AL MUTHANNA INTERNATIONAL TRAUMA CONFERENCE
MAY 9 – 11, 2020
SAMAWA, IRAQ

Under the patronage of His Excellency
Professor Dr. President of the University, Prof. Dr. Amer Ali Al-Atwi

Prof. Dr. Basim Herez Ali Asudani, Dean of Al Muthanna Medical College

Prof. Dr. Nasser Ghaly Yousif, Conference Coordinator

Prof. Dr. S. G. Ahmed, Conference Scientific and Technical Coordinator, Egypt

Publisher Website
www.scholarsliterature.com

Al-Muthanna University is focused from the first day on making the world and our community a better place through education, innovation and research. Our (658) faculty members are actively engaged in research, participating in the international conferences, editing and reviewing research in the international journals, supervising graduate students ,authoring books, and making patents

Scholars LITERATURE

La Prensa Medica Argentina

Research Article

DOI: https://doi.org/10.47275/0032-745X-S1-012
S1-012

The Efficiency of Endoscopic Fat Myringoplasty under Local Anesthesia

Abbas A Alkalabi[1]* and Raid M Al-Ani[2]

[1]Department of Surgery, University of Karbala, College of Medicine, Iraq
[2]Department of Surgery, University of Anbar, College of Medicine, Iraq

Abstract

Background: Myringoplasty is one of the most common surgical operations in the field of otology, and is known to have good outcomes. Endoscopic fat myringoplasty (EFM) is simple, safe, and cost-effective for the closure of eardrum perforations.

Objectives: To evaluate the success rate of EFM to close small- and moderate-sized tympanic perforations under local anesthesia.

Materials and Methods: This retrospective study was conducted at 2 hospitals: Al Hussein Teaching Hospital, Karbala, and Al-Ramadi Teaching Hospital, Anbar, Iraq. This project covered the period from January 2015 until October 2019. Patients were selected for the presence of central dry small- and moderate-sized eardrum perforations for over 6 months either due to traumatic or infective causes. The success rate, including healthy grafts and hearing improvement was carefully analyzed.

Results: There were 63 ears in 59 patients subjected to EFM. After 6 months of dealing with a perforation, the success rate of graft-taking by EFM was 92.1% (58 out of 63). There was no statistical difference in success rate in terms of age, gender, cause, site, and size of the perforation: P Value > 0.05.

The mean air-bone gap was significantly improved from 12.71 Db ± 2.275 preoperatively to 9.40dB±1.819 at 6 months after surgery: P-Value < 0.05.

Conclusion: EFM can be considered the treatment of choice to repair uncomplicated small- and medium-sized tympanic membrane perforations under local anesthesia. Further study is recommended for a more comprehensive evaluation.

Keywords: Myringoplasty; Fat; Tympanic Membrane Perforation; Otoendoscopy; Local Anesthesia

Correspondence to: Abbas A Alkalabi, Department of Surgery, University of Karbala, College of Medicine, Iraq; E-mail: abbaskadhem@gmail.com

Citation: Alkalabi AA, Al-Ani RM (2020) The Efficiency of Endoscopic Fat Myringoplasty under Local Anesthesia. Prensa Med Argent, S1-012. DOI: https://doi.org/10.47275/0032-745X-S1-012.

Received: May 09, 2020; **Accepted:** May 19, 2020; **Published:** May 21, 2020

Introduction

Myringoplasty is the most common otological operation worldwide. It defines as a surgical procedure specifically designed to repair tympanic membrane defect without reconstruction the ossicular chain. The objective of myringoplasty is to restore the integrity and vibratory properties of the tympanic membrane, thus prevents middle ear infection and improves hearing. Myringoplasty forms a barrier in the migration of squamous epithelium to the middle ear, so it prevents cholesteatoma formation. Also, it has the ability in preventing the deterioration in the state of hearing in chronic suppurative otitis media due to ossicular osteitis [1,2].

In the history of otologic surgery, a number of surgical techniques have been applied for tympanic membrane repair [2]. During the 1950s, Wullstein and Zollner advocated the use of thin skin grafts [3]. Other authors like Sooy followed in 1956, then the House and Plester in 1958 who advocated a skin flap either rotated from the ear canal or used as a free graft. During the 1960s, Hermann described a myringoplasty procedure by utilizing a temporalis fascia graft, which became gradually accepted, and even to date is the most widely used tympanic membrane repair material [4]. Rigenberg in 1962 [5] and Sterkers in 1964 confirmed the effectiveness of fat graft myringoplasty in tympanic membrane repair for small-sized perforations. Choosing the autologous fat based on the fact that adipose tissue is formed by the accumulation of adipocytes arranged in lobules, which separated by connective tissue trabeculae of mesenchymal origin. In myringoplasty, and in contrary to other graft materials, fat acts as an autologous graft which can stimulating reconstruction of the fibrous layer of the tympanic membrane. Prior study showed that several secretory substances originating from the adipocytes are playing role in local regulation of blood flow, angiogenesis, and modification of the extracellular matrix which play role in the healing process [6].

Myringoplasty could be done using a microscope or endoscope, under local or general anesthesia. There are many advantages of using an endoscope over the microscope first of all there is no need to elevate tympani-metal flap. Also, it provides complete view for the anterior angle, even with cases of the unfavorable anatomy of the external ear canal such as bulging of the anterior wall or exostoses. Moreover, surgical operation under local anesthesia avoids the risks of general anesthesia, time consuming and cost-effective.

All over the success rate of myrigoplasty is 60-99% [1]. While, the

success rate of fat myringoplasty in prior studies ranged from 72.9-91.2% [7-16]. Several factors might affect the success of the operation including, site and size of perforation, age of the patient, the state of the other ear, state of the operated ear (active or inactive), smoking, and any immune compromised diseases like diabetes mellitus.

To our best knowledge, this is the first study in Iraq. We aimed to evaluate the efficiency of endoscopic fat myringoplasty under local anaesthesia (LA) in a small and moderate sized eardrum perforation in terms of closure rate and hearing state.

Materials and Methods

This retrospective study was conducted from the 1st January 2015 to 31 October 2019, at Department of Otolaryngology, at 2 hospitals, Al Hussein Teaching Hospital, Karbala, and Al-Ramadi Teaching Hospital, Anbar, Iraq. Patients with unilateral or bilateral eardrum perforations for more than 6 months duration due to trauma or infective cause, dry small (<25% of the total eardrum surface area) and moderate size (25-50% of the total eardrum surface area) and subjected to FEM were enrolled in the study.

Exclusion Criteria

1. Active ear discharge.
2. Large perforation (>50% of TM surface area).
3. Presence of cholesteatoma or granulation tissue.
4. Uncooperative or intolerable patient to LA.
5. Medical problems that contraindicated to LA or epinephrine.
6. Allergy to lidocaine.

We reviewed and recorded the data from the patient's case sheets included age, gender, duration, cause of perforation, laterality, site, and size of perforation. Preoperative and postoperative (2 weeks, 6 weeks, 12 weeks, and 6 months) air-bone gap (ABG) were registered. Type of autologous fat (from ear lobule or abdomen) and the fate of surgery (closure of the perforation or not) were recorded too.

The collected images of the perforated eardrums by otoendoscope (Endoscope ShenDa 'J0200G SN 300.0096, 0° 4-175-A-W') and stored on a personal computer (hp Lap-PC) Figure 1A were objectively measured from them the size of the perforations by Universal Desktop Ruler V.3.5.3364 Program (http://avpsoft.com/products/udruler/). The surface area of eardrum perforation (P) and the total surface area of eardrum (E) were calculated. Thereafter, the percentage surface area of the perforation (P/E×100%) for the perforated drum was obtained from B,C and D (Figure 1).

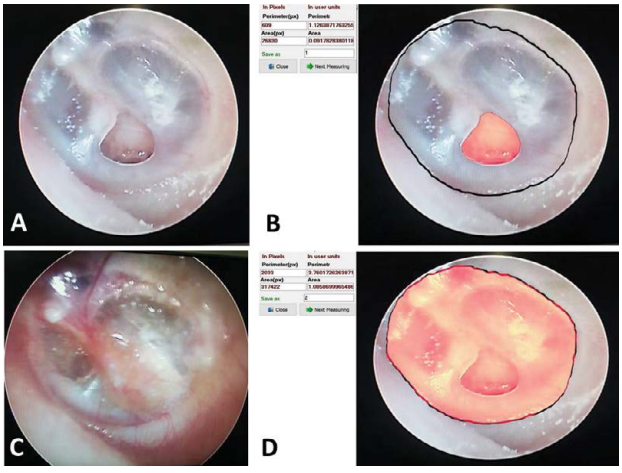

Figure 1: One of our cases operated on by EFM. (A) Left eardrum with central perforation. (B) Measuring the surface area of eardrum perforation using Universal Desktop Ruler. (C) Successful closure of the perforation. (D) Measuring the surface area of eardrum using Universal Desktop Ruler.

In our study all procedures were performed under (LA) in the operative theater under anesthetist supervision. Local anesthetic is used to infiltrate the ear canal with a 2% lidocaine with epinephrine 1:100,000. Infiltration of the skin of the external auditory canal in 4 point (3, 6, 9, and 12) at the oseo-cartilgenous junction was done. Also we used small piece of cotton ball soaked with few drops of lidocaine 10% placed directly on the tympanic membrane and perforation edge for 10 min.

Procedure

We used the 2.7 mm 10 cm length 0°rigid endoscope with video monitor, the endoscope tip is sprayed with defogging solution. Any bleeding is a source of additional difficulty, therefore, great care is taken to avoid canal skin abrasions and canal hematomas.

Freshening of the Perforation Margins

This step is crucial and often determines the success or failure of the graft. The freshening and rimming of the edges of the perforation can be carried out by means of a sickle knife or fine end micro-crocodile forceps.

Placement of the Fat Graft

The size of the fat plug must be 1-2 mm greater than diameter of the perforation to ensure that the graft is snug and fits tightly within the perforation. Small pieced of crushed gel-foam can be used in the middle to support the graft internally then the endoscope is carefully drawn back to ensure a panoramic view. The graft then introduced through the perforation similar to a "champagne cork" by placing half of the graft within the tympanic cavity. Next, 5 mm 2 dry pressed piece of Gel-foam is placed over the graft. Dressing by 10 cm of gauze soaked with iodine and antibiotic ointment applied to the external auditory meatus.

Postoperative Care

The patient was monitored postoperatively for a period of at least 1 hour, to ensure there are no audio-vestibular deficits secondary to the procedure. The first postoperative visit is scheduled after 7 days in order to remove the dressing and examine the ear to exclude any infection or hematoma.

The second postoperative visit takes place within 2 weeks and then after 3 weeks and 1 month consequently to rule out any complications or otorrhea. Then at 3 months, and finally the last visit will be after 6 months, we can judge the final results and obtain photo documentation Figure 1 and Figure 2. The presence of an intact tympanic membrane without signs of retraction is considered a good anatomic outcome. Also, we registered the preoperative and postoperative at 6 months (ABG) at the frequencies 0.5, 1, 2, and 4 k Hz of all operated ears.

For the purpose of the study, the operated ears divided into 2 groups according to the site of perforation anterior and other (any site other than the anterior location). The age groups divided into 2 groups (16-30, and >30 years).

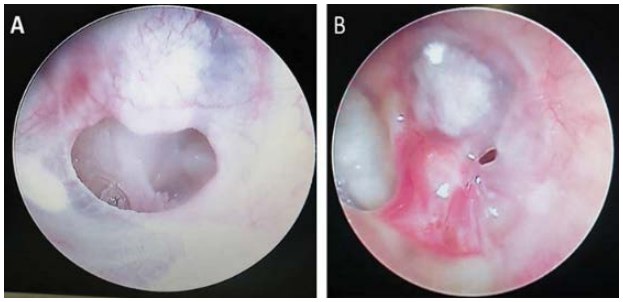

Figure 2: One of our cases operated on by EFM. (A) Left eardrum with central perforation. (B) Small residual perforation 6 months after the procedure.

The data were analyzed using IBM SPSS (Statistical Package for the Social Sciences) version 22. Pearson-Chi Square and Paired Samples tests were used. P-Value<0.05 considered significant difference.

Results

There were a 63 eardrum perforations from 59 patients fulfilled the inclusion criteria and enrolled in the study. The age of our patients ranged from 16 to 47 years with a mean of 25.24 years ± 7.632. There were 35 males (59.3%) and 24 females (40.7%) with a male /females 1.45/1. The majority of cases were due to CSOM (36, 57.1%). Thirty-four (54%) perforations were left side and 29 (34.8%) were right. Twenty-three patients were with anterior perforations and most of perforations were small size (n=52). The overall success rate of graft taking was 92.1%. There was no statistical significant difference concerning the age, gender, cause, site, and size of perforations P-Value>0.05 (Tables 1-3).

The Preoperative ABG was ranged from 10-15 dB with a mean 12.71 dB ± 2.275. While, Postoperative ABG was ranged from 4-13 dB with a mean 9.40dB ± 1.819. There was a significant difference between preoperative and postoperative ABG P-Value <0.05.

Fewer complications were seen during EFM, 5 patients with residual perforation (one of them the perforation associated with tympanosclerosis) and other patient with otomycosis resolved with routine treatment of the condition without affection of the graft taking.

Table 1: The fate of eardrum closure following EFM under LA in relation to the age group and gender in 63 cases.

Variable	Fate		Total N/%	P-Value
	Successful N*/%	Failure N/%		
Age group				
17-30 years	46 (90.2%)	5 (9.8%)	51 (100%)	0.258
>30 years	12 (100%)	0 (0.0%)	12 (100%)	
Total	58 (92.1%)	5 (7.9%)	63 (100%)	
Gender				
Males	36 (92.9%)	2 (5.3%)	14 (100%)	0.333
Females	22 (100%)	3 (12%)	9 (100%)	
Total	58 (92.1%)	5 (7.9%)	23 (100%)	

Table 2: The fate of eardrum closure following EFM under LA in relation to the cause of perforation in 63 cases.

Variable	Fate		Total N/%	P-Value
	Successful N*/%	Failure N/%		
Cause				
CSOM**	32 (88.9%)	4 (11.1)	36 (100%)	0.282
Trauma	26 (96.3%)	1 (3.7%)	27 (100%)	
Total	58 (92.1%)	5 (7.9%)	63 (100%)	

Table 3: The fate of eardrum closure following EFM LA in relation to the location and size of perforation in 63 cases.

Variable	Fate		Total N/%	P-Value
	Successful N*/%	Failure N/%		
Location				
Anterior	21(91.3%)	2 (8.7"%)	23 (100%)	0.866
Other	37 (92.3%)	3 (7.7%)	40 (100%)	
Total	58 (92.1%)	5 (7.9%)	63 (100%)	
Size				
Small	48 (92.3%)	4 (7.7%)	52 (100%)	
Moderate	10 (90.9%)	1 (9.1%)	11 (100%)	0.876
Total	58 (92.1%)	5 (7.9%)	63 (100%)	

Neither lateralization nor iatrogenic formation of cholesteatomas was seen in our cases after 6 months of surgery. There was no evidence of auditory impairment in any patient. In 4 patients, we performed the procedure bilaterally in the same setting, without running into any particular complications.

Discussion

Eardrum perforation is a common problem facing the otolaryngologists in their daily clinical practice. Mostly, the perforation is due to CSOM and in considerable cases due to trauma. The tympanic perforation results in hearing impairment and recurrent middle ear infection, even in small sized ones. Myringoplasty or tympanoplasty type 1 is one of the commonest operation in Otology owing to the huge number of eardrum perforations. It defines as surgical repair of uncomplicated tympanic membrane perforation using different kinds of natural or synthetic materials like, temporalis fascia, fat, cartilage, porcine small intestinal submucosa [17], and paper. It may be done using a microscope or endoscope, either under local or general anaesthesia. We used in the present study a fat graft (from the ear lobule or abdomen) to close small or medium sized perforation. The operation was done by using an endoscope under LA. The advantages of myringoplasty using autologous fat graft compared with conventional myringoplasty using temporalis fascia, are simple, short duration, minimally invasive, cost-effective and can be used for unsuccessful ear drum repair [7,14, 15]. In addition, the otoendoscopy has a wider angle of view and obtain a high-quality image making the examination of the anterior eardrum perforation is easier and also taking photos for pre and post-operative documentation [17]. Moreover, the operation avoids the risk of general anesthesia.

The over-all success rate (92.1%) of the closure of the tympanic perforations in our study was higher than the prior studies (Table 4). The possible causes for that were a small sample size in relation to

Table 4: The success rate of the closure of eardrum perforations following fat myringoplasty in the past 18 years.

Study authors, year	Number of cases	Success rate %
Ayache S, et al. (2003) (8)	45	91.1
Ozgursoy OB, et al. (2005) (7)	30	82.4
Landsberg R, et al. (2006) (16)	38	81.6
Fiorino F, et al. (2007) (15)	31	87.1
Dursun E, et al. (2008) (18)	15	86.7
Kim Dt, et al. (2011) (14)	46	87
Konstantinidis I, et al. (2013) (11)	82	85.36
Gun T, et al. (2014) (12)	183	84.7
Gun T, et al. (2016) (13)	57	87.7
Knutsson J, et al. (2017) (9)	100	72.9
Malafronte G, et al. (2018) (10)	125	91.2
Our study	63	92.1

other studies, we did the operation on virgin perforations, we studied a sample mostly for adult patients, and used for small and medium sized perforations.

The results of the present study showed no significant closure of eardrum perforations in relation to the age and gender of the patients. Same finding concluded by prior studies [8,9].

In our study, we operated on 27 (42.9%) perforations due to trauma, this finding considered high because of two reasons. Firstly, the incidence of eardrum perforations due to CSOM are high if compared with traumatic tympanic perforations. The second cause is that most of traumatic perforations heal spontaneously. This relatively high number of traumatic perforations are due to high explosion rate in our country. Anyhow, the study showed no statistical difference in the closure rate between the 2 causes of perforation (CSOM and trauma). This means that whatever the cause of perforations, the success rate of EFM is excellent if the surgeon chooses the appropriate cases.

No statistical significant difference in outcome was observed with regard to the location of tympanic perforation in our study [8]. Series concluded that fat myringoplasty by the use of endoscopy is very simplified, particularly when the works on anterior perforations, which is the main anatomical factor that may have a negative impact on the success of the operation. Other studies [9,14] showed that the location of perforation didn't affect the success of the fat graft myringoplasty. Malafronte G, et al. (2018) study [10] showed that marginal perforation is not a contraindication to the fat myringoplasty. While, Konstantinidis I, et al. (2013) study [11], showed that there is a statistical significant difference with regard to the location of perforation (low rate of closure in anteriorly located perforations vs other locations).The study by Gün T, et al. (2016) found that myrigoplasty using fat graft and hyaluronic acid fat graft have higher success rates for closure of anterior perforations than temporalis fascia graft [13].

Many researchers have studied the size of perforations as a factor affecting the results of fat graft myringoplasty with different opinions. In a prior study by Ozgursoy OB, et al. (2005), [7] found out the procedure is a cost-effective in small perforations of the eardrum, including recurrent perforations. Also, Ayache S, et al. (2003), [8] showed that perforation size is a good prognostic factor for success rate of fat graft myringoplasty. The procedure achieves its highest closure rate in eardrum perforations with a surface area <30% of the pars tensa [11]. While, other prior studies showed that there is no correlation between the size perforation and successful closure rate [12-14,16, and 18]. Also, the authors said that the fat needs only an oval-shaped surface to stick, regardless the size of eardrum perforation [14,16]. However, closure of a large perforation needs a large amount of fat with its sequel of the bulky appearance eardrum. Moreover, it impedes the usual vibration of the drum resulting in a poor audio logical outcome [12,14]. An interesting result of success rate of 87.1% of revision cases with a tympanic perforation size ranged from 1-5 mm, make the fat graft my ring oplasty more popular [15]. Our results had an excellent success rate for both small and medium sized perforations.

EFM under LA in the theater in our study was a short operation (15 min for each case), and the patients were discharged 3 hours following the procedure. Therefore, the procedure gains many advantages, including shorter operative time, and hospitalization, the waiting list, the cost of the operation and increase the patient satisfaction [10].

Our results showed hearing improvement in all operated ears, with a reduction of ABG from 12.71Db ± 2.275 preoperatively to 9.40dB ± 1.819 at 6 months following the procedure with a statistical significant difference (P Value<0.05). Some previous studies [11-14] concluded that hearing improvement in large sized-perforation was poor, while good for small perforations. This because that the eardrum of large perforation is thicker than small perforation. Prior studies showed non-significant difference in hearing before and after fat graft myringolasty [9, 10]. Fiorino F, et al. (2007), [15] showed significant improvement in the speech reception threshold (23.5 ± 8 dB preoperatively to 18.5 ±7.7 dB after the procedure) [16].

The first limitation of the present study was a small sample size and its obstacle in making more valid statistical analysis of the results. Therefore, we recommend for further investigation on a large number of cases to confirm the reliability of the efficiency of the EFM under LA in the closure of eardrum perforations and improvement of hearing. Secondly, the present study also didn't study certain factors which affect the healing process of the tympanic perforation like smocking, diabetes mellitus, and other immune-compromised conditions.

Conclusion

In conclusion, the rate of successful eardrum closure by EFM was 92.1%. The operation was not affected by the age and gender of the patient, the cause, site, and size of the perforation. We highly recommended the usage of EFM to close the small and medium sized perforations owing to high success rate, low complications, and good hearing outcome.

References

1. Darouassi Y, Aljalil A, Ennouali A, Hanine MA, Chebraoui Y, et al. (2019) Prognostic factors of myringoplasty: study of a 140 cases series and review of the literature. Pan Afr Med J.
2. Dangol K, Shrivastav RP (2017) Study of various prognostic factors affecting successful myringoplasty in a tertiary care centre. Int Arch Otorhinolaryngol 3: 250-254.
3. Wullstein H (1956) Theory and practice of tympanoplasty. Laryngoscope 8: 1076-1093.
4. Sterkers JM (1964) Greffe adipogène ultramince pour tympanoplastie. Ann Otolaryng 81: 265-270.
5. Ringenberg JC (1962) Fat graft tympanoplasty. Laryngoscope 2: 188-192.
6. Kim S, Moustaid-Moussa N (2000) Secretory, endocrine and autocrine/paracrine function of the adipocyte. J Nutr 12: 3110S-3115S.
7. Ozgursoy OB, Yorulmaz I (2005) Fat graft myringoplasty: a cost-effective but underused procedure. J Laryngol Otol 4: 277-279.
8. Ayache S, Braccini F, Facon F, Thomassin JM (2003) Adipose graft: an original option in myringoplasty. Otol Neurotol 2: 158-164.
9. Knutsson J, Kahlin A, von Unge M (2017) Clinical and audiological short-term and long-term outcomes of fat graft myringoplasty. Acta Otolaryngol 9: 940.
10. Malafronte G, Filosa B (2018) One hundred twenty-five fat myringoplasties: does marginal perforation matter?. Clin Otolaryngol 1: 362-365.
11. Konstantinidis I, Malliari H, Tsakiropoulou E, Constantinidis J (2013) Fat myringoplasty outcome analysis with otoendoscopy: who is the suitable patient?. Otol Neurotol 1: 95-99.
12. Gun T, Sozen T, Boztepe OF, Gur OE, Muluk NB, et al. (2014) Influence of size and site of perforation on fat graft myringoplasty. Auris Nasus Larynx 6: 507-512.
13. Gun T, Boztepe OF, Atan D, Ikincioguları A, Dere H (2016) Comparison of hyaluronic acid fat graft myringoplasty, fat graft myringoplasty and temporal fascia techniques for the closure of different sizes and sites of tympanic membrane perforations. J Int Adv Otol 2: 137-141.
14. Kim DK, Park SN, Yeo SW, Kim EH, Kim JE, et al. (2011) Clinical efficacy of fat-graft myringoplasty for perforations of different sizes and locations. Acta Otolaryngol 1: 22-26.
15. Fiorino F, Barbieri F (2007) Fat graft myringoplasty after unsuccessful tympanic membrane repair. Eur Arch Oto-Rhino-Laryngology 10: 1125-1128.

Citation: Alkalabi AA, Al-Ani RM (2020) The Efficiency of Endoscopic Fat Myringoplasty under Local Anesthesia. Prensa Med Argent, S1-012. DOI: https://doi.org/10.47275/0032-745X-S1-012.

16. Landsberg R, Fishman G, DeRowe A, Berco E, Berger G (2006) Fat graft myringoplasty: results of a long-term follow-up. J Otolaryngol 1: 44-47.

17. Fina M, Chieffe D (2019) Office-based otology procedures. Otolaryngol Clin North Am 3: 497-507.

18. Dursun E, Dogru S, Gungor A, Cincik H, Poyrazoglu E, et al. (2008) Comparison of paper-patch, fat, and perichondrium myringoplasty in repair of small tympanic membrane perforations. Otolaryngol neck surg. 3: 353-356.