ABSTRACT

It is necessary to have a reliable and reproducible animal model, in order to assess and treat chronic tympanic membrane perforations.

After a literature review, different surgical techniques and rates of patency of tympanic membrane perforation were encountered.

We report an inexpensive, readily available, and easy to create animal model.

INTRODUCTION

Chronic tympanic membrane perforation is a frequent clinical condition in our practice. In the last 5 years, 512 patients have been treated with the diagnosis of chronic tympanic membrane perforation in our institution.

In order to understand and treat chronic tympanic membrane perforation it is necessary to have a reliable and reproducible animal model, this model must resemble the patient clinical condition. Several attempts have been published, but the vast majority is based on acute injury, and thus heal spontaneously.

The tympanic membrane is a unique structure in the human body, due to its composition and the atypical pattern of healing. Therefore, every case is different and treatments may vary from observation to surgical management, and a chronic tympanic membrane perforation model is needed to test potential treatments.

The animal model must be inexpensive and have a good access to its tympanic membrane. The procedure must be minimally invasive and with an easy learning curve, increasing its effectiveness in application. Santa Maria et al. report that the perforation should be observed at least during 8 weeks to be defined as chronic.

METHODS AND MATERIALS

The study was made following the Guide for the care and use of laboratory animals and the “Norma Oficial Mexicana”. We performed an endoscopic, tomographic and tympanometric study of the guinea pig middle ear structures (n=5, 10 ears). Figure 1, Table 1.

Then 17 male guinea pigs, eight months age, weighing from 500 gr-800 gr, were selected. All subjects were anesthetized with 0.5mg/kg xylazine and 70mg/kg ketamine intramuscular; and 0.05 mg atropine subcutaneous.

Under endoscopic vision we performed myringotomy in the anterior quadrant using microflaps in a radial fashion and the edges were infolded. Then we applied a 5% glutaraldehyde solution in the edges with a cotton pledge for 1 minute. In 3 subjects we did not applied this solution, thus, serving as controls. Figure 3.

We did endoscopic follow up at 7, 14, 30 and 60 days, after that we performed histological analysis. Figure 4.

RESULTS

Control subjects healed within 2 weeks (6 ears). In the rest of the subjects we achieved chronic membrane perforation in 94% of the subjects (32 ears).

One subject (right ear) developed a keratin like tissue which made impossible to assess the tympanic membrane. Other subject developed acute otitis externa (left ear) and was excluded.

Histological analysis show a thick epithelial layer in the edges of the perforation. See Figure 5.

DISCUSSION

The goal of this study was to report a chronic tympanic perforation model, in order to assess the use of a novel bioplastic material developed by Dr. Martínez Richa as a member of Universidad de Guanajuato.

A universal model of chronic tympanic perforation does not exist yet. Nevertheless, this model mimics the patient’s condition of a stable chronic tympanic perforation.

Moreover, this model could be useful in the learning curve of otoendoscopic surgery, and we demonstrated that the anatomy of the guinea pig is a suitable model to practice this procedure under endoscopic view.

CONCLUSIONS

Our procedure is a feasible method and may be useful in further investigations to assess and treat tympanic membrane perforations. These results are comparable with the studies reported by Amoils and Kaftan.

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REFERENCES


