ARTICLE REVIEW ON IMPROVEMENT OF EUSTACHIAN TUBE FUNCTION BY TISSUE-ENGINEERED REGENERATION OF MASTOID AIR CELLS

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SOURCE:

Laryngoscope 2013 February; 123(2): 472–476. PMCID: PMC3599483. Published online 2012 October 19. doi: 10.1002/lary.23626.

Link: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3599483/

KEYWORDS

Eustachian tube, Mastoid cell, Function, Patient, Mastoidectomy, Regeneration therapy

INTRODUCTION

The review is a critical analysis of the article" Improvement of Eustachian Tube Function by Tissue-Engineered Regeneration of Mastoid Air Cells" published in the Laryngoscope.

In the review of this article, first to summarize it, then to analyze its print structure, keeping in view its layout and reader friendly ease. Lastly the review aims towards a critique analysis of the article evaluating its authority, currency, accuracy, objectivity and coverage. Any tables, graphs, diagrams and illustrations will also be analyzed.

ARTICLE SUMMARY

The purpose of this article is to assess the ability of regenerated mastoid air cells (MACs) to restore normal gas exchange function and helps to improve poor Eustachian tube (ET) function in patients with chronic otitis media (COM) by using tissue engineering method [1]. This article comprises a prospective randomised control study of Seventy-six patients with COM, who received tympanoplasty with mastoidectomy and MAC regeneration therapy in a two-stage. During first stage artificial pneumatic bones were implanted and in second stage, a nitrous oxide (NO2) gas study was performed, both in patients with good MAC regeneration and with poor MAC regeneration to measure middle ear pressure (MEP). For the control group, MEP was also measured in patients with good MAC development during cochlear implantation or facial nerve decompression.

ET function was measured twice in each patient, once before the 1st operation and 6 months after the second operation. Recovery of mastoid aeration and regeneration of the pneumatic air cells were assessed by performing high resolution computed tomography (HRCT) scan images taken before and then 6 months after the operations, respectively [2]. Statistical analysis was carried out using SPSS software.

Results were analyzed using Chi- square test. $P < 0.05$ was taken as a level of statistical significance. The discussion include that most cases of COM shows poor development of MACs and poor ET function. Although tympanoplasty with mastoidectomy is presently the best operative treatment for COM but recurrence is very common even after operation. MEP is regulated not only by the ET but also by MACs. This article summarizes that tissue-engineered regeneration of MACs improves ET function and gas exchange in the middle ear and MEP increased in the group with good MAC regeneration after administration of N2O gas[3].

ARTICLE STRUCTURE:

The article is available as PubReader; ePub (beta) & PDF (629K)

The article was introduced with an Abstract including an Objective, Study design, Method, Result and Conclusion. The operative method for MAC regeneration has been described in details. The result has been elaborated by use of tables. The discussion on importance of MAC regeneration and its outcomes on ET function is promising. The online article links included Pubmed, MedGen and related citations. The full text version is free to users including PDF format printout. Previously one article on same topic, had also been published in same journal : Regeneration of mastoid air cells in clinical applications by in situ tissue engineering. Kanemaru S, Nakamura T, Omori K, Magrufov A, Yamashita M, Ito J. Laryngoscope. 2005 Feb; 115(2):253-8 [4].

ARTICLE CRITIQUE

AUTHORITY

Established in 1896, for more than 100 years, otolaryngologists, clinicians, and researchers around the world have read The Laryngoscope to keep pace with and learn how to take advantage of the most important advances in the diagnosis and treatment of head and neck disorders. This journal is the first choice among otolaryngologists to publish their most important findings and share their own successful techniques with their colleagues. This is the highest ranked otolaryngology journal, published monthly[5]. ISI Journal Citation Reports © Ranking: 2012: 7/44 (Otorhinolaryngology); 72/121 (Medicine Research & Experimental). Online ISSN: 1531-4995 [6].

The editor in chief include Prof Michael G. Stewart(MD, MPH). The assistant editor includes Prof Robert C. Kern, MD and others.

The author Shin-ichi Kanemaru has another publication in Journal of Tissue Engineering Regenerative Medicine named " Glottic regeneration with a tissue-engineering technique, using acellular extracellular matrix scaffold in a canine mode. " recently published on January 8, 2014

ACCURACY

The article reveals that it is a prospective randomized control study. A prospective study is a cohort study that follows over time a group of similar individuals (cohorts) who differ with respect to certain factors under study, to determine how these factors affect rates of a certain outcome [7] and randomized control trial (RCT) name only for trials that contain control groups, in which groups receiving the experimental treatment are compared with control groups receiving no treatment (a placebo-controlled study) or a previously tested treatment (a positive-control study).

In prospective cohort study investigators begin enrolling subjects and baseline information is collected, after this subjects are then followed "longitudinally," i.e. over a period of time, usually for years, to determine if and when they become diseased and whether their exposure status changes. In this way, investigators can eventually use the data to answer many questions about the associations between "risk factors" and disease outcomes. Prospective cohort studies are typically ranked higher in the hierarchy of evidence than retrospective cohort studies[3] and can be more expensive than a case–control study.

CURRENCY

This paper was presented at the Triology Annual Meeting, San Diego, California, U.S.A., April 18–22, 2012 and accepted on July 9, 2012. It was printed online on October 19, 2012. The research it describes is current and article cites references in body of text ranging from 1997-2010.The article has also been cited in the Laryngoscope February 2013; 123(2): 472–476.

RELEVANCE

This was a scientific journal on a scientific database. It was written to inform otolaryngologists and clinical researchers in visual science rather than to entertain, advertise or promote a particular brand. The article is of particular interest to any general otolaryngologist but particularly to a worker in the field of mastoid ear disease. This is an easy article to read and will be relevant to post graduate students of otolaryngology. This article will also be of special interest to the health workers in otolaryngology who deals many cases of intractable COM on daily basis, where simple tympanoplasty with mastiodectomy show poor development of MACs and poor ET function.

OBJECTIVITY

This article provides information of the latest evidence relating to the understanding of COM and its complications, current treatment strategies, their limitations, new areas of research regarding the importance of mastoid cells regeneration in management of the patients. The author`s further dwell upon two stage procedure for the development of MACs via by artificial pneumatic bone implantation followed by NO2 gas study. The article not only shows good MAC regeneration, but also correlates closely with recovery of ET function and gas exchange function. The information was well supported and with adequate sample size and with all evidence acknowledged and referenced. There is no evidence of bias, a fact that is reinforced by the recognition and inclusion of the article in one of the most prestigious peer reviewed journals of the subject.

STABILITY

The article with its source an internationally acclaimed scientific journal on an academic data base is stable as a resource. The article is also being cited in further research papers. The results from the study undertaken are also fairly impressive and the trial was endorsed by an university of international repute.

RECENT ADVANCES RELATED TO TOPIC

A recent study " Development of a porous poly(DL-lactic acid-co-glycolic acid)-based scaffold for mastoid air-cell regeneration" done by Gould TW in the Division of Drug Delivery and Tissue Engineering, University of Nottingham, University Park, Nottingham, United Kingdom and published in the journal of Laryngoscope in Dec 2013[8]. This study related to in vitro development of a temperature-sensitive poly(DL-lactic acid-co-glycolic acid)/poly(ethylene glycol) (PLGA/PEG) scaffold for mastoid air-cell regeneration. This study demonstrates similar structural features to human mastoid bone, support cell growth, and display sustained antibiotic release. These scaffolds may be of potential clinical use in mastoid air-cell regeneration. But further in vivo studies are required to assess the suitability of PLGA/PEG-alginate scaffolds for this application.

CONCLUSION

This review has both, summarized and critically reviewed Shin-ichi Kanemaru article "Improvement of Eustachian Tube Function by Tissue-Engineered Regeneration of Mastoid Air Cells. The introductory links, structure, strength, accuracy and relevance of the article were analyzed and critiqued.

This article provides a review of the latest evidence for current treatment strategies, for intractable COM by the regeneration of mastoid air cells with tissue engineering methods. As this the most common cause of significant morbidity, and a leading cause of deafness all over world [9]. Although regenerated MACs can perform gas exchange function in the middle ear and improves ET function, besides that their function cannot reach the level of normally developed MACs. It is considered that mutualistic relationship exists between MAC function and the ET.

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