



## Tympanic membrane perforation in children: Endoscopic type I tympanoplasty, a newly technique, is it worthwhile?☆



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### ABSTRACT

**Objectives:** To evaluate the results of a newly introduced technique to our Department of endoscopic assisted transcanal myringoplasty applied in tympanic membrane perforation in children of any age and compare them to that of the previously standard microscopic assisted myringoplasty technique.

**Methods:** A retrospective study of myringoplasties performed between January 2005 and June 2014 in children suffering from chronic otitis media with perforation. In microscope-assisted cases, a transcanal approach was applied when the anterior tympanic annulus was completely visible through the ear speculum, and a postauricular approach was used in all other cases. A transcanal approach was used in all endoscopic-assisted cases.

**Results:** Between January 2005 and December 2010 and January 2011 and June 2014, 23 and 22 myringoplasties were performed by means of an operative microscope and an endoscope, respectively. Patient age varied from 5 to 16 years. Median duration of microscopic and endoscopic approaches was 90 min and 80 min ( $P = 0.3$ ), respectively. Hospital stay after surgery was significantly longer in the microscope group than the endoscope group ( $P < 0.001$ ). The intact graft success rate was 82.6% in microscopic and 90.9% in endoscopic approaches. Median postoperative air-bone gap of microscopic and endoscopic approaches was 6.2 dB and 6.6 dB, respectively ( $P = 0.9$ ). Neither intra- nor postoperative complications were observed.

**Conclusion:** Endoscopic transcanal myringoplasty is an alternative surgical approach to traditional technique. This surgery is more conservative than microscopic approach and can be performed in all pediatric cases independently from age. Moreover, it offers comparable anatomical and functional results to the traditional surgery, and grants better comfort for the child.

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## 1. Introduction

Myringoplasty (MP) in children is a common otologic procedure that can offer a success rate as high as 95% [1,2]. Most authors consider MP in children to be technically more difficult compared with adults due to narrowness of the external auditory canal (EAC) and generally smaller size of the ear [3,4]. In fact, in small children the procedure is technically demanding and must be performed by an experienced otologist [5]. In such a narrow anatomy, the preparation of tympanomeatal flap (TMF) generally necessitates

permeatal incision employing an endaural or postauricular approach, especially in anterior and subtotal perforations [6,7]. Furthermore, prognosis for graft survival in MP for anterior quadrant perforation is less than other quadrants due to predominant physiological blood supply to the posterior half of the tympanic membrane [8] and inadequate graft support [6].

The introduction of endoscopy to otologic surgery is gradually receiving greater attention in place of a standardized microscopic approach (MA), even in children [9,10]. Potential advantages of an endoscopic approach (EA) include the possibility to have a wide view and observe areas behind the angle, offering the possibility of being less invasive by adopting a transcanal approach and avoiding a postauricular or endaural approach.

Taking into consideration the aforementioned issues, the first aim of this investigation was to confirm the feasibility of EA to perform MP with TMF using the underlay technique in children, and report on its technical difficulty, complications, duration,

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failures, audiological outcomes, and advantages. The second aim was to compare the results of the newly adopted technique in our department of EA to the traditional MA performed in the same institute by the same surgeon in order to objectively evaluate the two approaches.

## 2. Materials and methods

### 2.1. Observation

An observational, retrospective study was performed analyzing the clinical records of children, who received surgical treatment for chronic otitis media between January 2005 and June 2014 at the Department of Pediatric Otorhinolaryngology, Spedali Civili, Brescia, Italy. Patients who presented a stable tympanic perforation for at least 1 year and no recurrent infection during the last 4 months were included. Patients with keratin accumulation or cholesteatoma, ossicular chain erosion, previously submitted to tympano-mastoid surgery, and who presented craniofacial dysmorphisms, were excluded from the analysis.

### 2.2. Subjects and techniques

All patients underwent MP, which was performed with an underlay TMF technique by the first author under general anesthesia. Microscope and endoscope assisted myringoplasty techniques were applied utilizing the same set of tools and injection of the external auditory canal (EAC) with vasoconstrictor was done before commencing the surgical procedure.

#### 2.2.1. Standard technique

From January 2005 to December 2010, myringoplasties were performed by means of an operating microscope. A transcanal approach was chosen when the anterior tympanic annulus was completely visible through the ear speculum, and a postauricular

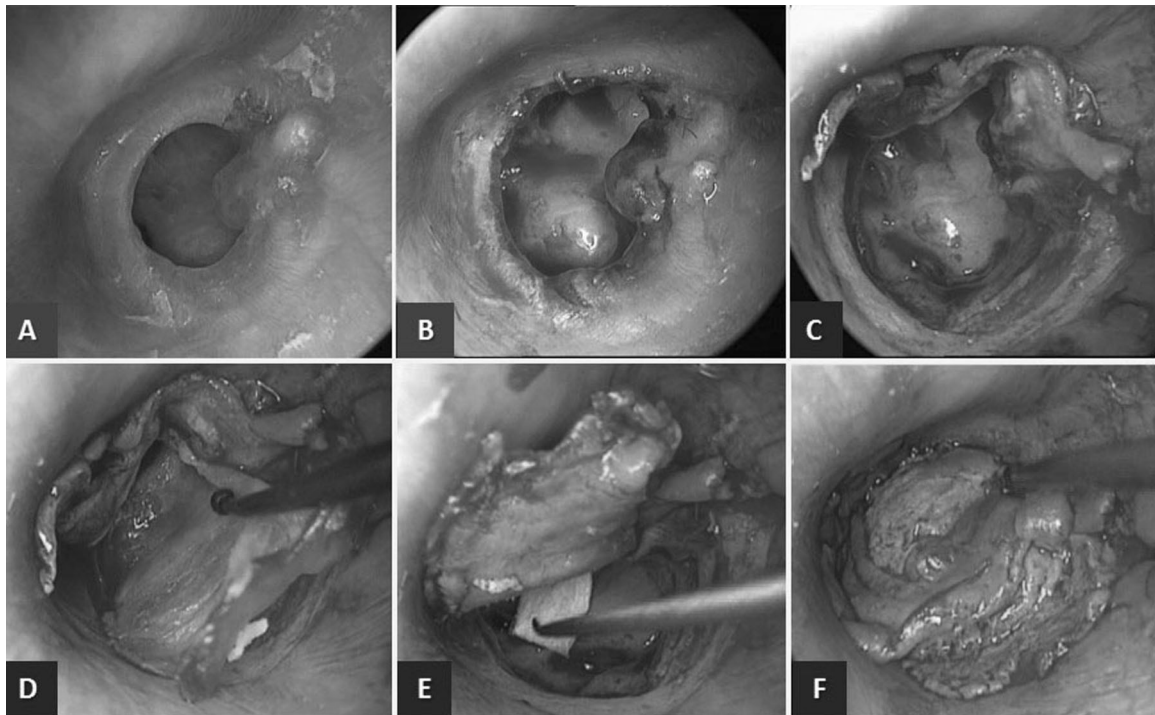
approach was used in the other cases. All MP were performed with an underlay technique using tragal perichondrium in the transcanal approach and temporalis fascia in the postauricular one. A Zeiss OPMI MDM S21 operating microscope was employed.

#### 2.2.2. Newly adopted technique

Between January 2011 and June 2014, MPs were performed with an underlay technique exclusively by the endoscope using tragal perichondrium.

**2.2.2.1. Endoscopic technique.** No special prior preparation was needed for EA. The patient was placed in an oto-surgical position, and the surgical field was cleansed using an antiseptic product prior to removal of wax or debris when present. Hair trimming in the EAC was not necessary, but was helpful in patients with small and bending EAC. Two different rigid 0° endoscopes, 2.7 mm diameter/11 cm long and 4 mm diameter/18 cm long (Hopkins KARL STORZ GmbH & Co. Tuttlingen Germany) were used. Antifogging liquid was needed to avoid blurred vision. Being the surgeon right handed, the scope was held by the left hand without the aid of any holder and the tools were managed by the right hand.

The endoscopic technique consists of cleaning and refreshing the margins of the perforation under scope control, which is easily feasible using a sickle knife and grasping forceps. The medial TMF is elevated with incision at 12 and 6 o'clock. The tragal perichondrium is harvested and trimmed. The graft is inserted under the anterior margin of the perforation and under the malleus. Gelfoam is applied adequately in the middle ear and then the free part of the flap is repositioned (Fig. 1). Bleeding during endoscopic procedures was easily controlled by local application of epinephrine 1:100,000 solution on a gelfoam sponge. Immediately after skin incision of the external auditory canal, bleeding was prominent but after a short while it reduced spontaneously. To give enough time for spontaneous hemostasis to take place, the tympano-meatal flap was prepared before harvesting the tragal perichondrium.



**Fig. 1.** Surgical steps in endoscopic myringoplasty (left ear). (A) Subtotal perforation of the ear drum. (B) Perforation after circumferential removal of scar tissue. (C) Tympanomeatal flap elevated. (D) Positioning of the tragal perichondrium graft under the anterior annulus and the tympanomeatal flap. (E) Insertion of gelfoam under the graft. (F) Repositioning the tympanomeatal flap and graft in underlay fashion.

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