

# Evaluation of Prognostic Factor for Perforation Closure Rate in Patient with Chronic Otitis Media

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## Abstract

**Objective:** To evaluate factors affecting the perforation closure rate for perforated otitis media. **Methods:** Between 2008 and 2012, a total of 118 patients with perforated chronic otitis media underwent tympanoplasty at Hyogo College of Medicine Hospital by a single surgeon. Prognostic factors were analyzed using multivariate analysis with logistic regression. **Results:** The success rate for tympanic perforation was 93.2%. Factors showing significance on multivariate analysis were dryness of perforation and patient age at the time of surgery. **Conclusion:** The results suggest that pre-surgical treatment is a key factor influencing the closure rate.

## Keywords

Tympanoplasty, Underlay Method

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## 1. Introduction

The goals in myringoplasty are restoration of the integrity of the tympanic membrane, eradication of the existing pathology, creation of a sound-conduction mechanism in a well-aerated, mucosa-lined middle ear cleft, and preservation of these outcomes over time [1] [2]. The most frequent failure in the underlay method is reperforation of the tympanic membrane, anterior blunting, and lateralization or thickening of the graft. The risk of reperforation reportedly ranges between 7% and 27% [2]. Many factors are considered to influence the rate of long-term success. This study evaluated the perforation closure rate for 118 patients (118 ears) with perforated chronic otitis media following the underlay method conducted via retroauricular approach by a single surgeon. In addition, identifiable clinical and technical prognostic factors were examined using multivariate analysis.

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## 2. Material and Methods

Between 2008 and 2012, a total of 118 patients (age range, 6 - 83 years) with perforated chronic otitis media, excluding adhesion otitis media and cholesteatoma, underwent tympanoplasty at Hyogo College of Medicine Hospital. The same surgeon performed tympanoplasty under general anesthesia using the retroauricular approach. Surgical procedures comprised the underlay technique, harvesting the temporalis fascia as a graft material, and application of fibrin glue [3]. We used the  $\chi^2$  test to compare postoperative success rates, and logistic regression analysis to identify factors affecting reperforation. All patients were followed up for at least 1 year. The variables included in logistic regression analysis were sex (male versus female), patient age (<10 years versus  $\geq 10$  years), side (right versus left), laterality (bilateral versus unilateral), size of perforation (<three quarters versus  $\geq$ three quarters), gelform in the middle ear space (yes versus no), otorrhea at surgery (discharge versus dry), chitin membrane (yes versus no), and methicillin-resistant *Staphylococcus aureus* (MRSA)-infected (yes versus no). Values of  $p < 0.05$  were considered indicative of statistical significance. Statistical analyses were performed using Statview version 5.0 software (Hulinks, Tokyo, Japan).

## 3. Results

The tympanic membrane perforation closure rate at more than 1 year after surgery was 93.2%. Demographic and clinical characteristics of the 118 patients are shown in **Table 1**. Results of univariate analysis of factors affecting the perforation closure rate using logistic regression analysis are shown in **Table 2**. The tympanic membrane perforation closure rate was higher in patients using gel form, with dry perforation and without MRSA. Presence

**Table 1.** Demographic and clinical characteristics of 118 patients.

Characteristic	Number (percent)
Sex	
Male	50 (42.4%)
Female	68 (57.6%)
Patient age	
<10 years	7 (5.9%)
$\geq 10$ years	111 (94.1%)
Side	
Right	58 (50.0%)
Left	58 (50.0%)
Laterally	
Bilateral	25 (21.2%)
Unilateral	93 (79.8%)
Size of perforation	
<three quarters	18 (15.2%)
$\geq$ three quarters	100 (84.2%)
Gelform in middle ear space	
Yes	46 (39.0%)
No	72 (61.0%)
Otorrhea at surgery	
Discharge	10 (8.5%)
Dry	108 (91.5%)
Chitin membrane	
Yes	104 (88.1%)
No	14 (11.9%)
MRSA-infected	
Yes	9 (7.6%)
No	109 (92.4%)

of discharge in the ear and patient age were factors significantly associated with whether closure of the tympanic membrane was achieved. Results of multivariate analysis for factors affecting long-term closure using logistic regression analysis are shown in **Table 3**. As in univariate analysis, discharge in the ear and patient age were identified as significant factors on multivariate analysis.

#### 4. Discussion

Successful closure of the perforation was achieved in 93.2% of the 118 ears. This success rate is comparable with results in the literatures [1] [4]. Some authors have recently recommended cartilage tympanoplasty in patients with high-risk perforation [5]. We also use cartilage tympanoplasty in revision cases and patients with adhesion otitis media, but the present study excluded utilization of cartilage, revision surgery, and cases of adhesion otitis media in order to perform simple analysis. In our study, all reperforation cases after surgery were found within 3 months. Albera *et al.* [2] reported that 89% of failures appeared within the first 3 months after surgery, including 63% within the first month. These results suggest good stability of the graft obtained by 3 months postoperatively affords good results in terms of healing of the tympanic membrane.

Controversy remains as to whether the size of perforation influences the success rate [1] [2]. The transcanal method of simple underlay myringoplasty using fibrin glue was developed in Japan [3] [6]. We performed the simple underlay myringoplasty using this technique only for dry, small-sized perforations. In the present study, almost all perforations were middle-sized or large and they were operated by the underlay method. Success rate thus did not differ significantly according to the size of the perforation.

Age is usually considered a major prognostic factor, and the proper age to perform myringoplasty remains controversial. Some authors have recommended performing the procedure as early as possible, while others recommend waiting until the child reaches 10 years of age, when Eustachian tube function has matured. In our previous study [7], the success rate for functional success, based on the presence of an intact membrane without adhesion or effusion, was significantly lower in children with abnormal contralateral ears. Multivariate analysis in the present study demonstrated age, but not laterality, as a significant factor, in the anatomical success of the underlay method.

Otorrhea has previously been considered a negative prognostic factor because the mucosa is thick and microbial agents might reduce the ability of the graft to attach [8]. Some authors have found a significantly higher rate

**Table 2.** Univariate analysis of prognostic factors associated with myringoplasty.

Factors	Contrast	<i>p</i>
Sex	Male versus female	0.652
Patient age	<10 years versus ≥10 years	0.038
Side	Right versus left	0.439
Laterality	Bilateral versus unilateral	0.974
Size of perforation	<three quarters versus ≥three quarters	0.978
Gelform in middle ear space	Yes versus no	0.146
Otorrhea at surgery	Discharge versus dry	0.009
Chitin membrane	Yes versus no	0.954
MRSA-infected	Yes versus no	0.079

**Table 3.** Multivariate analysis of prognostic factors associated with myringoplasty.

Factors	Contrast	<i>p</i>
Patient age	<10 years versus ≥10 years	0.025
Gelform in middle ear space	Yes versus no	0.265
Otorrhea at surgery	Discharge versus dry	0.029
MRSA-infected	Yes versus no	0.993

of graft uptake in patients who had dry ear for 3 months preoperatively [4]. Conversely, Albera [2] found no significant correlation with respect to dry ear. In our study, the only significant correlation with good outcome in both uni- and multivariate analyses was dry perforation. Our results indicate dryness of the perforation as an important predictive factor in the underlay method.

## 5. Conclusion

Multivariate analysis indicates dryness of perforation and patient age as important predictive factors in performing the underlay method.

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