



Effect of anti-adhesion barrier solution containing ciprofloxacin-hydrocortisone on abraded mucosa with otitis media

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ABSTRACT

Objective: No study to date has assessed the anti-adhesive effect of new middle ear (ME) packing agents in. This study compared the anti-inflammatory and anti-adhesive effect of antibiotic-steroid containing packing agents in abraded mucosa of the ME inflammation.

Materials and methods: Transbullar injection of a saline suspension of *Pseudomonas aeruginosa* lipopolysaccharide (LPS) induced otitis media. ME mucosa of guinea pigs was abraded using a pick 30 min after LPS inoculation. The animals were divided into four groups of 10 guinea pigs each. In group A, ME cavity was preserved without any packing. In group B, ME cavity was packed with soluble hyaluronic acid-carboxymethyl cellulose (HA-CMC). In group C, the ME cavity was packed with soluble HA-CMC. In group D, the ME cavity was packed with antibiotic-steroid containing soluble HA-CMC. Otoendoscopic examination, auditory brainstem responses (ABRs), and radiographic examination using computerized tomography (CT) were performed at 2 weeks post-surgery. Histopathological evaluation for ME mucosa was performed by light microscopy (LM) and scanning electron microscopy (SEM).

Results: Otoendoscopic findings and CT findings revealed that group D showed the best recovery of aeration in the ME compared to other groups. Recovery of ABRs threshold was significantly attenuated in group D. In LM and SEM findings, group D showed normalized mucosal thickening compared to other groups.

Conclusion: ME packing by antibiotic-steroid containing soluble HA-CMC may be useful in the abraded mucosa of the ME inflammation.

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1. Introduction

Ideally, the ear should be completely dry and free from infection at the time of tympanoplasty. A study documented no significant difference between dry and wet ears in causing re-perforations, but the occurrence of an adhesive eardrum was significantly greater when a tympanoplasty was performed on a discharging or moist ear rather than on a dry ear [1]. In a discharging or moist ear, the tympanic mucosa is often edematous. Potential postoperative problems include re-perforation, graft failure, and granular neodrum. In an effort to eliminate acute and chronic infections, otological antibiotic drops have been routinely used in tympanoplasty for chronic otitis media. Removal or disturbance of granular or polypoid tympanic mucosa can result in fibrosis and adhesions. To prevent these adhesions and to have an air-filled middle ear

space, a silastic sheet is often used to line the tympanic cavity. However, a silastic sheet may cause thickening of fibrotic tissue, necessitating a second operation for its removal. Non-ototoxic antibiotic drops such as ciprofloxacin alone or in combination with a steroid-soaked Gelfoam sponge is routinely packed in the middle ear (ME) cavity to prevent postoperative infection of the ear, as well as to support the eardrum [2].

A number of currently available otological preparations contain an antimicrobial in combination with either hydrocortisone or dexamethasone corticosteroid agents. Gelfoam is an absorbable hemostatic agent commonly used as a scaffolding substance to support tympanic membrane grafts and ossicular chains in tympanoplasty. However, unexpected fibrosis and adhesions after Gelfoam packing have been reported clinically and in animal studies [3–5].

Hyaluronic acid (HA) derivatives have been successful in preventing postsurgical adhesions in experimental and clinical studies [6,7]. Septrafilm is a well-known adhesion barrier bioresorbable membrane that consists of the chemical derivative hyaluronate (HA) and carboxymethyl cellulose (CMC). Previously,

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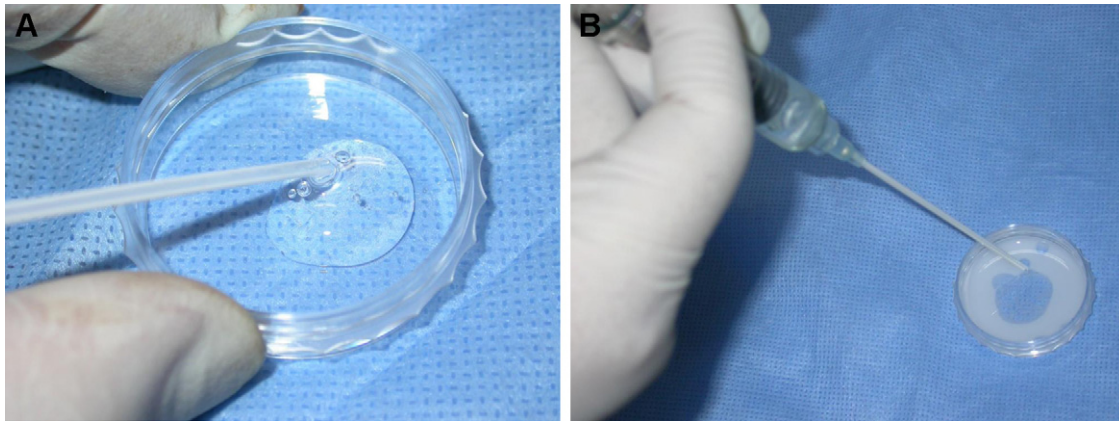


Fig. 1. Soluble HA-CMC (A). Combination of soluble HA-CMC with antibiotic-steroid ototopical solution was performed by stirring in the small Petri dish (B).

we reported the anti-adhesive effect of oxidized regenerated cellulose (Interceed), HA-CMC (Septrafilm), and esterified HA (MeroGel) in the abraded mucosa of a guinea pig model [8,9].

Recently, an anti-adhesion barrier solution has been developed. The effectiveness of several solutions, including CMC solutions, and solutions containing fibrinolytic drugs, polyvinylpyrrolidone-CMC, polysaccharide-CMC, and HA-CMC has been reported [10–13]. Bahadir et al. [14] reported that ME fibrosis and adhesion was reduced using a combination of Gelfoam and steroids in the ME cavity. However, the experiment was performed in healthy ME cavity in the absence of inflammation.

To date, no studies have investigated the anti-adhesive effect of new ME packing agents in an endotoxin induced otitis media. Most HA-CMC or modified HA based ME packing has been shown previously to have a beneficial effect on mucosal healing in a

healthy animal model [6–9]. None has compared the efficacy of Gelfoam and HA-CMC combined with ototopical antibiotic-steroid agents for packing of infected ME. We hypothesized that HA-CMC combined with ototopical antibiotic-steroid would demonstrate better efficacy in their ability to inhibit inflammatory adhesion formation. The purpose of this study was to compare the anti-inflammatory and anti-adhesive effects of antibiotic-steroid containing packing agents in abraded mucosa in inflammation of the MEs.

2. Materials and methods

Thirty male guinea pigs (weighing 250 g each) with normal eardrums were used. The guinea pigs were housed in rooms with a constant temperature of 22 °C, humidity of 50%, and an ambient

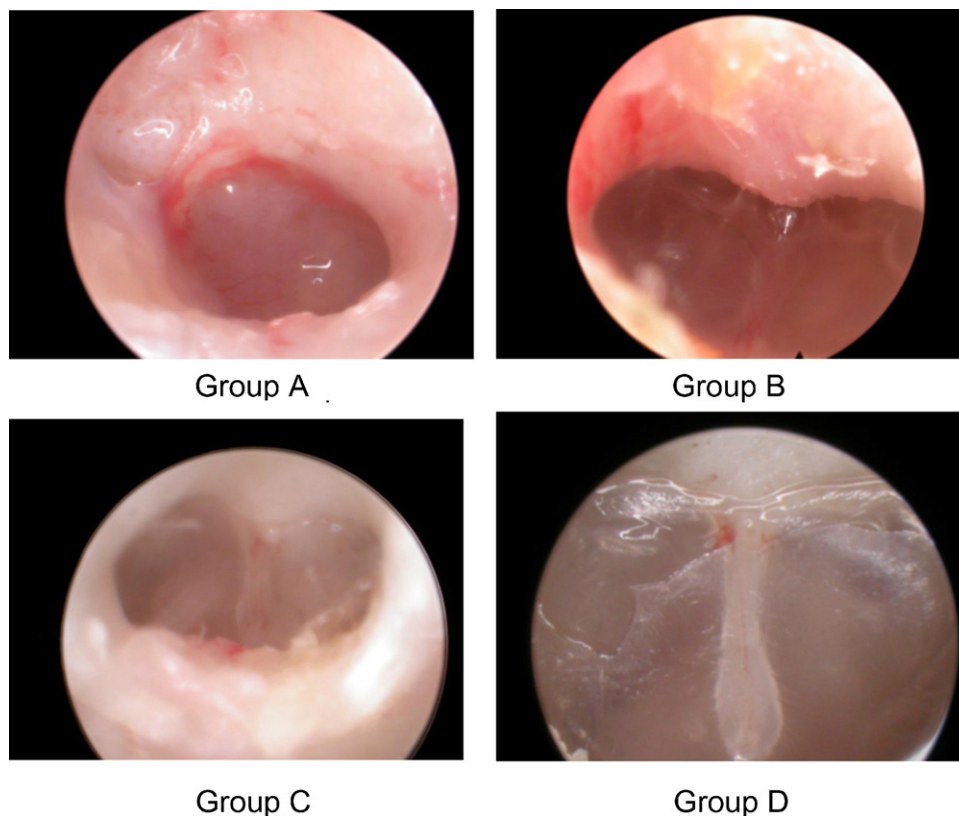


Fig. 2. Otoendoscopy 2 weeks after surgery shows the best recovery of the middle ear in group D. A: no packing, B: HA-CMC packing, C: ciprofloxacin-hydrocortisone ototopical solution packing, D: combined HA-CMC with ciprofloxacin-hydrocortisone ototopical solution packing.

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