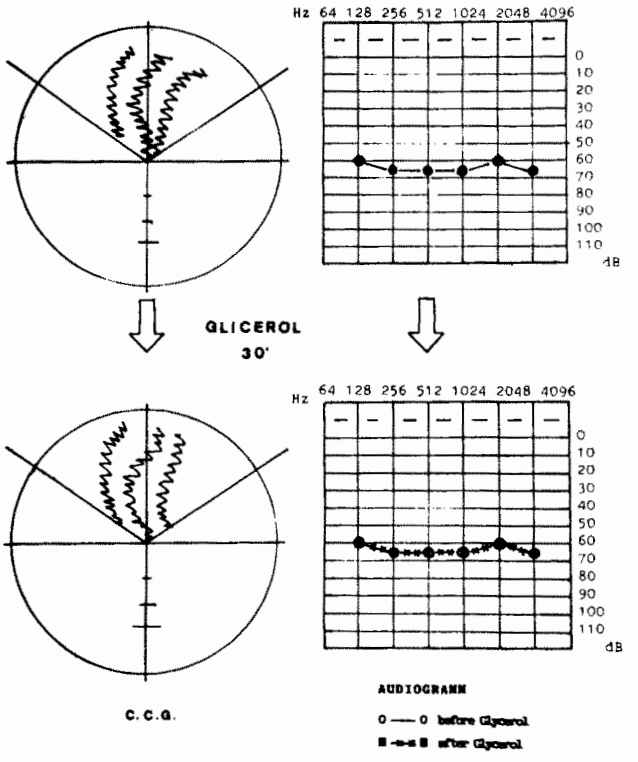

Fig. 3. As in the previous figures, CCG and audiometry are shown before and after glycerol ingestion. In this case both remained unchanged.

Only in 7.69% of patients did the audiometry deteriorate, with no change in the CCG. It is difficult to interpret these results, but we could assume it to be a case of long-established hydrops well compensated by the central nervous system. In all these cases we recommend initially transtemporal vestibular neurectomy.

CONCLUSIONS

The combined use of audiometry and Craniocorpography during Unterberger's test allows the evalution of the response of both the cochlear and the vestibular apparatus after glycerol ingestion.

The CCG increases the sensibility of the glycerol test, since the vestibular response to the osmotic changes induced by glycerol is more immediate, lasting and frequent than of the cochlea. By combining these two methods, audiometry and CCG, we can predict with sufficient accuracy the response of the endolymphatic hydrops to the treatment, simplifying the therapeutic indication and the choice of the surgical technique simpler.

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REFERENCES

1. Elorza FX, Bartual J. Vértigo de Ménière: IV Análisis estadístico del empleo y efectividad de los fármacos en el tratamiento del hydrops endolinfático. Otorrinolaringol Ibero Am 1983; X/2: 139–52.
2. Zini C. Cirugía del oído interno y otoneurocirugía. Actas del Congreso Nacional de ORL y Patol Cervico-facial 1984; II/1: 1–25.

3. Snyder J. Changes in hearing associated with glycerol test. Arch Otolaryngol 1971; 93/2: 155–60.
4. Arenberg IK, Stroud MH, Spector GJ, Carver WF. The salt-loading provocative glycerol test for the early diagnosis of auditory endolymphatic hydrops (Ménière's disease). A preliminary report. Rev Laryngol 1974; 95/11–12: 709–19.
5. Klockhoff I, Lindblom U. Glycerin test in Meniere's disease. Acta Otolaryngol (Stockh) 1967; Suppl 224; 450–1.
6. Sauer RC, Kaemmerle AW, Arenberg IK. The value of the glycerol test. A review of 60 ears with unidirecctional inner ear valve implants. Otolaryngol Clin North Am 1980; 13/4: 693–701.