

# Myringoplasty Comparative Results with the Use of Adipose Tissue and Perichondrium of the Tragal Cartilage

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## Abstract

**Background:** Myringoplasty is a surgical procedure aimed at the repair of a perforation in the tympanic membrane with intact and mobile ossicular chain. Described for the first time by Berthold in 1878, since its inception, different tissues have been introduced as grafts: fat of the ear lobe and tragal perichondrium.

**Objective:** To describe the comparative results of tympanoplasty with fatty tissue and perichondrium of the tragus.

**Methods:** A correlational, observational and longitudinal section descriptive study was carried out with the objective of determining the comparative results of myringoplasty, using perichondrium and fat grafts in patients with perforation of the tympanic membrane for different reasons, at the Clinical Military Hospital-Teaching Surgical Dr. Octavio de la Concepción and Pedraja of Camagüey province, during a period of three years from April 2014 to April 2017. The following variables were taken into account: age, sex, personal pathological history, cause of perforation, size, location, time of suppuration and postoperative complications.

**Results:** Most of the patients operated on were young adults with a slight predominance of females, a history of diseases that compromise the ventilation of the middle ear, as causes of recurrent infections, for periods of more than 10 years. The perforations were central and of variable size. The patients suppurred before proceeding, for a period equal to or greater than one year and post-surgical complications did not have a marked relevance.

**Conclusions:** Myringoplasty imposed an adequate technique to restore the anatomical integrity of the tympanic membrane and obtain anatomical, functional benefits in operated patients; these objectives are achieved with the use of grafts of the adipose type or perichondrium of the tragus in a similar way.

**Keywords:** Chronic otitis media; Myringoplasty; Perichondrium; Tympanic perforate

## Introduction

Chronic Otitis Media (OMC) is defined as an inflammatory process that affects the mucoperiosteal complex of the structures of the middle ear (tympanic cavity, mastoid block and Eustachian tube), of insidious onset, slow course with a tendency to persistence and to leave sequelae definitive [1-3].

It is classified as chronic suppurative otitis media, if the eardrum is intact and suppurative chronic otitis media, when there is a permanent perforation of the tympanic membrane [1-3].

Suppurated chronic otitis media is characterized by chronic otorrhea through a tympanic perforation, lasting at least six weeks, which alternates with inactive phases. It differs from acute suppurative otitis media in that otorrhea is not accompanied by pain or fever.

Although its manifestation is in adulthood, in most cases, its onset may be in the early ages of life [1-3].

The perforation of the tympanic membrane may be the consequence of an infection, trauma or even be part of a medical procedure. Perforations may be temporary or permanent and their effects will vary according to the size, location and associated abnormal conditions [4,5].

Infection is the main cause of tympanic perforation and acute infections of the middle ear can generate ischemia of the tympanic membrane, which associated with the increase in pressure in the space of the middle ear leads to tearing or rupture in the tympanic membrane. Traumatic perforations due to exposure to excessive atmospheric pressure such as blows to the ear by the palm of the

hand, impacted against a wave on the beach or an explosion can break the tympanic membrane. People who dive when exposed to water pressure are susceptible to perforations, especially if they have a history of previous tympanic disease. Attempts to remove wax or clean ears with water irrigation by untrained persons can result in tympanic perforation [6,7].

The treatment of acute perforations is usually expectant and is limited to preventing water from entering the ear, as a measure to prevent an acute infectious process. When an acute perforation is associated with otitis media, antimicrobial treatment should be initiated with proven efficacy against: *Streptococcus pneumoniae*, *Haemophilus influenzae* and *Moraxella catarrhalis*. When an acute perforation does not close spontaneously, myringoplasty or type I tympanoplasty is indicated as a surgical procedure [1-4].

The treatment of chronic perforations is surgical, except for particular cases and should always be carried out in the absence of middle ear infection. In the presence of concomitant acute otitis media, treatment with antimicrobials should be initiated and wait for the resolution of the infection before performing any surgical intervention on the patient [2-4].

The application of a graft in the tympanic membrane is complex for different reasons: the eardrum covers a cavity that contains air, and the graft must retain its position and nourish the edges, since it is not supported or receives nutrients from a flat surface. Physiologically it is a challenge between the blood vessels that grow at the edges of the old perforation, and the degeneration and degradation of the central graft, lacking the support and poorly nourished. If the graft is vascularized before softening and degenerating, the graft is useful; if it degrades, the necrosis appears and the perforation recurs. Although this is the basic cause of graft failure, there are many contributing factors, and controlling them increases the graft assimilation rate [1,8].

According to Gelos AE, et al. 1 400 years ago in 1640, Marcus Bouzer published the first case of attempted repair of a tympanic perforation, using a sheep bladder stretched over a piece of ivory. In 1850 Orsley tried with cotton and in 1887 Blake used paper patches. It was Berthold in 1878, in Vienna, who placed a skin-free graft over a perforation by applying a patch of adhesive cloth to the eardrum that, when removed, originated a de-epithelialization, giving the name to the myringoplasty intervention, Miringoplastik as quoted: Beltrán de Yturriaga C et al. [4] Kwong KM, et al. [6] and García de Pedro F, et al [9].

The interest of this technique resurfaces in the 50s as a result of the introduction of microsurgery with optical microscopes, antimicrobials and the works in Germany of Moritz and Wullstein and Zöllner in 1953 who published the classification of tympanoplasties still in force: [1,10].

**Type I:** Corresponds to myringoplasty, the ossicular chain is intact, mobile and the graft is placed on the handle of the hammer.

**Type II:** Hammer and stirrup present and mobile, interposition of anvil, cartilage or partial dentures remains between the hammer and stirrup headboard.

**Type III:** Stirrup present and mobile, columelization is performed between the neotympanum and headboard of the stirrup.

**Type IV:** Absence of the ossicular chain with mobile stage, columelization is performed between the neotympanum and the stage.

**Type V:** Absence of the ossicular chain and fixed stage, stapedectomy and columelization are performed [1,9].

The high failure rate motivated that alternative tissues were sought: amniotic membrane, cheek mucosa, cornea, tibial or mastoid periosteum by Clarós-Domenech in 1959, vein by Shea in 1960, connective tissue by Portmann in 1964, adipose tissue and Conchal or tragal perichondrium by Goodhill in 1963. The vein is a good graft for small perforations; it was introduced in the 1960s by Austin Shea and has as advantages: easy obtaining of the back of the hand or forearms, uniform thickness, fine, rough adventitia which facilitates epithelial proliferation, and intimate smooth on the other to avoid adhesions in the middle ear. Disadvantages: it does not allow its use in large perforations as well as the risk of necrosis and atrophy [9,10].

According to Gelos AE, et al. [1] Oertengren in 1958 and Heermann in 1960, like Storrs, in Germany, they began to use the temporary fascia, material that was gaining acceptance and became popular, and represented an important advance in tympanoplasty [11,12].

Aponeurosis is also an excellent graft material because it is thin but strong and could withstand the rigors of the healing process and because of its resistance to anoxia. This graft constitutes an ideal protein framework on which epidermisation is easily performed from the edges of the perforation. The graft does not induce immune rejection mechanisms, since it has no antigenic power [1,9,13,14].

Goodhill in 1964, according to Simsek E, et al. [15] used for the first time the perichondrium of the swallow or the shell as a graft and since then many studies have demonstrated the excellent results and quality of this type of graft, similar to those offered by temporary aponeurosis. The perichondrium seems more rigid, does not retract, available in the surgical field, structure, formed of pluridirectional collagen fibers and elastic fibers, is homogeneous, without fragility points and little antigenic. Sometimes the quantity of this material may be insufficient depending on the size of the perforation [15-18].

Nowadays, palisade cartilage is also used following Herrman's technique and is indicated in: atelectasis, shrink bags, box adhesions and reoperations in failures with other techniques [1,16,19,20].

The fat was first used by Ringenberg in 1962, extracted from the flag lobe; it can be used in small perforations. It is easy to obtain from the earlobe when it is in the surgical field. The fat cells disappear over a period of time, but the connective weft is maintained long enough to allow reepithelialization from the duct skin. However, it is a fragile tissue that can become infected in the postoperative period and often retracts [21-24].

In the late 50s and early 60s, tympanic membrane homografts or allografts and ossicles began to be used in Europe [1,9,25]. These grafts were indicated especially in case of total tympanic perforation with disappearance of the impeller and/or absence of the hammer handle, but they do not always adapt perfectly to the tympanic size and have medical-legal and immunological tolerance problems [1,9,25].

Autologous grafts are easy to obtain, lack immunological problems, are cheap, there is no risk of HIV transmission or Creutzfeldt-Jacob disease, and the epithelialization process occurs rapidly in them. Those currently in use are extracted from temporal fascia, perichondrium or cartilage, the latter especially in cases of Atelectasis, retractions or revision of tympanoplasties and except in the case of grafts in palisade, they are placed if the perforation is later by below the hammer handle and if the perforation is anterior above the hammer handle [1,9,16,19].

The success in tympanoplasty according to Shehhy, cited by Gelos AE, et al. [1] depends on the achievement of three goals: the eradication of the present pathological conditions, well-ventilated tympanic cage with healthy mucosa, and a secure connection between the mobile tympanic membrane and the inner ear.

As for the types of approaches to reach the tympanic membrane and its perforation, the most commonly used are the retroauricular approach, implemented by Wilde and the endaural of Lempert with its two subtypes I and II and the transcanal. Currently there is controversy regarding to graft placement techniques; the underlay or medial technique, the overlay or lateral and the inlay are mainly used [26-28].

As an additional procedure, the canaloplasty is performed seeking to improve the exposure of the perforation in its entirety and includes a milling of the anterior and inferior wall of the external auditory canal, sites that most often make it difficult to visualize the perforation [7,29,30].

The revival of the edges is used in small perforations; sometimes a new bleeding edge is enough from where the re-epithelization will start [9]. Revival and closure with grease is a procedure just like the previous one but a plug is inserted in the perforation site of fat usually obtained from the earlobe [31-35].

The grease is ideal for small perforations. Easy to obtain in the surgical field. The fat cells disappear soon but the connective web is maintained long enough to allow reepithelialization [36-40].

The grafts used during myringoplasty, with tragal perichondrium or ear lobe fat appear to show good results from an anatomical and functional point of view, so it is the authors' objective to determine the comparative results of myringoplasty, with swallow and fat perichondrium of the earlobe, in patients with perforation of the tympanic membrane due to different causes.

## Methods

Longitudinal descriptive study to determine the comparative results of myringoplasty, using as perichondrium graft of the swallow and ear lobe fat in patients with perforation of the tympanic membrane for different causes, at the Teaching Clinical-Surgical University Military Hospital Dr. Octavio de la Concepción and de la Pedraja of the province of Camagüey, for a period of three years from April 2014 to April 2017.

**Inclusion criteria:** Patients with tympanic perforation, with intact and mobile ossicular chain and dry tympanic cage, which underwent myringoplasty during the period under study.

**Exclusion criteria:** Patients who underwent myringoplasty as a complement to a tympanoplasty, in which another type of graft was used or who did not want to be part of the study.

The data were collected in a form created by the author (Annex 1), containing the variables that were studied.

The variables were used: age, sex, personal pathological history, cause of the perforation, suppuration time, time that the patient was without suppuration before the operation, location of the perforation, size of the perforation, type of graft used, evolution of the patient, complications.

The result of the study was established according to the improvement of the patient from the functional and anatomical point of view as follows:

**Good (B):** Patients with total perforation closure and a hearing gain of 21 to 40 decibels.

**Regular (R):** Patients with total or partial closure of the perforation and with a hearing gain of 1 to 20 decibels.

**Bad (M):** Patients with partial closure or no perforation closure who had no hearing gain or had hearing loss.

The data was processed in the statistical package SPSS (Statistical Package Social Sciences) version 15.0 for Windows. Descriptive statistics (frequencies and percentages) were used, presenting the results in texts and tables prepared by the author.

The patients' consent to participate in the investigation was considered in compliance with the charity, not maleficence and the identity of the patients was kept anonymous.

## Discussion

In the period from 2014 to 2017, 31 myringoplasty was performed at the Octavio de la Concepción and La Pedraja Teaching Surgical Military Hospital to patients presenting with a tympanic perforation with intact and mobile ossicular chain, with adequate tubal function and with dry tympanic box for a period of not less than 2 months, of which, in 16, perichondrium of the tragal cartilage was used as graft tissue and fatty tissue of the earlobe in the remaining 15 and were kept under follow-up during the 6 months after surgical treatment

The predominant age was between 17 and 39 years with almost all patients, corresponding to the results obtained by Gün T et al. [36] who in 2016 conducted a retrospective study with 136 patients where the average age was between the 25 and 33 years and had a predominance of the feminine sex. Niazi SA et al. [29] found in a 2016 study with 350 patients operated between August 2006 and July 2013, a broader age range between 15 and 46 years and a male predominance, as well as Lakpathi G et al. [41] in their study of 60 patients conducted in 2016, where they had 40 male patients and only 20 female patients and an age range between 15 and 55 years; however, Acar M, et al. [25] in its study of 61 patients conducted in 2015, as well as Migirov L, et al. [42-45] with 65 patients studied in 2013, had similar results to those of the author in terms of to the predominant sex, being the females those that contributed the greater number of cases. Although in the author's study there were no patients over 50 years of age and no pediatric patients were included, there are multiple studies with these age groups such as Berglund M, et al. [24] conducted in 2017, in that one third of the cases were under 15, and others in which only children studied, such as Migirov L, et al. [28] in 2015, who studied 22 children and Radaelli de Zinis LO, et al. [33] who studied 65 children between 4 and 16 years of age. Migirov L, et al. [42] also studied in 2014 a group of 21 patients between 65 and 90 years of age, who underwent myringoplasty with good results.

As a personal pathological history, the most common was allergic rhinitis and the predominant cause of perforation was infectious. This corresponds to what was described by Gelos AE, et al. [1] who attribute an important role to diseases that cause poor ventilation of the middle ear and therefore that the mucosa of the ear becomes sick and refers to a low incidence of traumatic processes, also Beltrán de Yturriaga C, et al. [4] defend the infectious tympanic perforation as the main cause of tympanic perforation and put traumatic background in the background, which is still an important cause, especially by the introduction of sticks and for the imprudent manipulation of the ears by untrained people, when trying to perform the extraction of earwax. There is also a cause of tympanic perforation, which although it does not reach a considerable percentage in the general population, if it is a predominant cause in the military population and is the blast wave trauma in the case of soldiers, studied by Ordóñez-Ordóñez LE, et al. [44] in 2013, with a sample of 86 patients of which 43 presented this cause of perforation.

The suppuration time in most patients was more than 10 years, because they were chronic suppurators since childhood, as in the study conducted by Vergara TV, et al. [45] in 2001, where 75 % of their patients had started the otorrhea chart in childhood, supporting this to suppurative chronic otitis media as the main cause of tympanic perforation in patients, and once the infection is installed, it is perpetuated by factors such as tubal tube dysfunction. Eustachian or alterations of the mucosa of the rhino pharynx.

The ear time without suppuration that prevailed was more than one year; There are differences in the dry ear time with the literature reviewed, since there are authors who prefer to wait at least 3 months with the dry ear before performing surgical treatment, such as Gómez P, et al. [46] in their study published in 2016 and Martínez GL, et al. [38] in the study carried out in 2005, while there are others who perform the technique even with the edematous box and with the presence of mucous or purulent secretions such as García RB, et al. [47] in their study published in 2011, in which they had better results in patients who had no secretions. Therefore, in what there is agreement by all authors is that the box must be dry and with a mucosa in good condition, that is not edematous, turgid or with the presence of granulations or secretions, in order to have a good result in the technique, as well as a permeable tube that keeps the tympanic cavity aerated to prevent graft loss.

The location of the perforation was central in most cases, similar to the results obtained by Niazi SA, et al. [29] in their study published in 2016 of 350 patients, in which all presented central perforation; the same results as those of the author had García RB, et al. [47] as well as Luaces RY, et al. [5] in the study of 42 patients in whom central perforation was found in most cases, with the difference that in his study the second place was occupied by the previous perforations, while in the author's study the second place was occupied by the subsequent perforations. Nor are the results obtained by Migiroy L, et al. [28] related to the author's results in the study published in 2015 with 22 children, in which the previous perforation predominated, followed by the central and subsequent perforation.

The size was variable, being the smallest in which fat was used as a graft with good results, these results corresponding to those of Gün T, et al. [36] in their study of 136 patients published in 2016, as well as those of Koc S, et al. [48] in the study published in 2013 of 30 patients and those of Martínez GL, et al. [38] conducted in 2005 with 50 patients, who advocate the use of perforation grease of 25% of the membrane surface with excellent results and in the larger ones, perichondrium was also used with very good results, as were those obtained by Li P, et al. [21] in 35 patients studied in 2014.

Complications only appeared in 3 patients, of which only one had no hearing gain, this evidences the good results of myringoplasty both from the anatomical point of view, with a total closure of the perforation in 94% of the cases studied, as from the functional point of view with auditory gain for 97% of cases. Similar results had Plodpai Y, et al [27] and collaborators 26 in the 2017 study of 181 patients with only 8% of complications, as well as Berglund M, et al. [24] who studied 3,775 cases with only 5.8% of patients with complications, which were mainly due to postoperative infection of the surgical area.

## Results

Since its inception the surgical repair of the tympanic membrane was a challenge for otologists, which thanks to the development of surgery with magnification and the use of different tissues as grafts, today presents excellent anatomical and functional results, as well as results obtained by the author in the study of 31 patients who underwent myringoplasty, using fatty tissue of the earlobe in 15 and tragal perichondrium in the remaining 16.

Table 1 shows a predominance of ages between 30 and 39 years with 14 patients, representing 45.2% of the total, of which 8 fat was used with good results in 5 patients and in 6 perichondrium was used with good results in 5, the rest presented regular results, so in this age group there were better results with the use of perichondrium, followed by patients who were between 17 and 29 years of age for 38% of the total, with 5 cases in which fat was used with good results in 3 patients and 2 that had regular results and 7 in which perichondrium was used with 4 cases with good results, 2 with regular results and 1 with poor results, presenting in this group a better result in patients in whom fat was used. There was no representation of operated patients who had an age corresponding to 50 years or more.

In table 2 it is observed that in the operated patients there was a predominance of the female sex with 19 patients that represented 61.3% of the total of the studied patients. Of them in 9 cases fat was used with good results in 6 and regular in 3 of the patients and perichondrium in 10, with good results in 7, regular in 2 and bad in 1 of the patients, therefore in the case of females the results were similar with both types of grafts, but not in the case of men, where a better result was evidenced in patients in whom perichondrium was used with 5 cases with good results and only 1 with regular ones, while with Fat were performed 6 cases of which 3 had good results and 3 regular results.

Table 3 shows that allergic rhinitis was more prevalent in 19 patients, with 61.3% of the total number of patients studied, fat was used with good results in 6 and perichondrium was used. in 10, with good results

**Table 1:** Myringoplasty. Comparative results with the use of adipose tissue and perichondrium of the tragal cartilage. Distribution of patients according to age.

Age Groups		17-29		30-39		40-49		50-59		60 or more		Total	
		No	%	No	%	No	%	No	%	No	%	No	%
Fat	G	3	9,7	5	16,1	1	3,2	0	0	0	0	9	29,0
	R	2	6,5	3	9,7	1	3,2	0	0	0	0	6	19,4
	B	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal		5	16,1	8	25,8	2	6,5	0	0	0	0	15	48,4
Perichondrio	G	4	12,9	5	16,1	3	9,7	0	0	0	0	12	38,7
	R	2	6,5	1	3,2	0	0	0	0	0	0	3	9,7
	B	1	3,2	0	0	0	0	0	0	0	0	1	3,2
Subtotal		7	22,6	6	19,3	3	9,7	0	0	0	0	16	51,6
Total		12	38,7	14	45,2	5	16,1	0	0	0	0	31	100

**Table 2:** Patients according to sex.

Sex		Male		Female		Total	
		No	%	No	%	No	%
Grasa	B	3	9,7	6	19,4	9	29,0
	R	3	9,7	3	9,7	6	19,4
	M	0	0	0	0	0	0
Subtotal		6	19,4	9	29,1	15	48,4
Perichondrium	B	5	16,1	7	22,6	12	38,7
	R	1	3,2	2	6,5	3	9,7
	M	0	0	1	3,2	1	3,2
Subtotal		6	19,4	10	32,3	16	51,6
Total		12	38,7	19	61,3	31	100

**Table 3:** Patients according to personal pathological history.

Personal pathological history		Allergic rhinitis		Chronic adenoiditis		Chronic tonsillitis		Total	
		No	%	No	%	No	%	No	%
Fat	G	6	19,4	2	6,5	1	3,2	9	29,0
	R	3	9,7	2	6,5	1	3,2	6	19,4
	B	0	0	0	0	0	0	0	0
Subtotal		9	29,1	4	13,0	2	6,4	15	48,4
Perichondrium	G	7	22,6	3	9,7	2	6,5	12	38,7
	R	2	6,5	1	3,2	0	0	3	9,7
	B	1	3,2	0	0	0	0	1	3,2
Subtotal		10	32,2	4	13,0	2	6,5	16	51,6
Total		19	61,3	8	25,8	4	12,9	31	100

**Table 4:** Patients according to the causes of the perforation.

Cause of perforation		Infectious		Traumático		Iatrogénic		Total	
		No	%	No	%	No	%	No	%
Fat	B	8	25,8	1	3,2	0	0	9	29,0
	R	5	16,1	1	3,2	0	0	6	19,4
	M	0	0	0	0	0	0	0	0
Subtotal		13	41,9	2	6,4	0	0	15	48,4
Perichondrium	B	10	32,3	1	3,2	1	3,2	12	38,7
	R	2	6,5	1	3,2	0	0	3	9,7
	M	1	3,2	0	0	0	0	1	3,2
Subtotal		13	41,9	2	6,4	1	3,2	16	51,6
Total		26	83,9	4	12,9	1	3,2	31	100

**Table 5:** Patients according to suppuration time.

Suppuration time		1-5 years		6-10 years		More than 10 years		Total	
		No	%	No	%	No	%	No	%
Fat	B	1	3,2	3	9,7	5	16,1	9	29,0
	R	0	0	2	6,5	4	12,9	6	19,4
	M	0	0	0	0	0	0	0	0
Subtotal		1	3,2	5	16,1	9	29,1	15	48,4
Perichondrium	B	2	6,5	3	9,7	7	22,6	12	38,7
	R	0	0	1	3,2	2	6,5	3	9,7
	M	1	3,2	0	0	0	0	1	3,2
Subtotal		3	9,7	4	12,9	9	29,1	16	51,6
Total		4	12,9	9	29,0	18	58,1	31	100

in 7 and poor results in 1, having similar results among the tissues used, followed by patients who had a history of chronic adenoiditis with 8 cases representing 25.8% of the total, of which it was used fat in 4 patients with 2 good results and 2 regular and perichondrium in 4 patients with good results in 3 and regular in 1, therefore having better results in these cases with the use of perichondrium and the smallest number was represented by chronic tonsillitis with only 4 cases for 12.9% of the total cases studied where the same results were better in the use of perichondrium with 2 cases, while in the 2 countries Before fat was used there were good results in 1 and regular results in 1.

Table 4 shows that there was a predominance of those of infectious diseases of the middle ear as a cause of perforation with 83.9% of the total cases, represented by 26 patients, of which fat was used in 13 with good results in 8 and regular in 5 and perichondrium was used in 13 patients, in which 10 had good results, 2 regular and 1 poor results, despite having better results the use of perichondrium, the traumatic causes that were less important were present in 4 patients for 12.9%, with the same results between one tissue or another and only one patient presented iatrogenic cause perforation for 3.2% of the total cases studied.

Table 5 shows that most of the patients presented otic suppuration of more than 10 years of evolution, with a representation of 18 patients for 58.1% of the total cases, using fat in 9 of the patients with good results in 5 and regular in 4, perichondrium was also used in 9 cases with good results in 7 and regular in 2, therefore it was better to use

perichondrium in these patients; the least part of the cases studied presented a period of otic suppuration of up to 5 years, with only 4 patients representing 12.9% of the total of the patients and between 6 and 10 years there were 9 patients, of whom they had better results were performed with perichondrium, with 3 patients with good results of 4, while in those who used fat there were 2 with regular results and 3 with good results.

Table 6 shows that there was no patient with a period of less than 7 months without otic suppuration before surgical treatment, the majority remained more than 7 months without otic suppuration with 5 cases representing 16.1% in the period of 7 to 12 months, of which 3 were performed using fat with good results in 2 and regular in 1 and perichondrium in 2, with a case with good results and 1 with regular results, with fat in this case. However, in 26 patients who had a period of more than 12 months and represented 83.9% of the total cases, there were better results in the use of perichondrium with 11 cases with good results, 2 with regular results and 1 with poor results, while the use of fat had 7 patients with good results and 5 with regular results.

Table 7 shows a predominance of centrally located perforations with 19 cases that represented 61.3% of the total number of patients studied, of which there were better results in which perichondrium was used, with 9 cases with good results, 2 with regular and 1 with bad, while in which fat was used, good results were obtained in 3 and regular in 4; followed with equal results for both tissues, perforations of the posteroinferior quadrant with 6 cases for 19.4%, those of the

**Table 6:** Patients according to the time without suppuration of the ear.

Time without ear suppuration		2-6 meses		7-12 meses		Más de 12 meses		Total	
		No	%	No	%	No	%	No	%
Fat	B	0	0	2	6,5	7	22,6	9	29,0
	R	0	0	1	3,2	5	16,1	6	19,4
	M	0	0	0	0	0	0	0	0
Subtotal		0	0	3	9,7	12	38,7	15	48,4
Perichondrium	B	0	0	1	3,2	11	35,5	12	38,7
	R	0	0	1	3,2	2	6,5	3	9,7
	M	0	0	0	0	1	3,2	1	3,2
Subtotal		0	0	2	6,4	14	45,2	16	51,6
Total		0	0	5	16,1	26	83,9	31	100

**Table 7:** Patients according to the location of the perforation.

Tympanic perforation location		Central		Quadrant antero-higher		Quadrant antero-lower		Post quadrant-higher		Post quadrant-lower		Total	
		No	%	No	%	No	%	No	%	%	No	%	
Fat	B	3	9,7	1	3,2	2	6,5	1	3,2	6,5	9	29,0	
	R	4	12,9	0	0	1	3,2	0	0	3,2	6	19,4	
	M	0	0	0	0	0	0	0	0	0	0	0	
Subtotal		7	22,6	1	3,2	3	9,7	1	3,2	9,7	15	48,4	
Perichondrium	B	9	29,0	0	0	1	3,2	0	0	6,5	12	38,7	
	R	2	6,5	0	0	0	0	0	0	3,2	3	9,7	
	M	1	3,2	0	0	0	0	0	0	0	1	3,2	
Subtotal		12	38,7	0	0	1	3,2	0	0	9,7	16	51,6	
Total		19	61,3	1	3,2	4	12,9	1	3,2	19,4	31	100	

**Table 8:** Patients according to the size of the perforation.

Tympanic perforation size		1-2 mm		3-4 mm		More than 4 mm		Total	
		No	%	No	%	No	%	No	%
Fat	B	6	19,4	3	9,7	0	0	9	29,0
	R	2	6,5	4	12,9	0	0	6	19,4
	M	0	0	0	0	0	0	0	0
<b>Subtotal</b>		8	25,8	7	22,6	0	0	15	48,4
Perichondrium	B	0	0	0	0	12	38,7	12	38,7
	R	0	0	0	0	3	9,7	3	9,7
	M	0	0	0	0	1	3,2	1	3,2
<b>Subtotal</b>		0	0	0	0	16	51,6	16	51,6
<b>Total</b>		8	25,8	7	22,6	16	51,6	31	100

**Table 9:** Patients according to postoperative complications.

Complications		Graft loss		Infection of the surgical area		Reperforation		Total	
		No	%	No	%	No	%	No	%
Fat	B	0	0	0	0	0	0	0	0
	R	0	0	1	3,2	1	3,2	1	3,2
	M	0	0	0	0	0	0	1	3,2
<b>Subtotal</b>		0	0	1	3,2	1	3,2	2	6,4
Perichondrium	B	0	0	0	0	0	0	0	0
	R	0	0	0	0	0	0	0	0
	M	1	3,2	0	0	0	0	1	3,2
<b>Subtotal</b>		1	3,2	0	0	0	0	1	3,2
<b>Total</b>		1	3,2	1	3,2	1	3,2	3	9,7

anterior inferior quadrant with 4 cases for 12.9% and those of the anterior and inferior quadrant quadrants were only present in one case each for 3.2% in each case.

Table 8 shows that all perforations in which fatty tissue was used as a graft were up to 4 mm in size, with 8 cases in which it was between 1 and 2 mm in diameter for 25.8%, with 6 good results and 2 regular and 7 cases in which the perforation was between 3 and 4 mm in diameter for 22.6% of the total cases, with 3 good results and 4 regular, this shows that the greater the drilling the worse results It has the use of fat. The patients in whom perichondrium was used as a graft, had perforations of more than 4 mm in diameter for a total of 16 cases that represented 51.6% of the total of the patients studied, with good results in 12, regular in 3 and bad in 1.

In table 9 it is observed that there were only 9.7% of cases in which postoperative complications appeared represented by 3 patients, of which 1 presented an infection of the surgical area without graft loss or reperforation, 1 presented a repercussion of smaller than the initial perforation and 1 presented a total graft loss, all representing equally 3.2% of the total cases studied, however from the point of view of results they were better in the cases in which it was used fat, where there was no loss of graft or hearing gain.

## Conclusions

The myringoplasty, according to the results obtained in the study and in the rest of the authors reviewed, constitutes an adequate technique for the restoration of tympanic integrity and for obtaining

a functional benefit and the types of graft used demonstrated its effectiveness achieving these goals.

The majority of the operated patients were young adults with a slight predominance of the female sex.

The history of diseases that compromise ear ventilation such as allergic rhinitis was present in almost all patients.

Middle ear infections were the main cause of tympanic perforation and prolonged periods of otorrhea, over 10 years, were the majority.

It is vitally important, to obtain good results, to keep the ear dry for at least two months before proceeding with surgery; to prevent graft loss.

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