A Review of Middle Ear Packing Agents

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INTRODUCTION

Tympanoplasty is a common otologic procedure performed to repair tympanic membrane perforations, address chronic infections, or restore conductive hearing loss. Middle ear packing (MEP) has long been used postoperatively to stabilize grafts, prevent adhesions, and achieve hemostasis. Despite widespread practice of middle ear packing, both the choice and quantity of packing material have been sources of ongoing debate. Chitosan based materials are a novel packing material for the middle ear.

THE IDEAL PACKING MATERIAL

- Biocompatible
- Absorbable
- Non-toxic
- Support hemostasis
- Easy to work with

METHODS

Comparing Chitosan based materials with gelatin sponge

Cases of tympanoplasty from 2017 to 2021 were reviewed and 27 patients who had middle ear packing with a chitosan-based product were identified. A cohort of 61 children and 131 adults were reviewed to serve as potential historical controls. Demographics, surgical information, and post-operative outcomes were abstracted. Audiograms were analyzed to assess changed in conductive hearing loss.

RESULTS

Results of graft failure and post-operative infections were similar between patients who received packing with gelatin sponge compared to chitosan based.

- Persistent ABG above 10 dB
- Average change in bone PTA of 1 dB
- 30-40% of patients had closure of the ABG > 10 dB

PACKING MATERIALS

Name	Composition	Advantages	Disadvantages
Gelfoam	Absorbable gelatin sponge	Non-toxic, non-antigenic, ease of handling	Adhesions, fibrosis
Merogel	Esterified Hyaluronic acid	Biocompatible, less fibrosis and scarring	Availability, handling
Posisep	Chitosan based	Antimicrobial, non-ototoxic	Limited long-term research
Surgicel	Oxidized regenerated cellulose	Non-toxic, non-antigenic	Limited long - term research
Otopore	Synthetic polyurethane foam	Less fibrosis and inflammation	Resorption times, fragmentation
Seprafilm	Carboxymethyl-cellulose +hyaluronic acid	Less fibrosis, non-toxic	Limited long-term research
Nasopore	Synthetic polyurethane foam	Non-ototoxic, less fibrosis	Subepithelial fibrous thickening

DISCUSSION

Gelatin Sponge is the most commonly used packing material despite documented fibrosis, adhesions, and TM retraction. Chitosan-based materials are a novel packing material that have shown to reduce adhesions. This study aimed to provide a comprehensive review of middle ear packing materials available, as well as retrospectively analyze the post-operative effect of chitosan-based materials. We saw results consistent with the literature, that chitosan-based materials are a safe packing material that perform similar to gelatin sponge.

Project Limitations

- Single centre
- Small sample size (n=27)
- Length of follow up (less than 1 year)

Future Directions

- Expand data collection
- Longer post-intervention data collection
- Compare to other packing materials used

CONCLUSIONS

Chitosan is a safe option to use for middle ear packing in tympanoplasty, as this method had similar rates of graft failure and was not ototoxic when compared to historical controls. Further studies are necessary to assess long term rates of scarring and fibrosis with chitosan packing compared to gelatin sponges.