INTERNATIONAL EDITORIAL ADVISORY BOARD

Prof. Ashutosh Kacker M.D
Professor of Clinical Otorhinolaryngology
Weill Cornell Medical College,
NY, NY 10021, USA
Personal address:-
1305 York Avenue, 5th floor, NY, NY 10021
USAT:(646)962-5097, F: 646) 962-0100
Email: ask9001@med.cornell.edu

Prof. Arun K. Gadre, MD, FACS
Heuser Hearing Institute
Professor of Otology and Neurotology,
Division of Otolaryngology–
Head and Neck Surgery, University of Louisville,
401 E Chestnut St Suite 710, Louisville,
KY 40202, USA
Email: arungadre@yahoo.com

Prof. Ludwig Moser
University of Wuerzburg
Department of Oto-Rhino-Laryngology, Plastic, Aesthetic,
and Reconstructive Head and Neck Surgery
Wuerzburg, Bavaria, Germany
Email: l_u_moser@hotmail.com

Prof. Sylvester Fernandes
22 Kelton St Cardiff NSW Australia
Sylvester.
Email: fernandes@newcastle.edu.au

Dr. Sharat Mohan
ENT & Voice surgeon
National Health Services
Derby, United Kingdom
Email: sharatmohan@hotmail.com

Prof. Ullas Raghavan
Department of ENT, Doncaster Royal Infirmary,
Armthorpe Road, Doncaster DN2 5LT UK
Email: ullasraghavanent@yahoo.com

Prof. Prepageran Narayanan
Dept of Otolaryngology and Head & Neck Surgery,
University Malaya Medical Center, Malaysia.
Email: prepageran@yahoo.com

Prof. Peter Catalano, MD, FACS, FARS
Chief of Otolaryngology
St. Elizabeth’s Medical Center
Professor of Otolaryngology
Tufts University School of Medicine, USA
Medical Director of Research Steward Health Care
Email: peter.catalano@steward.org

Prof. P. S. N. Murthy,
Head of Dept of E.N.T.,
P.S.I. Medical College, Chinoutpalli,
At/P.O. Gannavaram, Vijayawada,
Andhra Pradesh.
E mail: drmurtypsn@gmail.com

Prof. Mohan Kameswaran
Madras E.N.T. Research Foundation(P) Ltd; 1,
1st Cross Street; Off. 2nd Main Road;
Raja Annamalaipuram; Chennai-600028; Tamil Nadu.
E mail: merfmk@yahoo.com

Prof. T. V. Krishna Rao
Uma Krishna; 5-9-30-1/27 AB,
Basheerbagh Palace; Hyderabad-500053;
Andhra Pradesh.
E mail: drrrao@mmdsofttech.com

Prof. Krishna Kishore T.
Superintendent, and HOD, Dept. of ENT & HNS,
Govt ENT Hospital and Andhra Medical College,
China Waltair, Visakhapatnam, 500017,
A P India, Mob.919849116868
Email: drkktent@hotmail.com

Dr. Kumar Pravash
Senior Consultant, Tata Memorial Hospital
Shivam-6, TMC Colony, SION Tromba, Mumbai-88
Mob.09224182898
E mail: kpravashil@gmail.com

Prof. K. K. Ramalingam
K.K.R ENT Hospital & Research Institute,
274 Poonamallee High Road,
Kilpauk, Chennai- 600 010,
Tamil Nadu.
Phon: 044-26411444.
E mail: kkramalingam@hotmail.com

Dr. Madan Kapre;
Neeti Clinics & Nursing Home (ENT);
NeetiGaurav Complex; 21, Central Bazar Road;
Ramdaspeth; Nagpur – 440010; Maharashtra.
Email: madankapre@gmail.com

Prof R. Jayakumar,
Senior Consultant, Dept of E.N.T.,
Kerala Institute of Medical Sciences(KIMS),
P.B. No. 1, P.O. Anayara, Trivandrum-695029, Kerala
Email: jkrmenon@rediffmail.com

Prof. Achal Gulati;
Prof ENT, Mualana Azad Medical College
A-72, SwasthyaVihar; Delhi-110092.
Email: achalgulati@rediffmail.com

Prof. T.S. Anand;
4, Hemkunt Colony; Opp. Nehru Place; New Delhi-110048.
Email: doctoranand50@yahoo.com

Prof. Vikash Sinha,
Dean, MP Shah Medical College,
Pt. Nehru Road, Jamnagar-361008, Gujerat.
E mail: dr_sinhavikas@yahoo.co.in
The views expressed in the articles are entirely of individual author. The Journal bears no responsibility about authenticity of the articles or otherwise any claim how-so-ever. This Journal does not guarantee directly or indirectly for the quality or efficiency of any product or services described in the advertisements in this issue, which is purely commercial in nature.
The “Orissa Journal of otolaryngology and Head & Neck Surgery” is a half yearly medical journal indexed, Internationally (Index Copernicus international plc, Poland: http://indexcopernicus.com) & Nationally (Nircar, ISSN 0974-5262) Indexed], which publishes original articles and case reports. Case Reports (clinical records) should be very brief and should be confined to single cases without precedent in Indian literature or to cases which illustrate some, entirely new fact in management and investigation.

All articles are reviewed by one or more experts to determine validity, significance, originality of context and conclusions. Articles should not exceed 5000 words. Case reports should be restricted to 2000 words.

Address the manuscript to:

Dr. K. C. Mallik
Associate Editor; Plot.No.460/C3,
Sector-8, CDA, Cuttack, Odisha, India, PIN-753014,
Cell-09437092087.
E-mail: editorodishhaentjournal@gmail.com

From the year 2017 we are encouraging the authors to submit the articles only on website - http://ojolhns.com.

Only one copy of the manuscript and illustrations will be returned in case the manuscript is not accepted for publication. The letter transferring copyright should be addressed to the Associate Editor and should state that, the manuscript has not been published in a part or in whole elsewhere and is solely contributed to the Orissa Journal of Otolaryngology and Head & Neck Surgery. It should mention that, the authors undersigned hereby transfer, assign and otherwise convey all copyright ownership to the Association of Otolaryngologist of India, Orissa State Branch and that the authors do not have any objection to reviewing and editing of this submission of the Editorial Board.

Manuscripts sent without covering letter transferring copyright, signed by all the authors of the manuscript will not be reviewed and accepted for publication.

1. Manuscript: Manuscripts are sent out for blinded peer review. Do not include author’s names or institutions on text pages or on figures in the manuscript. The authors’ names and institutional affiliations should appear only on the Manuscripts submitted to Biomedical journals.” Published by the international Committee of Medical Journal, Editors (http:www.icmje.org). The manuscript should be computer typed in MS Word (Office 97 onwards) in point size of 12 on white opaque paper. Use double spacing throughout out for typing the manuscript. Provide margins of 2.5 cms on all sides. Type on the side of paper only. Submit 2 copies of manuscript. The author (S) should send a copy of the article in a compact disc (CD) along with Publication cost. The diskette should be labelled with the name of the author (S), title of article and the name and version of the word processor used (Microsoft word).

Photographs, if included in the electronic format should be scanned at 300 dpi and sent as jpeg format. Images or photographs should be in separate files or folders.

2. Title Pages: The title of the paper should be typed with capital letters on the top. The name of the authors should be given below the title. The initials and surname should be slated. Titles such as ‘Dr’ of ‘Mr’ and academic qualifications should not be mentioned either below the title or in the footnote. The footnote should mention the names of the authors, the name of the institution, the meeting at which the paper was read and acknowledgements and address for correspondence with the main author. The footnote should appear on the title page. The title of the articles should not contain more than 50 characters.

3. Abstract and keywords: A concise abstract of not more than 200 words is required for all original clinical and basic science contributions to facilitate rapid indexing and assimilation into the medical literature. Abstracts should be organized according to the outline below.

- Objective: Brief clear statement of the main goals of the investigation.
- Study design: eg. Randomized,prospective double blind, retrospective case review)
- Setting: eg. Primary care Vs Tertiary referral centre, ambulatory Vs Hospital.
- Patients: Primary eligibility criteria and key demographic features, interventions: Diagnostic, therapeutic and/or rehabilitative. Main outcome Measure (S): The most essential criterion that addresses the study’s central hypothesis.
Results: Include statistical measure as appropriate.

Conclusions: Include only those conclusions that are directly supported by data generalized from that study.

Basic Science Reports:

Hypothesis: Brief clear statement of the main goals of the investigation

Background: Concise, designed for orientation of the reader, who is unfamiliar with this line of investigation.

Methods: Succinct summary of techniques and materials used.

Results: Include statistical measures where appropriate.

Conclusions: Include only those directly supported by date generated from this study. Emphasize clinical relevance wherever possible. On the same manuscript page as the structured abstract, list in alphabetical order, key words (maximum of seven) for indexing using Medical Subject Headings (MeSH) from Index Medicus.

Disclosures

Authors must declare the disclosures as given below & also send the certificates regarding permission of ethical committee while submitting the main articles (both prospective & retrospective studies). All these will be displayed at the end of each article before the reference section.

(a) Competing interests/Interests of Conflict- None/If any
(b) Sponsorships - None/If any
(c) Funding - None/If any
(d) Written consent of patient- Taken/not applicable
(e) Animal rights- Maintained/not applicable.
(f) Plagiarism –not done/not crossed the limit.

References: References must be numbered consecutively according to the order of their citation in the text. Use numbers in parentheses for the citations. Personal communication and unpublished data may be cited as such in the text, but are not listed in the references. Journal title should be abbreviated according to Index Medicus. Reference should be made giving the author’s surname with the year of publication in parentheses. Only papers closely related to the subject should be quoted. Original papers should not have more than 16 references and case reports should not have more than 6 references.

It is most important that the authors should verify personally the accuracy of the exact reference. The responsibility of having permission to reproduce. Illustrations and photographs from others published work will rest with the authors.

Illustrations: Illustrations should be referred to the text as “figs” and given Arabic numbers. They should be marked lightly with pencil on the back with the figure number, caption, names of authors and title of the paper. The top should be marked with an arrow. Illustrations should be of very high contract and very clear Line-diagrams should be drawn on separate sheets with black Indian ink on thick white paper. The size should be at least twice that of final reproduction. Lettering should be professionally done and not handwritten or typed. Each illustration should be described in a legend and grouped on a separate sheet of paper. The legends of micro-photographs should mention the stain as well as the magnification. The illustration should not be folded during transmission and protected by cardboard. Two sets of illustrations must be submitted with the manuscript.

The illustration of any patients must be shadowed with black rectangles over their eyes so as to cover / nullify their identities.

5. Tables: Tables should be given Roman numbers and referred to in the text as “Table No.” They should be as few as possible and contain only essential data. They should be type written on separate sheets of paper. The tables must have a descriptive.


7. Abbreviations: Abbreviations should be standard abbreviations.

8. Drug names: Use generic name with the trade names in parentheses.

9. Bibliography: Bibliography should be given at the end of the article on a separate sheet of paper in ICMJE style. The names of the journals should be underlined and should appear with standard abbreviation. The full title of the paper should be given. Mention et al after writing the names of three authors, if the authors are less than three of write the names of all the authors.

Adapted From:

National Information Standards Organization NISO Z39.29-2005 (R2010) Bibliographic References as adapted by the National Library of Medicine for its databases

1. Standard journal article

List the first six authors followed by et al.


2. Organization as author


4. Article not in English

5. Volume with supplement

6. Issue with supplement

7. Volume with part

8. Issue with part

9. Issue with no volume

10. No volume or issue

11. Pagination in roman numerals

12. Type of article indicated as needed

13. Personal author(s)

14. Editor(s), compiler(s) as author

Charges Payable: According to the decision of the AOI, Orissa State Branch contributors of the articles are to pay Rs. 5,000/- for printing charges of Review of Articles, Original Research Articles and Case Series and Rs 4000/- for Case reports. Diagrams & Tables over 6 will be charged extra at the rate of Rs. 250/- for each diagram/table over the above usual charges. The total Publication cost should be sent by Registered/ Speed Post. D.D. for such payments are to be made in the name of “Orissa Journal of Otolaryngology & HNS” Payable at any bank in “Cuttack, Odisha. addressed to:-

Dr. K. C. Mallik
Associate Editor
Plot. No. 460/3C, Sector -8, CDA, Cuttack, Odisha, India, PIN-753014, Cell-09437092087
Email: editorodishaentjournal@gmail.com

OR deposit the amount through a/c transfer to:
Orissa Journal Of Otolaryngology & Head And Neck Surgery
A/C No-30115405052
IFSC : SBIN0005760
SBI, SCB Medical college Campus Branch, CUTTACK
And then Inform us via Email- editorodishaentjournal@gmail.com
## Contents

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Title and authors</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Editorial Board</td>
<td>ii - iv</td>
</tr>
<tr>
<td>2.</td>
<td>Instructions to Authors</td>
<td>v - vii</td>
</tr>
</tbody>
</table>

### INVITED EDITORIAL

1. RARE INSTANCES OF LONG TERM RECURRENCE IN TWO CASES OF VESTIBULAR SCHWANNOMA AFTER TOTAL TUMOR REMOVAL (13 AND 16 YEARS AFTER SURGERY)  
   Sampath Chandra Prasad, Eyad Abu Nahleh, Karthikeyan Balasubramanian, Mario Sanna : 01-04

### ORIGINAL RESEARCH ARTICLES (MAIN ARTICLES)

2. IDENTIFICATION OF RECURRENT LARYNGEAL NERVE AT ITS ENTRY POINT USING CRICOTHYROID MUSCLE AS A LANDMARK DURING THYROIDECTOMY- OUR EXPERIENCE  
   Gurshinderpal Singh Shergill, Dipak Ranjan Nayak, Ankur Kaur Shergill : 05-09

3. POTENTIALITY OF BERA AS ESSENTIAL DIAGNOSTIC MARKER FOR EARLY DIAGNOSIS OF HEARING LOSS IN HIGH RISK GROUP IN PAEDIATRIC POPULATION, AN INSTITUTIONAL STUDY  
   Roohia MD, V.Krishna Chaitanya, N Janardhan, Miss Ushasree : 10-14

4. A STUDY OF ENDONASAL ENDOSCOPIC DACRYOCYSTORHINOSTOMY BY CONVENTIONAL VERSUS MODIFIED MUCOSAL FLAP TECHNIQUE: A RANDOMIZED CONTROLLED STUDY  
   Priti R. Dhoke, Vikrant Dagar, V. V. Harkare, N V Deosthale, Kanchan. S. Dhote : 15-19

5. PREVALENCE OF HEARING IMPAIRMENT IN CHILDREN (AGED 6-17 YRS) IN A SCHOOL OF VILLAGE DASAULI, LUCKNOW (U.P.) INDIA  
   RanveerSingh, Pankaj Kumar Verma, JayaGupta, AusafAhmad, Amit Kumar Srivastava : 20-23

6. HEARING ASSESSMENT IN CHRONIC RENAL FAILURE PATIENTS  
   Ranjita Krishnan, Rejee Ebenezer Renjit : 24-28

7. TURBINECTOMY VERSUS TURBINOPLASTY: AN OUTCOME ANALYSIS  
   Vidya B. Thimmaiah, John MS Stanley, Viswanatha B : 29-32

8. SAFETY PROFILE OF INTRANASAL CORTICOSTEROIDS USED AS TREATMENT IN ALLERGIC RHINITIS PATIENTS ATTENDING ENT OPD AT A TERTIARY CARE CENTRE: A COMPARATIVE STUDY  
   Syed Mohd Faiz, Rajeev Krishna Gupta, A Saurabh Srivastava : 33-40

### CASE REPORT

9. PRESENTATION OF AN UNCOMMON LESION IN THE NASAL CAVITY- NEUROENDOCRINE CARCINOMA  
   Tushar Kanti Ghosh, Srijoy Gupta : 41-45

10. PAPILLARY SQUAMOUS CARCINOMA OF PARANASAL SINUS-AN UNCOMMON HISTOLOGICAL VARIANT  
    Dipak Ranjan Nayak, Amrutha Gudiseva, Kanthilatha Pai, Suraj Nair, Suresh Pillai : 46-48
ABSTRACT:
We report two rare cases of long term recurrence of vestibular schwannomas after gross total removal. Two patients, a 66 year old female and a 61 year old male, underwent surgery for vestibular schwannoma. In both patients an enlarged translabyrinthine approach was performed to achieve a gross total removal of vestibular schwannoma. Both the patients developed a tumor recurrence 13 and 16 years after surgery respectively. Recurrences after gross total tumor removal with Enlarged Translabyrinthine Approach is uncommon. Though different centres have different protocols, generally follow-up is restricted to a maximum of ten years after surgery since most recurrences tend to occur within this time period. This report points out to the fact that patients need to be put on prolonged follow up for at least 15 years even after gross total removal.

RUNNING TITLE – Recurrence of vestibular schwannoma.

Key words – Vestibular Schwannoma, Recurrence, long term, hearing preservation.

INTRODUCTION:
Vestibular Schwanomas (VS) are the most common benign tumors of the cerebellopontine angle (CPA). The translabyrinthine approaches (TLA) popularized by William House and the technical refinements brought about thereafter that led to the development of the enlarged translabyrinthine approach (ETLA) have made access to the tumor safe and exposure of even giant VS possible with minimal surgical sequelae. Recurrence rates after gross total removal (GTR) are extremely low leading a few authors to advocate cessation of serial Magnetic Resonance Imaging (MRI) follow-up scans after a few years of surgery for VS after GTR. Here we present two cases wherein the patients developed a recurrent VS, 13 and 16 years after total removal with an ETLA.

Case 1 – A 66 year old female patient presented to our centre in March 2000, with history of right sided hearing loss, ipsilateral tinnitus and incapacitating vertigo. ENT examination was unremarkable. Pure tone audiometry revealed a moderate to severe high frequency sensory neural hearing loss (SNHL) in the right ear. Brainstem Evoked Response Audiometry (BERA) in the right ear revealed an inter-aural delay in the Vth wave. A MRI revealed the presence of an intracanalicular tumor of approximately one cm in size. A diagnosis of a right sided VS was made. After explaining all the available modalities of treatment for VS to the patient, an approach of wait-and-scan was adopted. In March 2001, a repeat MRI showed that the tumor had grown by five millimetres (Figure-1). In the same month the patient underwent ETLA for excision of tumor. A GTR was achieved with preservation of both facial and cochlear nerves. Postoperatively, the facial nerve was House Brackmann (HB) grade I. The postoperative period was uneventful. She was followed up with serial MRI scans in the first, third, fifth and seventh year after surgery, all of which were negative for recurrence (Figure-2 A,B). The next scan that was done in March 2014 and this time there was a clear demonstration of...
a one centimetre tumor in the CPA (Figure-3). The patient has been put on ‘wait-and-scan’ and the next scan is scheduled in March 2015.

Case 2 — In 1998 a 61-year-old male presented with tinnitus in the right ear and ipsilateral hearing loss. As in the first case, the ENT examination was unremarkable. Pure tone audiometry revealed anacusia in the right ear. Brainstem Evoked Response Audiometry (BERA) on the same ear revealed an inter-aural latency in the Vth wave. An MRI showed a 2 centimetre tumor in the right CPA. A diagnosis of a VS was made. In April 1998 the lesion was totally excised using an ETLA. As in the first case, the facial and cochlear nerves were preserved. On the 1st postoperative day, the patient experienced a facial weakness of HB grade II which improved on the 2nd day postoperative. The postoperative period was uneventful. Follow up MRI showed no recurrence in the first, third, fifth and seventh years (Figure-4A) postoperatively. In 2011, the patient underwent a coronary artery bypass surgery in another centre during which time a brain MRI was done. Despite the evidence of a small lesion in the CPA, this was reported as normal. In 2014 the patient came to our centre for a routine check-up during which time the earlier scan was reviewed and the missed tumor was detected. A repeat MRI done one year later in April 2014 that confirmed
the recurrence(Figure-4 B). In the same month, the patient underwent a revision surgery using the earlier ETLA approach and the tumor was totally removed.

**DISCUSSION:**

Over the last few decades, the ELTA has taken center stage in the surgical treatment of VSs. This approach provides an unparalleled exposure of the CPA and also brings with it additional benefits of providing a high degree of safety to the facial nerve and the evasion of cerebellar retraction. Reported recurrence rates after TLA or ETLA are between 0% and 0.5% which is very low when compared to other approaches to the CPA like the suboccipital (SO) /retrosigmoid (RS) or the middle cranial fossa (MCF) approaches.

The completeness of tumor removal during surgery was defined and classified in the report of the Consensus meeting on systems for reporting results in acoustic neuroma held in Tokyo in 2001. This classification, which was revised in our earlier publication, categorizes removal of tumor during surgery into four groups: 1) Gross total removal, 2) Near-total removal, 3) Subtotal removal and 4) Partial removal. The word ‘recurrence’ can be used only if there is demonstration of tumor during follow-up after GTR and the word ‘residual’ for the tumor that is left behind after incomplete excisions. The incidence of recurrence after GTRs with ETLa was 0.05% (1/2011) in our earlier reported series of 2400 cases published in 2012. With the addition of the two cases against the updated series of ETLa, this rate comes down to 0.04% (3/2555).

The reasons for recurrences after GTR, despite the wide exposure achieved in ETLa, are unclear. Histological analysis have shown that VS lacks a true capsule and the tumor periphery is formed only by compressed neoplastic cells. Tumor specimens have shown microscopic tumor ingrowth of the cochlear nerve and demonstrated histologically inseparable planes between the facial nerve and the multifocal tumor. It must be noted that in both our cases the facial and cochlear nerves were preserved during the surgery. The vestibular and cochlear components of the eighth cranial nerve usually enter the Internal Auditory Canal (IAC) as a single unit. They divide into separate nerves within the IAC. The point of separation may vary among individuals. Only in the three to four centimeters of the most lateral part of the IAC do the vestibular and cochlear nerves usually divide into distinct, identifiable structures. At the fundus of the IAC, the vestibular nerve is separated into superior and inferior divisions by the crista falciformis. Therefore, the tumor may microscopically follow these nerves into their own canal in the fundus of the IAC. Visualization of this area requires removal of part of the bony partition between the vestibule and the lateral IAC.

Often because of the previous sacrifice of the vestibular and cochlear nerves, the recurrent tumor is asymptomatic until it reaches a large size and hence it is important to diagnose this by follow-up serial scanning with MRI. MRI with Gadolinium contrast is the gold standard for diagnosing VS with sensitivity and specificity reaching 100% and this
holds true even for detecting recurrences. However, in detecting recurrences, there are certain difficulties that come in the way of an accurate diagnosis. The presence of scar tissue, fat or artefacts after surgery may also give rise to enhancements on post contrast T1 weighted MRI. The dural response to the surgical manipulation, development of granulation tissue and chemical inflammation induced by blood (hematoma) may be responsible for this. Several authors report that persistent nonspecific postoperative enhancement is commonplace following VS resection but a linear enhancement is usually due to dural enhancement or scarring while a nodular enhancement correlates with a tumor. Carlson et al. reviewed over 200 postsurgical VS patients and correlated patterns of enhancement with tumor recurrence. Of them 66.0% displayed enhancing lesion regression and 3.5% showed complete resolution of enhancement.

The MRI protocols for follow-up of VS after surgery is also a matter of debate. It is obvious that a long term follow-up is necessary to differentiate between the recurrent/residual tumor and other factors that lead to enhancement. Despite the widespread clinical use of MRI in the last 2 decades, there remains no consensus regarding optimal timing or frequency of postoperative MRI surveillance. At the GruppoOtologico, we used to perform scans at one, three and five years after surgery for GTRs and discontinue follow-up there was no evidence of recurrence. However with our latest experience we have modified this protocol. We now advice our patients to undergo scans at one, three and five, ten and fifteen years after surgery or in between in case of symptoms. The follow-up protocol must be followed strictly especially after hearing preservation surgery due to a higher probability of recurrence. While Shelton reported 0.3% recurrence rate, with an average time of recurrence of 10 years, Mazzoni et al. claimed that the majority of recurrence VS regrowth between three and seven years from the surgery. After this timetumor recurrence was theoretically possible but extremely improbable. Like us, Carlson et al. also recommend a repeat imaging at 15 years for linear enhancement during follow-up. Barr ing Roche et al. who reported 9.2% recurrence rate after TLA for VS with a follow-up ranging from 8 to 16 years there have been no reports of recurrences after 10 years of follow-up, nor have been authors advocating a follow-up for greater than 10 years. However, considering that the incidence of long-term recurrence (after 10 years) after GTR of VS is still very low (2/2553 cases; 0.08%) the cost-benefit ratio of following up all VS for five more years must also be considered.

CONCLUSION:

Recurrences after GTRs with ETLA for VS is extremely rare. We present two cases of recurrences after GTRs with ETLA 13 and 16 years after surgery for VS. This report points to the fact that prolonged follow up in such cases is necessary for detection of late recurrence of the tumor, more so in hearing preservation surgery. We suggest up to 15 years of follow-up with gadolinium-enhanced MRI scanning at the intervals of one, three and five years after surgery and once every five years thereafter for 15 years.

DISCLOSURES:

(a) Competing interests/Interests of Conflict- None
(b) Sponsorships – None
(c) Funding - None
(d) Written consent of patient- taken
(e) Animal rights- Not applicable

REFERENCES:

ABSTRACT:

Thyroidectomy is a commonly performed surgery for various thyroid diseases. The common complications associated with a thyroid surgery are recurrent laryngeal nerve palsy (unilateral or bilateral), hypoparathyroidism due to injury to parathyroid glands during surgery. We employed the technique of identifying recurrent laryngeal nerve at its entry point using cricothyroid muscle as landmark and noted the frequency of recurrent laryngeal nerve palsy and hypoparathyroidism in this technique.

Objective: To predict the frequency of occurrence of recurrent laryngeal nerve palsy and permanent hypoparathyroidism during thyroidectomy by identifying the recurrent laryngeal nerve at its entry point using cricothyroid muscle as landmark and retrograde tracking of it.

Material and methods: We conducted a retrospective study at two tertiary care centres in India. In this study, we took all the patients of thyroidectomy where recurrent laryngeal nerve was identified at its entry point using cricothyroid muscle as landmark and traced in a retrograde manner. A total of 36 patients were included in the study. We predicted the frequency of recurrent laryngeal nerve palsy and hypoparathyroidism by using our method to identify recurrent laryngeal nerve.

Results and discussion: In present study there was no permanent laryngeal nerve palsy but the frequency of permanent hypoparathyroidism was 11.6%.

Key words: recurrent laryngeal nerve, hypoparathyroidism, cricothyroid muscle.

INTRODUCTION:

Thyroidectomy is a commonly performed surgery for various thyroid diseases like multinodular goiter, Grave’s disease and thyroid carcinomas. Various types of thyroid surgeries were performed in the past for thyroid diseases like lobectomy, isthmectomy, subtotal thyroidectomy, near total thyroidectomy and total thyroidectomy. But the current surgical trend favours operative procedures limited to lobectomy, isthmectomy and total thyroidectomies even for benign diseases like multinodular goiter and Graves’ disease. The common complications associated with a thyroid surgery are recurrent laryngeal nerve palsy (unilateral or bilateral), hypoparathyroidism due to injury to parathyroid glands during surgery, haematoma etc. But the most common complication is recurrent laryngeal nerve palsy. Various surgical techniques have been used to recognize and trace the recurrent laryngeal nerve during thyroid surgery to avoid injury to it. Many landmarks are utilized to identify recurrent laryngeal nerve like Berry’s ligament, inferior thyroid artery

Author Affiliations:

*Assistant Professor, Department of ENT and Head and Neck Surgery, ANINS, Port Blair
**Professor & Unit Head, Department of ENT and Head and Neck Surgery, Kasturba Medical College, Manipal, Manipal University.
***Assistant Professor, Department of Oral Pathology and Microbiology, Manipal College of Dental Sciences, Manipal, Manipal University.

Address of Correspondence:

Dr. Dipak Ranjan Nayak
Professor
Department of ENT and Head and Neck Surgery
Kasturba Medical College, Manipal
Manipal University, Manipal, Udupi, Karnataka. 576104
Email: drnent@gmail.com
and the tubercle of Zuckerkandl[6]. Frequency of recurrent laryngeal nerve palsy ranges from 0.3 to 9% in literature[6,7]. Another most common complication of total thyroidectomy is hypoparathyroidism. Preservation of parathyroid gland with its blood supply is mandatory to prevent hypoparathyroidism post-surgery. Several studies in the literature report the frequency of permanent hypoparathyroidism following total thyroidectomy to be ranging from 1.6% - 50%[1,2,8,9]. We are here in describing our experience of thyroid surgery cases, where we meticulously identified the recurrent laryngeal nerve at its entry point and traced it in a retrograde manner to prevent post-operative complications.

OBJECTIVES:
1. To predict the frequency of occurrence of recurrent laryngeal nerve palsy during thyroidectomy by identifying the recurrent laryngeal nerve at its entry point using cricothyroid muscle as landmark and retrograde tracing of it.
2. To furnish the chances of occurrence of permanent hypoparathyroidism by employing the same method in thyroidectomy

MATERIALS AND METHOD:
A multi-institutional retrospective cohort study was carried out at Kasturba Hospital, Manipal and Andaman and Nicobar Islands Institute of Medical Sciences, Port Blair on patients who underwent hemi-thyroidectomy, total thyroidectomy or completion thyroidectomy for various thyroid diseases from June 2012 to August 2017. The patient selection included solely those thyroidectomy cases, in which the recurrent laryngeal nerve was preoperatively identified and traced.

All 36 patients selected for the study underwent Ultrasonography of neck, thyroid function tests and fine needle aspiration preoperatively. Extent of surgery was pre-decided depending on fine needle aspiration cytology (FNAC) and Ultrasonography neck reports. Patients with benign unilateral nodule underwent hemi-thyroidectomy while patients with malignant diseases underwent total or completion thyroidectomy. Patients with multinodular goiter involving both thyroid lobes also underwent total thyroidectomy.

In the current study, we identified recurrent laryngeal nerve precisely at its entry point to larynx and traced its course in a retrograde manner.[Fig 1] The nerve was duly recognised at its entry point using lower border of cricothyroid muscle as a landmark, after ligating the superior pole of thyroid. It was then traced along its course in a retrograde method. Post operatively second day, we carried out video-laryngoscopy examination on all the operated patients to assess the vocal cord mobility. Loss of vocal cord mobility is termed as recurrent laryngeal nerve palsy. The same videolaryngoscopic examination was performed at 6 months post-operative to determine permanent recurrent laryngeal nerve palsy.

On the second post op day, we measured the serum calcium levels in all the patients to assess the parathyroid function. The calcium levels <8 mg/dl were labelled as hypoparathyroidism. The calcium levels were also assessed at 6 months post operatively. Serum calcium levels below 8 mg/dl, were termed as permanent hypoparathyroidism. Data was analysed using SPSS 16 software.

OBSERVATIONS AND RESULTS:
A total of 36 patients who had undergone thyroidectomy were included in our study. Out of 36 patients, 32(89%) were females (F) and only 4 (11%) patients were males (M). There was a clear female preponderance, with a high F:M ratio of 8:1. The age of patients in the study ranged from 26 years to 62 years with a mean age of 43 years.

Fine needle aspiration and cytology was performed for all the 36 subjects. On the basis of FNAC findings, the patients were categorized as follows: 22(61%) patients were diagnosed with colloid goiter, 9(25%) patients suffered from papillary carcinoma and the remaining 5(13%) were diagnosed with follicular neoplasm. The thyroid diseases demonstrated the following gender distribution; out of 4 male patients, 2 were diagnosed with papillary carcinoma, one patient with colloid goiter and the remaining one patient with follicular neoplasm on FNAC. Out of 32 female patients, a majority (21) suffered from colloid goiter. Seven female patients were diagnosed with papillary carcinoma while the remaining 4 had follicular neoplasm. In the individual gender groups, 50% of the male patients, in male group were diagnosed with malignancy of thyroid while in the female group; only 22% of female patients were detected with malignancy of thyroid on FNAC.

A total of 19 of 36 (53%) patients underwent hemi-thyroidectomy, 12 (33%) patients underwent total thyroidectomy and a minority of 5(14%) patients underwent completion thyroidectomy. Post thyroidectomy specimens were sent for final histopathological examination. A thorough histopathological examination revealed colloid goiter or multinodular goiter in 14(39%) patients. Thirteen (36%) patients were diagnosed with papillary carcinoma, 4(11%) with follicular adenoma, 4(11%) with follicular carcinoma and the remaining one (3%) patient was diagnosed as a case of anaplastic carcinoma. In our study, 50% of the patients were suffering from benign thyroid diseases and the other 50% with
malignancies of thyroid. In males, the final histopathological examination revealed papillary carcinoma in 2 patients and follicular adenoma and colloid goiter in the other two respectively. The female distribution of thyroid diseases on histopathological examination is as follows: 13 females were diagnosed with colloid goiter, 3 with follicular adenoma, 11 female patients were detected with papillary carcinoma, 3 with follicular carcinoma and the remaining one with anaplastic carcinoma. We calculated sensitivity of FNAC to able to identify true number of papillary carcinoma cases from total number of papillary carcinoma cases. Sensitivity of simple FNAC is 64% for diagnosis of papillary carcinoma in the current study.

We divided the patients into three age groups of < 20 years, 20-40 years and > 40 years. We tried to find distribution of the benign and malignant thyroid diseases in different age groups. There was no patient recorded in the age group of < 20 yrs. Sixteen patients were in the age group of 20-40 yrs. Out of the latter, 10 patients (62.5%) were detected with benign thyroid disease (7 colloid goiter, 3 follicular adenoma); 6 (37.5%) patients suffered from carcinoma of thyroid, 5 patients with papillary carcinoma and 1 suffered from follicular carcinoma. Twenty patients were in the age group of > 40 yrs. In this group, 12 (60%) were diagnosed with carcinoma thyroid gland (8 papillary carcinoma, 3 follicular carcinoma and 1 anaplastic carcinoma); the remaining 8 (40%) patients were detected with benign disease (7 colloid or multinodular goiter, 1 follicular adenoma).

Twelve patients underwent total thyroidectomy, 19 patients hemi thyroidectomy and the remaining 5 patients underwent completion thyroidectomy. During surgery, the recurrent laryngeal nerve was identified at its entry point in all cases and traced in a retrograde manner. Total no of recurrent laryngeal nerves identified were 48. On the second post-operative day, vocal cords were visualised with Hopkins rod (video laryngoscopy) to check the vocal cord mobility. Out of 48 nerves identified, 1 (2%) showed paralysis 2nd post op day. At 6 months follow up, the paralysis of the nerve recovered fully. In our study, observed transient recurrent laryngeal palsy was 2%, but no permanent palsy was noted. It was statistically significant.

In all cases, parathyroid glands were identified and preserved. We measured the serum calcium levels in patients at post-operative day 1. Calcium level < 8 mg/dl were considered to indicate hypoparathyroidism. Out of 19 patients who underwent hemi thyroidectomy, none developed hypoparathyroidism. In our study, 12 patients underwent total thyroidectomy and 5 patients, completion thyroidectomy. Thus, a total of 17 patients were at risk of developing hypoparathyroidism. Out of the latter, 8 (47%) patients developed low calcium levels at post op day 1. On a complete follow up over a period of 6 months, 6 of 8 patients, recovered completely while 2 patients still required calcium supplements at 6 month post op for recovery. In our study, 47% patients developed transient hypoparathyroidism and 11.6% patients developed permanent hypoparathyroidism. [Table 1] It was statistically significant.

**DISCUSSION:**

Thyroid diseases are very common in the current Indian population. These diseases have been found to have a greater incidence in females as compared to males. In our study also, F:M ratio was 8:1. Preoperative workup for thyroid diseases includes thyroid function tests, Ultrasonography of neck but the most imperative diagnosis is imparted by FNAC of thyroid lesions. Recent literature recommends lobectomy, isthmection and total thyroidectomy for thyroid diseases. The type of thyroidectomy depends upon the pathology of the thyroid lesion, which is predetermined by FNAC.

**Table 1.** Post operative hypoparathyroidism at day 2 in total and completion thyroidectomy

<table>
<thead>
<tr>
<th>Surgery</th>
<th>Hypoparathyroidism post op day 2</th>
<th>Total patients</th>
<th>Patients who developed hypoparathyroidism %</th>
<th>P value &lt;0.05 considered significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total thyroidectomy</td>
<td>6 6 12 50%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completion thyroidectomy</td>
<td>2 3 5 40%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>8 9 17 47%</td>
<td></td>
<td></td>
<td>&lt;0.003</td>
</tr>
</tbody>
</table>

**Table 2.** Hypoparathyroidism at 6 months post-operative after total and completion Thyroidectomy.

<table>
<thead>
<tr>
<th>Surgery</th>
<th>Hypoparathyroidism post op at 6 months</th>
<th>Total patients</th>
<th>Patients who developed hypoparathyroidism %</th>
<th>P value &lt;0.05 considered significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total thyroidectomy</td>
<td>2 9 12 16.7%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completion thyroidectomy</td>
<td>0 5 5 0%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2 15 17 11.7%</td>
<td></td>
<td></td>
<td>&lt;0.038</td>
</tr>
</tbody>
</table>
Sensitivity of FNAC to diagnose thyroid diseases ranges from 63%-93% in various studies\textsuperscript{11,12}. In the present study, sensitivity of FNAC to diagnose papillary carcinoma was observed to be 64%. Extent of benign papillary carcinoma was accessed with the help of Ultrasonography of neck and thyroid function tests which further assist in diagnosis of Grave’s disease. Lobectomy is usually done in benign diseases like nodular goiter involving only one lobe of thyroid. Total thyroidectomy is done for carcinoma of thyroid gland, multinodular goiter involving both thyroid lobes and for Graves’ disease. In our study, 19 patients underwent lobectomy, 12 underwent total thyroidectomy and 5 underwent completion thyroidectomy.

In cases of thyroid swelling, chances of getting thyroid carcinoma are greater in male patients and in an age group greater than 40 years. In our study, in both male and female patient groups, 50% of the patients were diagnosed with carcinoma of thyroid gland in the final histopathological report. Age group of >40 years was found to have higher incidence of carcinoma of thyroid gland as compared to the age group of 20-40 years.

The most common complication of thyroid surgery has been found to be recurrent laryngeal nerve palsy. Various landmarks are used to identify the recurrent laryngeal nerve accurately during thyroid surgeries like tracheoesophageal groove, relation to inferior thyroid artery, berry’s ligament and tubercle of Zuckerkandle\textsuperscript{6}. The observed frequency of recurrent laryngeal nerve paralysis in the current literature is between 0.3% and 9%. The common modes of injury to the nerve include partial or complete transection, traction or mishandling of the nerve, contusion, crush, burn, clamping, misplaced ligature, and compromised blood supply\textsuperscript{13,14}. Accidental transaction of the nerve usually occurs at the level of the upper two tracheal rings, where the nerve closely approximates the thyroid lobe in the area of Berry’s ligament. Intraoperative haemostasis along with comprehensive knowledge of anatomy are indispensable for an accurate nerve identification and preservation\textsuperscript{15,16}. Proper identification of the recurrent laryngeal nerve and careful dissection during thyroid surgery minimizes the chances of recurrent laryngeal nerve palsy. The recurrent laryngeal nerve palsy can be transient which recovers over a period of time. It can be permanent due to more severe injury. In our study, frequency of transient recurrent laryngeal nerve palsy is 2% and no permanent palsy reported.

Postoperative clinically manifested hypoparathyroidism is another major and occasionally a serious complication of total thyroidectomy. Postoperative hypoparathyroidism after thyroidectomy has been variably defined, frequently based on the total serum calcium levels. Moreover, in the recent times, the intraoperative, perioperative, or immediate postoperative intact parathyroid Hormone (iPTH) levels are employed to categorize and foretell postoperative hypoparathyroidism more precisely. Literature suggests varying rates of developing hypoparathyroidism post thyroidectomy which ranges from 1.6%-50\%.\textsuperscript{17} Most authors recommend serum calcium levels below 8 mg/dl to be called as hypocalcaemia and hypoparathyroidism. It is a relatively cheaper method to detect post-operative hypoparathyroidism. iPTH levels <10 pg/ml is also considered as an indicator of hypoparathyroidism by a majority of authors. Transient hypoparathyroidism occurring post total thyroidectomy is common and the prevalence of hypoparathyroidism is quite high. Majority of patients of transient hypoparathyroidism recover over a period of time. Some authors suggest a waiting period of at least 6 months duration, for complete recovery of parathyroid functions and before labelling it as permanent hypoparathyroidism \textsuperscript{18-22}. In our study, transient hypoparathyroidism was observed in 47% cases, but a majority of patients recovered completely after a 6 months period. Permanent hypoparathyroidism was noted in 11% of patients postoperatively after 6 months.

CONCLUSION:

Recognition of recurrent laryngeal nerve at its entry point to larynx and then tracing it in a retrograde manner during thyroid surgery is a novel method which immensely reduces the chances of permanent recurrent laryngeal nerve palsy. In spite of meticulous precise surgical techniques, the chances of getting hypoparathyroidism post thyroid surgeries are inevitable.
DISCLOSURES:
(a) Competing interests/ Interests of Conflict - None
(b) Sponsorships - None
(c) Funding - None
(d) Written consent of patient- taken
(e) Animal rights - not applicable
(f) Plagiarism - not crossed the limit

REFERENCES:
10. Unnikrishnan AG, Menon UV. Thyroid disorders in India: An epidemiological perspective. Indian J Endocrinol Metab.2011;15 Suppl 2:S78-81
ABSTRACT:

Introduction: Development of auditory function in newborn infants is revealed by auditory brainstem potentials. Effects of brainstem and cochlear disorders on auditory brainstem potentials were noted in abnormal infants. BERA is established method of testing hearing of newborns, neonates and infants. It is used as method of screening for deafness in this age group particularly for at risk patients. It is Non invasive modality to assess neural integrity of auditory pathway. In this study we focus on early identification of infants with high risk of impaired hearing and also observe pattern of maturation of auditory pathways as age advances in high risk infants so that rehabilitation can be initiated when brain is sensitive to development of speech and language.

Objectives
1. To study neural maturity in neonatal auditory pathway by absolute latencies, Inter wave latency delay by BERA
2. To study progression/regression of myelination by observing wave morphology at periodical intervals at birth, 3months, 6month in high risk infants.

Materials and Methods:
Observations and Results: An observational study was conducted from December 2013 to may 2015 in Department of ENT where Study group comprised of 30 babies with more than one high risk factor for hearing loss. 25 full term normal neonates taken as control group were included in study. In majority of the infants when BERA was performed only wave I, III & V could be definitely identified. In group comprising of 30 high risk neonates BERA was performed and no response was obtained from 10 neonates. Remaining 20 neonates showed abnormal BERA. Response parameters were prolonged absolute latencies of wave I, II, III, V at 90db, wave IV not found in any case. Prolonged inter peak latencies of I-III, III-V, V-I were obtained at higher frequencies. Time interval of wave I-III, III-V, V-I were obtained by subtracting latency of peak I from III, V & wave III from V of BERA response derived at higher intensities.

Discussion and Conclusion: Early diagnosis and timely intervention for deaf and hard of hearing in newborns provides proper path for normal development of hearing impaired. All normal newborns and high risk infants should undergo hearing evaluation within first 6 months followed by thorough diagnostic evaluation and follow-up for infants who fail their initial testing.

Key Words: Auditory Brainstem Responses, Deafness, Neural, Developmental delay.

INTRODUCTION:

Development of auditory function in newborn infants is revealed by auditory brainstem potentials. The developing child must pass through critical periods of language acquisition and even a mild hearing loss can interfere with this natural growth. The effects of brainstem and cochlear disorders on auditory brainstem potentials were noted in several abnormal infants.

The harmful effects of hearing loss on the development of a child’s ability to learn, to communicate and to socialize

Author Affiliations:
* Resident, ** Associate Professor, *** Professor & Head, **** Audiologist & Speech Therapist, Dept of ENT, Narayana Medical College and Hospital, Nellore

Author of Correspondence:-
DR. V. Krishna Chaitanya
Associate Professor-ENT, Quarters No 98, Narayana Medical College and Hospital, Chinthareddypalem, Nellore-524003
Andhra Pradesh, drvkc17@gmail.com
Phone- 9963337475, 8008086119

DOI- 10.21176/ojolhns.2018.12.1.3
DOI URL- https://doi.org/10.21176 ojolhns. 2018.12.1.3

POTENTIALITY OF BERA AS ESSENTIAL DIAGNOSTIC MARKER FOR EARLY DIAGNOSIS OF HEARING LOSS IN HIGH RISK GROUP IN PAEDIATRIC POPULATION; AN INSTITUTIONAL STUDY

*Roohia MD, **V.Krishna Chaitanya, ***N.Janardhan, ****Miss Ushasree

Date of receipt of article -10.10.2017
Date of acceptance -14.01.2018
DOI- 10.21176/ojolhns.2018.12.1.3
DOI URL- https://doi.org/10.21176 ojolhns. 2018.12.1.3

How to cite this article

The harmful effects of hearing loss on the development of a child’s ability to learn, to communicate and to socialize

Author Affiliations:
* Resident, ** Associate Professor, *** Professor & Head, **** Audiologist & Speech Therapist, Dept of ENT, Narayana Medical College and Hospital, Nellore

Author of Correspondence:-
DR. V. Krishna Chaitanya
Associate Professor-ENT, Quarters No 98, Narayana Medical College and Hospital, Chinthareddypalem, Nellore-524003
Andhra Pradesh, drvkc17@gmail.com
Phone- 9963337475, 8008086119

DOI- 10.21176/ojolhns.2018.12.1.3
DOI URL- https://doi.org/10.21176 ojolhns. 2018.12.1.3
have stimulated efforts to initiate rehabilitative procedures early in life. Brainstem evoked response audiometry referred from here onwards as BERA which are auditory brain stem responses are now an established method of testing the hearing of newborns, neonates and infants. It is being used as a method of screening for deafness in this age group particularly for at risk patients. It is a Non invasive modality to assess neural integrity of the auditory pathway.

In this study we tried to focus and observe on early identification of infants with high risk of impaired hearing and also observe the pattern of maturation of auditory pathways as age advances in high risk infants so that rehabilitation can be initiated when brain is sensitive to development of speech and language.

**OBJECTIVES:**

1. To study neural maturity in neonatal auditory pathway by absolute latencies, Inter wave latency delay by BERA
2. To study progression/regression of myelination by observing wave morphology at periodical intervals at birth, 3months, 6month in high risk infants.

**MATERIALS AND METHODS:**

An observational study was conducted from December 2013 to may 2015 in Department of ENT where Data regarding the antenatal, birth history and detailed examination of the newborn were collected in a predesigned Proforma.

Study group comprised of 30 babies with more than one high risk factor for hearing loss. 25 full term normal neonates taken as control group were included in the study. Initial evaluation of BERA was performed within 3days of hospitalization after obtaining informed consent from parents. 1st follow up was performed at 3 months and 2nd follow up was performed at 6months in all these babies who included both high risk and normal neonates. Data regarding the antenatal, birth history and detailed examination of the newborn were collected in a predesigned Proforma. Neonates with following high risk factors of prematurity, hyperbilirubinaemia, Delayed birth cry, consanguinity, family h/o deafness, family h/o congenital anomalies, high risk pregnancies, h/o miscarriages, meningitis, low birth weight, septic shock were included in the study comprising of study group. Another group of babies were considered as a control group consisting of Full term Neonates without risk factors.

Audiological testing was performed in a sound proof room with electrical isolation and with good ambience. Equipment used for testing is GSI audera with insert ear phones. BERA testing was performed by qualified Audiological professional who had adequate experience in performing and analysis of BERA. Patient is placed in supine position over soft cushioned couch and mother/ care giver was present during testing, all neonates were given sedation for carrying out BERA.

For BERA recording, a filter setting of 30-3000Hz is recommended to enhance the BERA when testing infants. Electrical activity picked up by the recording electrodes within the specified window must be processed through several stages to visualise the BERA wave form. This is because the BERA peaks are of extremely small voltage (>1μv) and are buried in a back ground of interference, which includes ongoing electroencephalogram activity, muscle potentials caused by movement or tension, and 50Hz power-line radiation. The stages of processing include amplification, filtering, and signal averaging.

A standard Protocol was followed for performing the procedure where Click acoustic stimuli with rate of 11.1/sec was administered to all the babies. A Rarefaction in polarity was presented by insert ear phone to each ear at varying intensities from 90-30dhnHL. A Time window was 15 milliseconds was maintained with a Filter setting of 30-3000Hz. The presence of wave V at the intensity of 30dBNHL was taken as the normal threshold. BERA measures considered for diagnosis were absolute latencies of wave I, III, V, Inter peak latencies of I-III, III-V, I-V and Progression and regression of wave morphology.

After obtaining BERA recording detailed analysis was carried out with the help of audiologist. Auditory brainstem evoked potentials are used to observe the pattern of maturation of the auditory pathways in terms of absolute latency, Interaural latency delay at the time of birth at 0-3 days, 3 months, 6 months and documented. The response latencies in milliseconds were obtained by establishing peak of the wave and reading out the digitally displayed time.

**OBSERVATIONS AND RESULTS:**

A total 55 neonates were included in the study, among them 30 children were high risk neonates and 25 were normal neonates forming the control group tested at 0-3days, at 3 months, and at 6months of age. In the majority of the infants when BERA was performed only wave I, III & V could be definitely identified.

In the group comprising of 30 high risk neonates BERA was performed and no response was obtained from 10 neonates. Remaining 20 neonates showed abnormal BERA. Response parameters in this study were prolonged absolute latencies of wave I, II, III, V at 90db, wave IV not found in any case. Prolonged inter peak latencies of I-III, III-V, I-V were obtained at higher frequencies. The time interval of wave I-
III, III-V, V-I were obtained by subtracting the latency of peak I from III, V & wave III from V of BERA response derived at higher intensities.

The following high risk factors were documented in the neonates comprising the high risk group of 30 where prematurity was observed in maximum 20.0% and craniofacial anomalies form the least in 3.33% of neonates. These findings were documented in the Table I mentioned below.

Table- I : High Risk Factors Distribution in Neonates with Delayed BERA Responses & Absent BERA Responses (n = 30)

<table>
<thead>
<tr>
<th>High Risk Factor</th>
<th>Distribution</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>prematurity</td>
<td>6</td>
<td>20.0</td>
</tr>
<tr>
<td>hyperbilirubinaemia</td>
<td>5</td>
<td>16.67</td>
</tr>
<tr>
<td>h/o consanguinity</td>
<td>2</td>
<td>6.67</td>
</tr>
<tr>
<td>Delayed birth cry</td>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>Low birth weight</td>
<td>4</td>
<td>13.33</td>
</tr>
<tr>
<td>Family h/o deafness</td>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>meningitis</td>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>Birth asphyxia with hypoxic encephalopathy</td>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>Craniofacial anomalies</td>
<td>1</td>
<td>3.33</td>
</tr>
</tbody>
</table>

BERA responses in 25 normal neonates show that as age advances absolute latencies from age 0-3 days to 6 months of wave I, III, V have decreased. Also it was observed that Inter Peak Latencies of wave I-III, III-V, and V-I also decreased. These results were tabulated in the Table II mentioned below. Absolute Latencies of 20 High Risk Infants from age 0-3 days to 6 months of age show marked decrease in absolute latencies of wave I ranges from 2.7-3.0ms to 1.3-1.5ms, wave II from 3.6-3.8ms to 2.2-2.5ms, wave III from 4.6-5.0ms to 3.8-4.2ms, wave V from 7-7.5ms to 6-6.3ms were observed from 0-3 days to 6 months. Inter Peak Latencies are prolonged in these children from 0-3 days to 6 months. There is no decrease in I-III and V-I. Wave morphology in 20 high risk neonates ranges from average to poor. These results were tabulated in the Table III mentioned below.

When the average difference of BERA responses between high risk and normal neonates was compared it was observed that the difference is decreased in absolute latencies of wave I, III, V from 0-3 days to 6 months. The difference in Inter Peak Latencies between high risk and normal neonates is more from 0-3 days to 6 months.

It is observed that in present study wave morphology in 10 neonates who have absent BERA wave morphology was very poor, not repeatable and peaks could not identify from 0-3 days to 6 months. In neonates who had delayed BERA

Table- II: Range of Responses of BERA in normal neonates (n = 25)

<table>
<thead>
<tr>
<th>AGE</th>
<th>Absolute Latency</th>
<th>Inter Peak Latency delay</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WA VE-I</td>
<td>WA VE-III</td>
</tr>
<tr>
<td>O-3days</td>
<td>2.0-2.2ms</td>
<td>4.2-4.4ms</td>
</tr>
<tr>
<td>3 months</td>
<td>1.5-1.7ms</td>
<td>3.9-4.1ms</td>
</tr>
<tr>
<td>6 months</td>
<td>1.9-2.1ms</td>
<td>4.0-4.2ms</td>
</tr>
</tbody>
</table>

Table-III: Range of Responses of BERA in 25 High Risk Infants

<table>
<thead>
<tr>
<th>AGE</th>
<th>Absolute Latency</th>
<th>Inter Peak Latency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WA VE-I</td>
<td>WA VE-III</td>
</tr>
<tr>
<td>O-3days</td>
<td>0.8m sec</td>
<td>0.5m sec</td>
</tr>
<tr>
<td>3 months</td>
<td>0.1m sec</td>
<td>0.2m sec</td>
</tr>
<tr>
<td>6 months</td>
<td>0.6m sec</td>
<td>0.2m sec</td>
</tr>
</tbody>
</table>

Table-IV: Difference of BERA Responses in High Risk & Normal Neonates (Average)
response, the wave morphology was average with fail repeatability.

Response for average to poor morphology can be attributed to inadequate myelination of auditory pathway from cochlear level to brain stem level. In normal neonates there is good peak to peak repeatability & good wave morphology.

**DISCUSSION:**

Congenital hearing loss is one of the most common congenital anomalies which can be identified early in life. Its early recognition and intervention helps in the overall development of the child. The aim of hearing screening is to early detection and early intervention of hearing loss. BERA is a very valuable Audiological investigation for neonates and the otherwise difficult to test child as one of the most reliable measures of neural integrity in the cochlear and caudal brainstem pathway. Long term follow-up is needed to study the correlation between early ABR morphology and the effects on hearing function, speech and language development later in life.

In our study among 30 high risk infants who underwent BERA, 20 neonates (66.6%) got abnormal BERA response in the form of prolonged absolute latencies. These prolonged absolute latencies of wave I, II, III, V decreases as age advances from 0-3 days to 6 months. These prolonged absolute latencies of wave I, II, III, V during 0-3 days of birth are due to delayed maturation and myelination of auditory pathway due to high risk factors. It is also observed that wave IV was absent in all these neonates. This absence of wave IV is because of incomplete myelination of auditory pathway.

The inverse correlation between gestational age and absolute latencies shows that as gestational age increases - and the brainstem in the central nervous system matures - there is a continuous decrease in absolute wave latencies in term and preterm newborns. Such decrease relates to the progressive myelination of central nervous structures, increased axon diameter, improved neural activity synchronism, effective structural connections, and improved synaptic function; all of these factors derive from the maturation process of the central auditory system.

Similarly Absolute latencies of wave I, III, V in normal neonates were decreased as age advances and the difference between absolute latencies of high risk neonates and normal neonates also decreased as age advanced. This delayed absolute latency in high risk neonates as compared to normal neonates is due to delayed maturation process of auditory pathway in high risk neonates.

The latency increase was even more marked in premature newborn, as the maturity level in this group is at an earlier stage compared to term neonates, since this process depends on the gestational age. An increased absolute latency in premature compared to term newborn may be related to electrical conduction delays because of myelination of developing auditory pathway structures up to the brainstem; this suggests that the degree of nerve fiber myelination and immature auditory pathways affects wave latency.

From the literature available it was observed that four variables were found to be important for predicting hearing loss. They were length of stay in the NICU, gestational age, craniofacial anomalies and TORCH infections. Our study found prematurity as the most common risk factor for hearing impairment. These possibilities is confirmed by the global delay in absolute and inter peak latencies in the study sample compared to the adult population, as well as the inverse correlation between gestational age and absolute latencies.

In present study 20 high risk neonates showed abnormal prolonged Inter Peak Latencies of wave I-III, III-V, V-I from 0-3 days to 6 months. In high risk neonates Prolonged Inter Peak Latencies of wave III-V decreased as age advances, ranges from 2.4-2.5ms in 0-3 days to 2.2-2.1ms in 6 months, but Inter Peak Latencies of wave I-III and V-I prolonged from 0-3 days to 6 months.

There is no improvement in average difference of Inter Peak Latencies between high risk and normal neonates from 0-3 days to 6 months. This could be because of difference in maturation of auditory pathway in high risk neonates as compared to normal neonates and improper myelination of higher order neurons in auditory pathway in high risk neonates which gives impression that maturation of auditory pathway is not yet complete.

It is observed that in present study wave morphology in 20 high risk neonates ranges from average to poor. In 10 neonates who have absent BERA, wave morphology was very poor, not repeatable and peaks could not identify from 0-3 days to 6months. In neonates in who had delayed BERA response, the wave morphology was average with fail repeatability. Response for average to poor morphology can be attributed to inadequate myelination of auditory pathway from cochlear level to brain stem level. In normal neonates there is good peak to peak repeatability & good wave morphology.
The primary objective of this study was to analyse the maturation and myelination of auditory pathway by using BERA results in terms of absolute latencies and Inter Peak Latencies in high risk neonates & normal neonates. This has provided us with new insights in the normal development and the risks that can compromise the immature auditory system of high risk neonates. Researches to be taken up to establish population based, cost effective hearing screening modalities and guidelines.

CONCLUSION:

Early diagnosis and timely intervention for deaf and hard of hearing in newborns provides a proper path for normal development of the hearing impaired. All the normal newborns and especially the high risk infants should undergo hearing evaluation within the first 6 months followed by thorough diagnostic evaluation and follow-up for infants who fail their initial testing. No Aggressive treatment decision for the management of the child should be made until repeated BERA measurement confirms the diagnosis of hearing improvement.

DISCLOSURES:

a) Competing interests/Interests of Conflict- None
b) Sponsorships – None
c) Funding - None
d) Written consent of patient- taken
e) Animal rights- Not applicable

REFERENCES:

ABSTRACT:
Introduction: Modified dacryocystorhinostomy with mucosal flap is a newer technique, it involves creation of large rhinostomy and preservation of nasal and lacrimal sac mucosa, which increases the success rate of this procedure.
Objective: To compare the result of endonasal endoscopic dacryocystorhinostomy done by conventional method versus modified mucosal flap technique in chronic dacryocystitis patients.
Methods: 96 cases of chronic dacryocystitis of either sex, and age group 20 to 60 years with nasolacrimal duct obstruction diagnosed by syringing were enrolled in this study between November 2014 to October 2016. Group-A patients underwent conventional dacryocystorhinostomy and Group-B patients underwent modified dacryocystorhinostomy with mucosal flap technique. The post operative follow up was done upto 6 month to assess lacrimal patency using syringing.
Results: Success rate was determined by symptomatic relief of epiphora and patency at syringing at the end of 6 month. Success rate of conventional dacryocystorhinostomy was found to be 75% and modified dacryocystorhinostomy with mucosal flap technique was 93.75% (p value 0.011).
Conclusion: Success rate of mucosal flap technique was better and found statistically significant.
Keywords: Dacryocystitis, Nasolacrimal duct, Dacryocystorhinostomy.
endoscopic DCR done by modified mucosal flap technique with conventional DCR.

Methodology

1. Patient & Methods: This randomized controlled study was carried out over a period of two years in tertiary care centre after ethical committee approval. Total 96 cases were randomized into two groups, 48 in each group. Every consecutive patient complaining of epiphora and diagnosed as acquired nasolacrimal duct obstruction fulfilling inclusion criteria and willing to come for follow up were included in the study.

2. Inclusion criteria: Patients of age group of 20-60 years with epiphora due to nasolacrimal duct obstruction either primary or secondary and patients with fistula/mucocele/pyocele of lacrimal sac.

3. Exclusion criteria: Patient with congenital dacryocystitis, canalicular or common canalicular blockage, eyelid malposition, post traumatic lid and bony deformities, patients with failed external DCR and patients of DNS and other nasal pathologies.

Written and informed consent of each patient taken. Group A patients underwent conventional DCR while Group B patients underwent modified DCR. Most of the patients were in the age group of 40-50 years (39.6%) which was followed by 50-60 years age group (26%). All surgeries in both groups were done transnasally under endoscopic control by single otolaryngologist senior surgeon. All cases selected for the study were evaluated and a brief history was taken from each patient regarding symptomatology and duration of disease. A detailed clinical examination was performed. Anterior rhinoscopy was done to look for any intranasal pathology like deviated nasal septum, inferior turbinate hypertrophy, spur, stenosis etc. Nasal endoscopy was done to see the accessibility of operation site and nasal pathology prior to the surgery. Lacrimal sac syringing, probe test, and routine investigations of every patient were done. The patients were posted for surgery either under G.A or L.A with sedation and positioned in reverse trendelenberg position for surgery.

4. Surgery:

(a) Conventional endonasal dacryocystorhinostomy:

Group-A patients underwent conventional endonasal dacryocystorhinostomy.

In conventional DCR lacrimal sac is connected directly to the nose by removing the layers of bone and mucosa which separate these two structures.

(b) Modified endonasal dacryocystorhinostomy with mucosal flap technique:

Group- B patients underwent modified mucosal flap technique.

Step-1 (Mucosal incision) An incision was made in lateral wall of nose with the help of sickle knife, starting just anterior to the axilla of middle turbinate and proceeded in forward direction for 0.5-0.7 cm then vertically downward for 1.25 cm and therefore it proceeded posteriorly.

Step-2 (Flap elevation) A suction Freer elevator is used to elevate the flap and creating a posteriorly based nasal mucoperiosteal flap. After elevating the flap it was reflected up towards middle turbinate.

Step-3 (Bone removal) The bone underlying the flap constitutes of anterior lacrimal crest of the maxilla anteriorly and lacrimal bone posteriorly. An osteotomy was performed with straight 2 mm Kerrison punch forceps and an angled punch was used to remove bone at upper limit of the sac. The complete antero-posterior extent of the medial wall of the sac was exposed. Lacrimal bone was removed with a Freer’s elevator or with ball probe. At this point, it was important to meticulously locate and remove all small bone fragments.

Step-4 (Lacrimal sac incision and flap creation) The lacrimal sac medial wall incised vertically at the anterior margin of the exposed sac such that posterior lacrimal flap became larger than anterior lacrimal sac flap. Two small horizontal incision one superiorly and another inferiorly was given and U shaped posterior flap created. This lacrimal flap was reposed posteriorly. While small anterior lacrimal flap was reposed anteriorly.

Step-5 (Repositioning of nasal mucosal flap) The posteriorly based nasal flap was cut horizontally into two parts, so as to make superior and inferior nasal mucosal flap. Superior nasal mucosal flap is used to cover the raw bone which left superiorly over the upper limit of the sac. The inferior nasal mucosal flap is apposed with the posterior lacrimal flap’ (figure no. 1).

Step-6 (Patency check) With the help of suction tip, mucopurulent discharge or blood was removed, then stoma patency was checked by lacrimal sac syringing done with normal saline from outside by the assistant and free flow of the saline was observed endoscopically. 4% solution of xylocaine with 1:100,000 adrenaline soaked cotton pieces were used which were squeezed before placing into the nasal cavity to attain hemostasis and decongestion of the operative site and to improve hemostasis during incision and fashioning of the mucosal flap.

Medicated nasal packing was done with gauze piece soaked with Neosporin ointment. Any complications during the surgery bleeding, damage to lacrimal sac, damage to nasal mucosa and damage to orbital structures were noted and
treated accordingly.5. Post Operative care: For both the groups postoperative nasal packing done with neosporine soaked tape gauze and it is kept for 24 hours. The pack removed after 24 hrs. Saline nasal drops 4 -5 times a day advised to avoid crust formation. Patient will be advised to avoid nose blowing for 4-5 days. Patients followed up on 7th day, 15th day, 1 month, 6 month postoperatively and syringing was done (figure no.2). Postoperative Diagnostic Nasal Endoscopy done on 7th day to remove the crusts and synechiae if any. Diagnostic nasal endoscopy done during follow up to see any complication (figure no.3). The result of endoscopic DCR with or without mucosal flap technique recorded in the case record form.

6. Outcome measures: We measured anatomical and functional Success by symptomatic relief of epiphora & patency at syringing. Statistical analysis was done by using Epi Info Software version 6.0.

Chi square and Z score test was used and data analysis and recording was done. Level of significance was taken as 0.05.

RESULTS:

96 Patients underwent endoscopic DCR Surgery. Females constituted 59.4% while males constituted 40.6%. Male: female ratio was approximately 1:1.46. Females were commonly affected than males and it is thought to be due to congenital anatomic narrowing of nasolacrimal drainage system, long duration of exposure to smoke and increased probability of exposure to dusty environments. Simple epiphora (52.1%) was the commonest symptom of presentation followed by epiphora with discharge in both groups. Left side involvement (62.5%) of disease was more commonly observed. This could be because; nasolacrimal duct and lacrimal fossa forms a more acute angle on the left side than the right side. Early post-operative complications encountered after conventional DCR were bleeding (6.25%) and ecchymosis (2.5%) while in modified DCR technique bleeding was seen in 4.2% cases and ecchymosis seen in 4.2% cases. Late post-operative complications were shown in table 1. They were encountered after conventional DCR in the form of granulation (35.4%), crusting (16.7%), synechiae (6.2%) and stenosis (8.3%) while in modified DCR technique were granulation (8.3%), crusting (12.5%), synechiae (4.2%) and Stenosis (4.2%). Granulation was observed more in conventional DCR patients most probably because of bare bone which was statically significant (P value-0.004). On the basis of outcome measures of symptomatic relief of epiphora and patency at syringing, the success rate of Group A was 75% whereas in Group B rate was 93.75%. which was shown in table 2. The difference in both groups was statistically significant (P value-0.011) (table no.2). Table no 3 Showing causes of failure and we found that 12 failure cases were due to granulation, synechiae and stenosis in Group A.

Granulation was seen in 8 cases which were obstructing the neo-ostium site. Stenosis was seen in 3 cases due to scarring and synechiae in one patient. Out of 3 failure cases in Group B granulation observed in one case while synechiae seen in 2 cases.

DISCUSSION:

Ever since endoscopic DCR was popularized in the 90’s, there has been a constant debate between the external DCR & endoscopic DCR. According to ophthalmologist endoscopic DCR are not as successful as external DCR. The reason may be related to the lack of outline apposition of the nasal & lacrimal sac mucosa & the smaller bony ostium.

<table>
<thead>
<tr>
<th>Late complication</th>
<th>Group A (n=48) No. of cases</th>
<th>Group B (n=48) No. of cases</th>
<th>Z-score</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granulation</td>
<td>17 (35.4%)</td>
<td>4 (8.3%)</td>
<td>2.83</td>
<td>0.004</td>
</tr>
<tr>
<td>Crusting</td>
<td>8 (16.7%)</td>
<td>6 (12.5%)</td>
<td>0.534</td>
<td>0.593</td>
</tr>
<tr>
<td>Synechiae/Adhesion</td>
<td>3 (6.2%)</td>
<td>2 (4.2%)</td>
<td>0.447</td>
<td>0.655</td>
</tr>
<tr>
<td>Stenosis/Cicatrization</td>
<td>4 (8.3%)</td>
<td>2 (4.2%)</td>
<td>0.816</td>
<td>0.414</td>
</tr>
</tbody>
</table>

Table-2. Showing outcome of surgery.

Table-3. Showing causes of failure.
Surgical failure occurs when the lacrimal sac does not marsupialise on the lateral nasal mucosal wall. With this article we hope to resolve this problem to some extent.

Dacryocystorhinostomy has been classified as external and endoscopic. The later has been further sub classified as laser assisted DCR, endoscopic canalicular laser assisted DCR and mechanical endonasal DCR with drills or without drills. In conventional endoscopic DCR surgery, the nasal mucosal flap is completely excised, along with the medial wall of lacrimal sac. Patency of the rhinostomy site depends on anastomosis of the cut edges of the nasal and lacrimal sac mucosa. However the pattern of anastomosis between these cut edges is unpredictable. If nasal to nasal mucosa and lacrimal to lacrimal mucosa anastomosis occurs, then the rhinostomy site will be closed. In modified mucosal flap technique, the nasal mucosal flap was preserved till end and was cut horizontally to make superior and inferior nasal flap. A U-shape lacrimal flap is created and apposition of nasal and lacrimal sac flap done.

Tsirbas and Wormald in their article have shown new technique in endonasal DCR. They emphasize on preservation of nasal mucosa and creation of a flap anastomosis. The general principle of creating a mucosa lined fistula is vital in external DCR was emulated in this new method.

There are very few large scale prospective randomized controlled trials in the literature to support the benefits of the various adjunctive measures in Endoscopic DCR. Mitomycin-C an alkylating agent with inhibitory affects on fibroblasts has been shown to cause a decrease in both the density and cellularity of nasal mucosal specimens taken from Endoscopic DCR. However, its role in preventing closure of the rhinostomy site remain uncertain.

KSC Yuen et al noticed that patients with granulation tissue were found to have a lower success rate due to closure of the rhinostomy site. They noticed granulation in 17% cases of entire lacrimal sac excised and 6.5% cases of lacrimal sac flap group. In our study granulation was observed more in conventional DCR may be because of bare bone, which correlates with other studies. Qing shan etal also noticed granulation in 15% cases of mucosal flap technique and 39% conventional DCR.

The surgical success rate depends upon creating a wide osteotomy and preservation of mucosa around the bony ostium. They observed that Asian patients with thicker frontal process of the maxilla have more wide region of bare bone after surgery, which can lead to unwanted formation of granulation tissue and scar tissue around the ostium, thus...
result in failure of surgery. Kansu et al. also noticed a success rate of 88.3% in their study of mucosal flap technique.

In our study we introduced a new technique of fashioning a V-shaped nasal mucosal flap to cover the bared bone around the sac. This technique preserved most of part of nasal mucosal flap to cover the bared bone as possible and reduced the mucosal flap mobility.

The present study shows that the success rate of group A was 75% (48/36), as apposed to group B 93.75% (48/45). We observed that the rate of granulation and scar tissue formation was lower in group A with a lower incidence of ostium failure than in control group B.

These results suggest that the preservation of the nasal mucosa and fashioning of a nasal V-shaped flap, apposing well to the lacrimal sac flap and covering the bared bone, can reduced the formation of granulation tissue and lessens the risk of subsequent scan and closure of ostium. SNF-superiornasal flap In all our cases we took special care to create a good exposure and removal of all small bony specules. We avoided the use of stents, so granulation tissue formation was less.

CONCLUSION

This randomized controlled study showed that the success rate was more in mucosal flap technique as compared to conventional DCR which was statistically significant. Closure of bare bone with nasal mucosal flap and apposition between the lacrimal sac mucosa and the nasal mucosa decreases the formation of granulation tissue in mucosal flap technique. So it could be a better alternative to conventional DCR in future.

Limitation

To make our results more generalized, we need to investigate higher number of patients, this is not feasible, as everybody is not doing mucosal flap technique.

DISCLOSURES:

a) Competing interests/Interests of Conflict- None
b) Sponsorships – None
c) Funding - None
d) Written consent of patient- taken
e) Animal rights- Not applicable

REFERENCES

ORIGINAL RESEARCH ARTICLE

PREVALENCE OF HEARING IMPAIRMENT IN CHILDREN (AGED 6-17 YRS) IN A SCHOOL OF VILLAGE DASAULI, LUCKNOW (U.P.) INDIA

*Ranveer Singh, **Pankaj Kumar Verma, ***Jaya Gupta, ****Ausaf Ahmad, *****Amit Kumar Srivastava

HOW TO CITE THIS ARTICLE

ABSTRACT:
Background: Hearing loss in school going children causes behavioral complications and also it causes impact on childrens’ academic achievement. It largely remains undetected; the aim of this study is to ascertain the percentage of hearing impaired children in a school in village Dasauli of Lucknow district.

Methods: A Cross-sectional study was conducted to calculate the prevalence of hearing impairment in school children aged 6 years to 17 years in Techno school of village Dasauli in district Lucknow during month of July 2017 to December 2017. The students’ aural examination and audiological tests were performed by qualified Otolaryngologist and Audiologist respectively.

Results: This study was conducted among 597 school children of age group of 6 to 17 years. 95(15.9%) children were suffering from hearing impairment. Maximum 67 (70.5%) individuals had Wax, followed by 20 (21.0%) individuals had Chronic Otitis media, 7 (8.2%) individuals had Serous Otitis media and minimum number of individuals belongs to Post operative case of MRM (Modified Radical Mastoidectomy).

Conclusions: The hearing loss could lead to delay in the development in speech and language which leads to learning problems which in turn leads to poor academic achievements. As inference drawn from the present study that school screening is the most effective method of diagnosing deafness in school age children, this program should be extended to all school in all the areas to know the disease burden in society and early measure can be taken to avoid any disability.

Key words: Hearing impairment, Audiometry, Prevalence, Cross-sectional study.

INTRODUCTION:
Hearing is one of the important part of five basic senses and it helps in Communication with others. Hearing impairment effects child’s ability to normally acquire the spoken language. Hearing loss of even 15dB can create hearing disability in children and consequently impairment in their mental growth. These disabilities can cause behavioral complications in six functional areas: mental maturity, perception, speech, cognition and general intelligence, academic achievement and interpersonal behavior. Most of the time unilateral hearing loss remains undetected but it also cause impact on children’s academic achievement, it was found that 30% of children with unilateral hearing loss lag at least 1.2yrs behind their normal peers in terms of academic achievement. Adequate hearing acuity is of paramount importance and prerequisite in the personality development of a child. Hearing impairment especially during early age has serious ill effects on child’s psycholinguistic skills and school performance. There is convincing evidence to suggest
that for optimum development of speech and language the auditory pathway must be stimulated from very early age to allow it and higher centers to mature properly. The purpose of this study is to determine the prevalence and type of hearing loss amongst school going children and to evaluate the etiological factors of hearing loss and their distribution pattern.

MATERIAL AND METHOD:

A cross sectional study was conducted to estimate the prevalence of hearing impairment in school children aged 6 yrs to 17 yrs in Techno school of village dasauli , tehsil Baksika talab, district Lucknow, UP. Study was conducted during month of July 2017 to December 2017 , aged 6 yrs to 17 yrs were included in this study. Ear ,nose and throat examination of all students were done. The students having any ear disease were checked for hearing loss by doing Tuning fork test and in those student who were having abnormal tuning fork test, audiometry test was performed and if needed tympanometry test was done to check middle ear compliance and pressure. These two tests were performed in department of ENT, Integral institute of medical sciences and research, Lucknow.

RESULT:

Total of 597 individuals were studied in different age groups, with minimum age 6 years and maximum age 17 years (Mean age 11.50 ± 3.60). Maximum numbers of individuals were at the age of 15 years and 17 years i.e. 76 (12.7%), followed by 65 (10.9%) individuals in the age of 13 years, 61 (10.2%) individuals in the age of 14 years, 53 (8.9%) individuals in the age of 16 years and 47 (7.7%) individuals in the age of 11 years (Table 1).

Table 1-

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Frequency (Number of Children)</th>
<th>Percent (%) Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>35</td>
<td>4.2</td>
</tr>
<tr>
<td>7</td>
<td>31</td>
<td>5.3</td>
</tr>
<tr>
<td>8</td>
<td>34</td>
<td>5.7</td>
</tr>
<tr>
<td>9</td>
<td>40</td>
<td>6.7</td>
</tr>
<tr>
<td>10</td>
<td>45</td>
<td>7.5</td>
</tr>
<tr>
<td>11</td>
<td>46</td>
<td>7.7</td>
</tr>
<tr>
<td>12</td>
<td>45</td>
<td>7.5</td>
</tr>
<tr>
<td>13</td>
<td>65</td>
<td>10.9</td>
</tr>
<tr>
<td>14</td>
<td>61</td>
<td>10.2</td>
</tr>
<tr>
<td>15</td>
<td>76</td>
<td>12.7</td>
</tr>
<tr>
<td>16</td>
<td>53</td>
<td>8.9</td>
</tr>
<tr>
<td>17</td>
<td>76</td>
<td>12.7</td>
</tr>
</tbody>
</table>

There were 390 (65.3%) males and 207 (34.7%) females in the study population (Table 2).

Table 2-

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency (Number of Children)</th>
<th>Percent (%) Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>390</td>
<td>65.3</td>
</tr>
<tr>
<td>Female</td>
<td>207</td>
<td>34.7</td>
</tr>
</tbody>
</table>

Among 597 individuals, 502 (84.0%) individuals having no hearing loss. Hearing loss was present in 95 (15.9%) individuals, out of which it is in right ear in 36 (6.0%) individuals and in left ear in 17 (2.8%) individuals and in both ears in 42 (7.2%) individuals. So the prevalence of hearing loss was found to be 15.9% (Table 3).

Table 3-

<table>
<thead>
<tr>
<th>Hearing Loss</th>
<th>Frequency (Number of Children)</th>
<th>Percent (%) Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Hearing loss</td>
<td>502</td>
<td>84.0</td>
</tr>
<tr>
<td>Right Ear</td>
<td>36</td>
<td>6.0</td>
</tr>
<tr>
<td>Left Ear</td>
<td>17</td>
<td>2.8</td>
</tr>
<tr>
<td>Both Ear</td>
<td>42</td>
<td>7.2</td>
</tr>
</tbody>
</table>

Out of 95 (15.9) individuals with hearing loss, maximum were in the age of 10 and 12 years ie (15.8%) individuals, followed by 12 (12.7%) individuals in the age of 9 years, 11 (11.5%) individuals in the age of 16 years, 9 (9.4%) individuals in the age of 14 years and 8 (8.4%) individuals in the age of 13 years and 15 years.

Table 4-

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Frequency (Number of Children)</th>
<th>Percent (%) Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>4</td>
<td>4.2</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>2.2</td>
</tr>
<tr>
<td>8</td>
<td>3</td>
<td>3.1</td>
</tr>
<tr>
<td>9</td>
<td>12</td>
<td>12.7</td>
</tr>
<tr>
<td>10</td>
<td>15</td>
<td>15.8</td>
</tr>
<tr>
<td>11</td>
<td>3</td>
<td>3.1</td>
</tr>
<tr>
<td>12</td>
<td>15</td>
<td>15.8</td>
</tr>
<tr>
<td>13</td>
<td>8</td>
<td>8.4</td>
</tr>
<tr>
<td>14</td>
<td>9</td>
<td>9.4</td>
</tr>
<tr>
<td>15</td>
<td>8</td>
<td>8.4</td>
</tr>
<tr>
<td>16</td>
<td>11</td>
<td>11.5</td>
</tr>
<tr>
<td>17</td>
<td>5</td>
<td>5.4</td>
</tr>
</tbody>
</table>

Out of 95 individuals with hearing loss, 55 (57.9%) individuals were male and 40 (42.1%) individuals were female (Table 5).
Out of 95 individuals with hearing loss, maximum 93 (97.9%) individuals had Conductive hearing loss, only 2 (2.1%) individuals had mixed hearing loss (Table 6).

Table 5 - Percent distribution number of children with respect to gender (N = 95)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Number of Children</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>55</td>
<td>57.9</td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>42.1</td>
</tr>
</tbody>
</table>

Out of 95 individuals with hearing loss, maximum 67 (70.5%) individuals had Wax, followed by 20 (21.0%) individuals had Chronic Otitis media, 7 (8.2%) individuals had Serous Otitis media and minimum number of individuals belongs to Post operative case of MRM (Modified Radical Mastoidectomy) (Table 7).

Table 6 - Percent distribution number of children with respect to Types of Hearing Loss (N = 95)

<table>
<thead>
<tr>
<th>Types of Hearing Loss</th>
<th>Number of Children</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductive hearing</td>
<td>93</td>
<td>97.9</td>
</tr>
<tr>
<td>Mixed hearing loss</td>
<td>2</td>
<td>2.1</td>
</tr>
</tbody>
</table>

DISCUSSION:-

In our study a prevalence rate of as much as 15.9% was found in otherwise apparently normal school children. Prevalence of hearing loss in this study was found higher as compared to some previous studies like Mishra et al' and Tulli et al' who found a prevalence rate of 11.7% and 12.5% respectively. This was because of rural population who are having poor standard of living and ignorant about hearing loss in otherwise healthy children.

Conductive hearing was more prevalent having a prevalence rate of 97.9% as compared to mixed hearing loss which had a prevalence rate of only 2.1%, no case was found having sensorineural hearing loss. These results are similar to those of kalpana et al who found a prevalence rate of conductive hearing loss of 96.22%.

Cerumen was the most common cause of hearing loss with prevalence of 67% followed by chronic suppurative otitis media 23.5% and serous otitis media 8.2%. All these are reversible causes which can be cured by giving some awareness to the parents.

Awareness of this problem amongst parents and school teachers is of utmost importance to detect this disability at an early age to provide the child the benefit of proper medical attention before the disability reaches serious proportions.

Since hearing loss is more prevalent in rural areas regular school health checkups and assistance of some voluntary organization for screening programmes will reduce hearing handicap. Since conductive hearing loss is the commonest cause and it can be corrected by doing early intervention by trained medical staff.

CONCLUSION:-

The hearing loss could lead to delay in the development in speech and language which leads to learning problems which in turn leads to poor academic achievements.

Hence simple measure like regular screening for ear diseases and hearing assessment done at the school level can prevent hearing loss. Health education must be given to school children about the problems of hearing loss.

The early detection of ear diseases is essential as they are associated with hearing loss and these children are at increased risk. The parents must be made aware about the dangers of undetected hearing loss in school children during parents teachers meetings.

Otoscopic and audiological workup remains the main stay of detecting hearing impairment in school age children.

As inference drawn from the present study that school screening is the most effective method of diagnosing deafness in school age children, this program should be extended to all school in all the areas to know the disease burden in society and early measure can be taken to avoid any disability.

Funding: no funding sources

Conflict of interest: none declared
Ethical approval: the study was approved by the institutional ethics committee.

**DISCLOSURES:**

(a) Competing interests/Interests of Conflict- None  
(b) Sponsorships – None  
(c) Funding - None  
(d) Written consent of patient- taken  
(e) Animal rights- Not applicable

**REFERENCES:**


HEARING ASSESSMENT IN CHRONIC RENAL FAILURE PATIENTS

*Ranjita Krishnan, **Rejee Ebenezer Renjit

HOW TO CITE THIS ARTICLE

ABSTRACT:

Background: The occurrence of hearing loss in the course of chronic renal failure (CRF) was investigated in numerous research studies, attempting to explain both the etiological factors and treatment possibilities. According to various authors, the percentage of occurrence of hearing loss in patients suffering from CRF differs between 20% and 80%.

Objectives: Our study was conducted in this context as an attempt to find the prevalence of sensorineural hearing loss in chronic renal failure patients, to assess the frequency and type of hearing loss in patients with CRF, to find any correlation between duration of illness and SNHL and also to assess the etiological factors related to sensorineural hearing loss among chronic renal failure patients.

Methodology: This is a hospital based cross-sectional study conducted at Dr S.M.C.S.I Medical college, Karakonam, during the period November 2013 – June 2015. A sample of 89 chronic renal failure patients were assessed by pure-tone audiogram.

Results: Out of the 89 chronic renal failure patients, 57 patients (64%) were detected to have sensorineural hearing loss in the order of frequency high > mid > low frequency. In this study, there is a statistically significant correlation between age of the patients and stage of the disease with SNHL. However there is no significant correlation between duration of chronic renal failure and blood parameters with SNHL.

Conclusion: SNHL is common among patients with chronic renal failure. Hence a pure tone audiometry should be done routinely in all chronic renal failure patients even if they don’t report hearing loss. Moreover periodic audiological assessment should be incorporated in their management to start rehabilitation as early as possible.

Keywords: Pure tone audiometry, sensorineural hearing loss, chronic renal failure.

INTRODUCTION:

Hearing loss and chronic renal failure are frequently associated and this association is known since 1927 when Alport first described a case of familial kidney disease with concomitant sensorineural hearing loss and termed it as Alport syndrome1. Over the years a series of observations concerning infrequent affections or syndromes with a close relationship between hearing impairment and CRF was reported.

There are several potential mechanisms for hearing loss in chronic renal failure that have been postulated in literature including deranged haemoglobin levels, electrolytes, blood urea and serum creatinine, calcium and phosphorous levels, hypertension, diabetes, ototoxic medications, effects of haemodialysis2,3. This study is thus undertaken with the aims of assessing the frequency and type of hearing loss in patients with CRF and to evaluate the relationship between suggested etiological factors in causation of hearing loss in these patients. In patients with chronic renal failure, if sensorineural hearing loss is detected at an earlier stage, we can prevent the further progression of hearing loss in these patients by giving...
neurotropic drugs and auditory rehabilitation by providing hearing aids.

**OBJECTIVES OF THE STUDY:**

- To study the prevalence of sensorineural hearing loss in patients with chronic renal failure.
- To assess hearing loss at different frequencies (250, 500, 1000, 2000, 4000, 8000 Hz) in patients with chronic renal failure.
- To study the correlation between hearing loss and duration of chronic renal failure.
- To assess the factors affecting hearing loss in patients with chronic renal failure.

**MATERIALS AND METHODS:**

This is a prospective cross sectional study conducted in a period of 2 years, aimed at finding out the prevalence and factors related to hearing impairment among chronic renal failure patients attending the Nephrology OPD and Dialysis unit in Dr. S.M.C.S.I. Medical College and Hospital, Karakonam. Patients were brought to the ENT OPD and an informed consent was obtained from them. Data including age, sex, stage of the disease and duration of illness were noted. Investigations such as level of hemoglobin, blood urea, serum creatinine, serum potassium, serum sodium, serum phosphorous, serum calcium, serum chloride done as routine investigations in the Nephrology OPD and the results were noted from the IP/OP chart of the corresponding patient. All patients where then subjected to a routine otological workup which include otoscopic examination of the ear, tuning fork tests and pure tone audiometry.

Audiometric assessment was done in a sound proof room using GRASON STADLER (GSI 61) Audiometer. Pure tone average was calculated as the average value of hearing thresholds at 500 Hz, 1000Hz and 2000 Hz. Pure tone average greater than 25 Hz was taken as hearing loss.

The data collected was entered in Microsoft Excel and was analyzed using SPSS software (version 21.0). Bivariable analysis using Chi square test and Odds ratio with 95% confidence interval was used to find out association between hearing impairment and various factors related to it. p value less than 0.05 was considered to be statistically significant. Binary logistic regression was used for finding out the independent predictors of hearing impairment.

**RESULTS:**

1. **PREVALENCE OF SENSORINEURAL HEARING LOSS AMONG CRF PATIENTS**

Out of 89 patients 57 (64%) patients with CRF had sensorineural hearing loss and it was absent in 32 (36%) patients. Prevalence of SNHL is shown in Figure 1.

2. **SENSORINEURAL HEARING LOSS AT DIFFERENT FREQUENCIES:**

In the right ear 81 (91.0%) patients showed a dip at 8000 Hz, 71 (79.8%) patients showed a dip at 4000 Hz, 59 (66.3%) patients showed a dip at 2000 kHz, 51 (57.3%) patients showed a dip at 1000 Hz, 43 (48.3%) showed a dip at 500kHz and 35 (39.3%) showed hearing loss at 250 Hz. Similarly in the left ear, 82 (92.1%) of patients showed SNHL at 8000 Hz, 66 (74.2%) patients showed SNHL at 4000 kHz, 57 (64%) showed a dip at 2000 kHz, 44 (49.4%) patients showed a dip at 1000 kHz, 41 (46.1%) patients showed SNHL at 500 Hz and 38 (42.7%) showed SNHL at 250 Hz. Results are depicted in Figure 2. The inference from these results are that maximum number of patients with chronic renal failure had SNHL at high frequencies and only few patients have SNHL at lower frequencies ie 8000 kHz > 4000 kHz > 2000 kHz > 1000kHz > 500kHz > 250kHz.

3. **SENSORINEURAL HEARING LOSS AND DURATION OF ILLNESS:**

Sensorineural hearing loss was present in 21 (55.3%) and absent in 17 (44.7%) patients who had the disease for less than 2 years duration. Between 2 and 4 years duration 23 (69.7%) patients had SNHL and 10 (30.3%) were normal. More than 4 years duration 13 (72.2%) patients had SNHL and 5 (27.8%) were normal. These results show that maximum number of CRF patients have the disease for more than 4 years duration. Relation between duration of illness and sensorineural hearing loss is shown in Table 1. There is statistically no significant association detected between duration of illness and sensorineural hearing loss (p value = 0.324)

4. **FACTORS AFFECTING HEARING LOSS IN PATIENTS WITH CHRONIC RENAL FAILURE:**

   **AGE:** Age was classified into 2 groups, < = 50 and > 50. Patients < = 50 consisted of a total of 25 patients of which 19 (76%) patients had SNHL and 15 (60%) did not have SNHL. Patients > 50 years consisted of a total of 64 patients of which 47 (73.4%) had SNHL and it was absent in 17 (26.6%) patients. Relation between age and sensorineural hearing loss is shown in Table 2. There is statistically significant association between age and sensorineural hearing loss (p value = 0.003)

   **STAGE OF THE DISEASE:** 17 patients were under stage 2 disease of which 6 (35.3%) of them had SNHL and 11 (64.7%) of them did not have hearing loss. In stage 3, there were total of 18 patients of which 11 (61.1%) of them have SNHL and 7 (38.9%) of them did not have SNHL. In stages 4 and 5 there were a total of 16 and 38 patients of which 14 (87.5%) in stage 4 and 26 (68.4%) in stage 5 have SNHL and 2 (12.5%) in stage 4 and 12 (31.6%) in stage 5 are not diagnosed.
to have SNHL. Relation between stage of the disease and sensorineural hearing loss is shown in Table 3. There is statistically significant association between stage of the disease and sensorineural hearing loss (p value = 0.016)

3. BLOOD PARAMETERS: There is statistically no significant association between the levels of Hemoglobin (p = 0.729), Blood urea (p = 0.482), Serum creatinine (p = 0.945), Serum potassium (p = 0.970), Serum sodium (p = 0.556), Serum chloride (p = 0.967), Serum calcium (p = 0.069), Serum phosphorous (p = 0.852) with sensorineural hearing loss. Relation between laboratory values and sensorineural hearing loss is shown in Table 4.

DISCUSSION:

Sensorineural hearing loss among patients with CRF has been a common finding in studies investigating the effects of renal failure on auditory function. Despite differences in methodologies and indices of auditory function, existence of hearing loss has been a common threat\(^4\). The higher incidence of hearing loss among patient with CRF has long been established and is constantly being verified by new studies. Although the gross anatomy of the kidney and cochlea differ, many similarities exist between the nephron and the striavascularis at the anatomical, physiological, pharmacological, pathological and ultra-structural levels\(^1\).

All this may make the nephron and the striavascularis susceptible to the same type of hemodynamic or pharmacological insults. Many studies have documented the association between the hearing loss and chronic renal failure. Accelerated presbyacusis, duration of renal failure, hemodialysis, ototoxic drugs, hypotension, circulating uremic toxins, anemia, electrolytic imbalances and metabolic disturbances are some of the causes listed in literature as possible causes for hearing loss in patients with chronic renal failure\(^5\). Out of 89 patients in our study with chronic renal

Table-1. Sensorineural hearing loss and duration of illness: \(x^2 = 2.253\) df = 2 p = 0.324

<table>
<thead>
<tr>
<th>Duration of illness</th>
<th>Hearing loss</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Absent</td>
<td>Present</td>
</tr>
<tr>
<td>&lt;2</td>
<td>17</td>
<td>21</td>
</tr>
<tr>
<td>2.1-4.0</td>
<td>10</td>
<td>23</td>
</tr>
<tr>
<td>&gt;4</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>57</td>
</tr>
</tbody>
</table>

Table-2. Age and sensorineural hearing loss \(x^2 = 8.729\) df = 1 p = 0.003

<table>
<thead>
<tr>
<th>Age</th>
<th>Absent</th>
<th>Present</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>≤50</td>
<td>15</td>
<td>60</td>
<td>10</td>
</tr>
<tr>
<td>&gt;50</td>
<td>17</td>
<td>26.6</td>
<td>47</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>36</td>
<td>57</td>
</tr>
</tbody>
</table>

Fig-1: Prevalence of sensorineural hearing loss among chronic renal failure patients.

Fig-2: Sensorineural hearing loss frequencies.
failure the prevalence of sensorineural hearing loss was noted in 57 (64%) patients. These results were supported by studies done by Aliasghar Peyvandi et al., in which 70 end stage renal disease patients were taken of which 23 (46%) patients had sensorineural hearing loss and by Sanjay Gaur et al. who showed among 52 CRF patients, an overall prevalence of sensorineural hearing loss was 73.07%. In our study sensorineural hearing loss was noted maximum at high frequencies (91%) followed by mid frequencies (64%) and least in low frequencies (42.7%). Same pattern of hearing loss was observed in a prospective study conducted by Suja Sreedharan et al. in 25 patients receiving treatment for CRF, 18% of patients had SNHL at low frequencies, 32% of patients had SNHL at mid frequencies and 72% of them had at high frequencies. Similarly Lam and Ozturan studied 15 subjects with CRF and 10 controls using pure tone audiometry and otoacoustic emissions. Their results supported our study by mentioning that all 15 subjects with CRF were found to have sensorineural hearing loss in high frequencies, compared to that of controls. In our study sensorineural hearing loss was present in 21 (55.3%) and absent in 17 (44.7%) patients who had the disease for less than 2 years duration. In patients with duration of disease between 2 and 4 years, 23 (69.7%) patients had SNHL and 10 (30.3%) were normal. In case of duration of disease more than 4 years, 13 (72.2%) patients had SNHL and 5 (27.8%) were normal. These results show that maximum percentage of sensorineural hearing loss occurred in CRF patients who had the disease for more than 4 years duration. However, no statistically significant association was detected between duration of illness and sensorineural hearing loss (p value=0.324) in our study. But this inference was disputed by Raaed Aboud Aloubade et al. in his study in which out of total of 100 patients with CRF of which all were males and 92 of them were on regular hemodialysis and 8 were on conservative management. They found that 36% showed SNHL and the incidence of SNHL was found to increase with duration of chronic kidney disease. In a case control study done by Akeem.O.Laisi et al also determine the pattern of hearing loss among patients with chronic renal failure, 33 CRF patients and 28 healthy controls of which 34 were males and 27 were females, they also found a positive correlation between duration of illness and chronic renal failure. In our study, age was classified into 2 groups, <=50 and >50. Patients <=50 consisted of a total of 25 patients of which 10 (40%) patients had SNHL and 15 (60%) did not have SNHL. Patients >50 years consisted of a total of 64 patients of which 47 (73.4%) had SNHL and it was absent in 17 (26.6%) patients. There is statistically significant association between age and sensorineural hearing loss (p value=0.003). Our study was supported by Raaed Aboud Aloubade et al. who conducted a study to find out the incidence of sensorineural hearing loss in a total of 100 patients with CRF, which showed a positive correlation between incidence of SNHL and advanced age. In our study 17 patients comes under stage 2 of which 6 (35.3%) of them have SNHL and 11 (64.7%) of them don’t have. In stage 3, there were total of 18 patients of which 11 (61.1%) of them have SNHL and 7 (38.9%) of them had normal hearing. In stages 4 and 5 there were total of 16 and 38 patients of which 14 (87.5%) in stage 4 and 26 (68.4%) in stage 5 have SNHL and 2 (12.5%) in stage 4 and 12 (31.6%) in stages 5.

<table>
<thead>
<tr>
<th>Stage of the disease</th>
<th>Hearing loss</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Absent</td>
<td>Present</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>2</td>
<td>11</td>
<td>64.7</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>38.9</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>12.5</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
<td>31.6</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>36</td>
</tr>
</tbody>
</table>

Table -3: Hearing loss and stage of the disease.

<table>
<thead>
<tr>
<th>BLOOD PARAMETERS</th>
<th>Hearing loss</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Absent</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td></td>
<td>mean</td>
<td>sd</td>
<td>mean</td>
</tr>
<tr>
<td>Haemoglobin</td>
<td>8.903</td>
<td>2.3472</td>
<td>9.060</td>
</tr>
<tr>
<td>Blood urea</td>
<td>95.50</td>
<td>39.563</td>
<td>101.32</td>
</tr>
<tr>
<td>Serum creatinine</td>
<td>7.175</td>
<td>3.7294</td>
<td>7.123</td>
</tr>
<tr>
<td>Serum potassium</td>
<td>5.184</td>
<td>.9027</td>
<td>5.177</td>
</tr>
<tr>
<td>Serum sodium</td>
<td>133.59</td>
<td>6.829</td>
<td>134.56</td>
</tr>
<tr>
<td>Serum chloride</td>
<td>103.63</td>
<td>6.399</td>
<td>103.68</td>
</tr>
<tr>
<td>Serum calcium</td>
<td>8.466</td>
<td>1.1494</td>
<td>8.921</td>
</tr>
<tr>
<td>Serum phosphorous</td>
<td>5.081</td>
<td>1.6415</td>
<td>5.023</td>
</tr>
</tbody>
</table>

Table -4: Blood parameters and their effects on sensorineural hearing loss.
stage 5 are not diagnosed to have SNHL. There is statistically significant association between stage of the disease and sensorineural hearing loss (p value=0.016). Our inferences were supported by a retrospective study done by Pandey S et al\textsuperscript{12} to know the relationship between the different stages of CRF and corresponding audiological findings in them. Twenty-three subjects (46 ears) in the age range of 25 to 60 years were included in the study and subjected to pure tone audiogram. Significant differences in the degree of sensorineural hearing loss were observed among patients with different stages of CRF.In our study, no statistically significant association was found between the levels of hemoglobin (p = 0.729), blood urea (p = 0.482), serum creatinine (p = 0.945), serum potassium (p = 0.970), serum sodium (p = 0.556), serum chloride (p = 0.967), serum calcium (p = 0.069), serum phosphorous (p = 0.852) with sensorineural hearing loss. Our results were supported by studies done by Johnson et al\textsuperscript{13} who found no relationship between fluctuations of hearing and serum urea nitrogen, creatinine, pottasium, sodium, calcium and glucose.

CONCLUSION

In our study, we have made certain conclusions regarding the effect of various etiological factors on the hearing thresholds in patients with chronic renal failure based on a single audiological evaluation. Patients with CRF are subject to wide fluctuations in hemodynamic and metabolic parameters over time. Though we have arrived at certain broad conclusions based on our results, we cannot presume to identify the exact etiological factors responsible for hearing loss. High frequency sensorineural hearing loss was detected in majority of chronic renal failure patients and there was a positive correlation of sensorineural hearing loss with stage of the disease and age of the patients.However, lack of correlation between hearing function and blood parameters precludes a detailed description of the mechanisms causing hearing loss in CRF. A routine screening for hearing loss in chronic renal failure patients may be helpful to diminish co morbidities and improve their quality of life. Prevention of development of chronic renal failure is another important factor. Based on this study we recommend the following points

1. Pure tone audiometry should be done routinely in all chronic renal failure patients even if they don’t report hearing loss.
2. Periodic audiological assessment should be incorporated in the management of all chronic renal failure patients to start rehabilitation as early as possible.

REFERENCES:

TURBINECTOMY VERSUS TURBINOPLASTY: AN OUTCOME ANALYSIS

*Vidya B. Thimmaiah, **John Stanley, ***Viswanatha B

How to cite this article

Abstract

Introduction: Nasal obstruction is one of the most common chief complaints of the patients visiting the ENT outpatient department. In some patients the cause for the nasal obstruction may be hypertrophy of the inferior turbinate, the proper management of which is still debatable.

Material and method: 60 symptomatic patients with hypertrophy of inferior turbinate presenting to the department of ENT over a period of one year that is from 1st February 2016 to 31st January 2017, a detailed history was taken and thorough clinical examination was done and examination with 00 degree nasal endoscope, patients were operated for their enlarged turbinates either by turbinectomy or turbinooplasty. The findings were recorded pre operatively, per operatively and post operatively with the aid of the endoscope and after discharge from the hospital. The patients were called for follow-up every fortnightly for six months and they were asked for relief of symptoms, examined for nasal obstruction and for recurrence of symptoms. These findings were included in the descriptive study and statistically analyzed.

Results: Nasal obstruction was the common complaint and the patients were most commonly diagnosed to have allergic rhinitis. Most of the patients became symptom free with total turbinectomy as compared to turbinooplasty.

Conclusion: Total Inferior turbinectomy and inferior turbinooplasty both have comparable success rates. Total turbinectomy allows complete removal of inferior turbinate there by reducing the chances of developing recurrent obstructive symptoms.

Introduction:

Since the latter part of the 19th century different medical and surgical treatments have been developed to treat the enlarged turbinate, reduction in the size of the inferior turbinate is an accepted treatment for the same and this gives considerable improvement in the nasal airway. The bone and or the mucosa may be enlarged, but what constitutes pathologic or normal is not well defined and therefore there is controversy over the management of the turbinate in symptomatic subjects. (1)

Nasal obstruction was in itself a very bothersome symptom, it especially affects the sleep of the patient. In turn, can lead to symptomatic sequelae such as sinusitis, otitis media, and the onset or worsening of mild to severe sleep disturbances, leading to inability to concentrate, day time somnolence, and low results of psychometric tests, including obstructive sleep apnoea.

Nasal obstruction was reviewed by Kimmelman, who in 1989 published a practical outline to guide the treatment of the most common etiologies, including allergic rhinitis, infectious rhinitis, and vasomotor rhinitis. Kimmelman estimated that in the United States alone at that time, an estimated $5 billion was being spent annually on medications to relieve nasal obstruction. An additional $60 million was being spent on surgical remedies, and another $10 billion on...
the treatment of associated disorders, such as recurrent rhinosinusitis, otitis media, bronchitis, and asthma. Further adding to the condition’s economic impact are less tangible factors, such as absenteeism and decreased productivity. (2)

In clinical practice inferior turbinectomy and turbinoplasty is routinely performed. We performed both inferior turbinectomy and inferior turbinoplasty on 30 patients, each. Our objective was to compare the efficacy of both the methods in terms of subjective and objective relief of symptoms, safety, recurrence and postoperative morbidity.

OBJECTIVES

• To study the outcome of inferior turbinectomy versus turbinoplasty with an endoscope.
• To compare the efficacy of turbinectomy and turbinoplasty in terms of both subjective and objective relief of symptoms.
• To compare the efficacy of turbinectomy and turbinoplasty in terms of safety, recurrence and postoperative morbidity.

INCLUSION CRITERIA:

• All the symptomatic patients with hypertrophy of the inferior turbinate willing to undergo surgery.
• Age between 21 to 70 years.
• Hypertrophy of inferior turbinate due to the allergic rhinitis and vasomotor rhinitis.
• Hypertrophy of inferior turbinate causing alteration in smell and headache.
• Hypertrophy of inferior turbinate associated with deviated Nasal septum.

EXCLUSION CRITERIA:

• Age below 21 years and above 70 years.
• Patients with asymptomatic hypertrophy of inferior turbinate.
• Patients who have already undergone surgery for hypertrophy of inferior turbinate.

MATERIAL AND METHOD:

60 symptomatic patients with hypertrophy of inferior turbinate presenting to the Department of ENT over a period of one year that is from 1st February 2016 to 31st January 2017, a detailed history was taken and thorough clinical examination was done and examination with 0° degree nasal endoscope, patients were operated for their enlarged turbinates either by turbinectomy or turbinoplasty. The findings was recorded pre operatively, per operatively and post operatively with an aid of the endoscope. After discharge from the hospital, the patients were called for follow-up every fort night for 6 months and were asked for relief of symptoms, examined for nasal obstruction and for recurrence of symptoms. These findings were included in the descriptive study and statistically analyzed.

Surgical management of turbinate dysfunction that was done in this study:

1. INFERIOR TURBINECTOMY: This procedure involves clamping the inferior turbinate at its base to achieve hemostasis, followed by the use of turbinectomy scissors or endoscopic instruments to resect the entire turbinate along its base.

2. INFERIOR TURBINOPLASTY: is a procedure that attempts to preserve the mucosa of the turbinate in order to improve the mucociliary clearance and air conditioning function of the inferior turbinate. An incision is made along the inferior border of an in-fractured inferior turbinate and medial and lateral submucosal flaps are elevated. The anterior 2/3 bone of the inferior turbinate is partially resected under the flaps. The flaps are trimmed to re-drape the remaining bone.

OBSERVATION AND RESULTS:

STUDY DESIGN: A Comparative surgical study with 60 patients randomized into 2 groups with 30 in Group A (total turbinectomy) and 30 patients in Group B (turbinoplasty) is undertaken to study the incidence of complications.

Table 1: Showing the age distribution of the patients.

<table>
<thead>
<tr>
<th>Age in years</th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>18-20</td>
<td>6</td>
<td>20.0</td>
</tr>
<tr>
<td>21-30</td>
<td>18</td>
<td>60.0</td>
</tr>
<tr>
<td>31-40</td>
<td>5</td>
<td>16.7</td>
</tr>
<tr>
<td>41-50</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100.0</td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>26.43 ± 6.73</td>
<td>31.70 ± 9.04</td>
</tr>
</tbody>
</table>

Table 1 shows, the age distribution of the patients, which varied between 18-50 years in the study with the average of 26.43 ± 6.73 in Group A and 31.70 ± 9.04 in Group B.
1. Bleeding: In group A, 2 patients (6.7%) had bleeding during the intraoperative period. In group B, none of the patients had significant bleeding.

2. Crusting: In group A, 8 patients (26.7%) had crusting. In group B, 1 patient (3.3%) had crusting.

3. Synechae: In group A, 4 patients (13.3%) had synechae on follow-up. In group B, none of the patients had synechae.

4. Headache: Was not reported in either group.

Table 2: Showing the gender distribution of the study.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Male</td>
<td>22</td>
<td>73.3</td>
</tr>
<tr>
<td>Female</td>
<td>8</td>
<td>26.7</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 2 shows the gender distribution of the study, - In Group A: 73.3% are males, 26.7% are females and in Group B: 56.7% are males and 43.3% are females.

Table 3: Shows the spectrum of the clinical presentation.

<table>
<thead>
<tr>
<th>Clinical Diagnosis</th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>DNS B/L with HIT</td>
<td>28</td>
<td>93.0</td>
</tr>
<tr>
<td>SINUSITIS with HIT</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>SPUR with HIT</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>30</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 3 shows the spectrum of the clinical presentation, deviated nasal septum with hypertrophy is the single most common complaint in the patients of both groups affecting all the 58 patients. Sinusitis with HIT affecting 1 patient in group A. Spur with hypertrophy inferior turbinate [HIT] affecting 1 patient in group B.

Table 4: Shows indication for total turbinectomy.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Number of patients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEADACHE</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>NASAL OBSTRUCTION</td>
<td>29</td>
<td>96.7</td>
</tr>
<tr>
<td>TOTAL</td>
<td>30</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4 shows indication for total turbinectomy, nasal obstruction is the single most common complaint in 29 patients (96.7%). 1 patient had headache.

Table 5: Shows indication for turbinoplasty.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Number of patients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEADACHE</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>NASAL OBSTRUCTION</td>
<td>30</td>
<td>100.0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>30</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 5 shows indication for turbinoplasty, nasal obstruction is the single most common complaint in 30 patients (100%).

Table 6: Shows comparison of Post-op complications between two groups.

<table>
<thead>
<tr>
<th>Complications</th>
<th>Group A (n=30)</th>
<th>Group B (n=30)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bleeding</td>
<td>2(6.7%)</td>
<td>0</td>
<td>0.492</td>
</tr>
<tr>
<td>Crusting</td>
<td>8(26.7%)</td>
<td>1(3.3%)</td>
<td>0.026*</td>
</tr>
<tr>
<td>Synechae</td>
<td>4(13.3%)</td>
<td>0</td>
<td>0.112</td>
</tr>
<tr>
<td>Headache</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 6 shows comparison of Post-op complications between two groups,

1. Bleeding: In group A, 2 patients (6.7%) had bleeding during the intraoperative period. In group B, none of the patients had significant bleeding.
2. Crusting: In group A, 8 patients (26.7%) had crusting. In group B, 1 patient (3.3%) had crusting.
3. Synechae: In group A, 4 patients (13.3%) had synechae on follow-up. In group B, none of the patients had synechae.
4. Headache: Was not reported in either group.

Table 7: Shows the recurrence of symptoms in the study groups.

<table>
<thead>
<tr>
<th>Recurrence</th>
<th>Group A (n=30)</th>
<th>Group B (n=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>0</td>
<td>6(20.0%)</td>
</tr>
<tr>
<td>No</td>
<td>30(100.0%)</td>
<td>24(80.0%)</td>
</tr>
</tbody>
</table>

Table 7 shows the recurrence of symptoms in the study groups, the incidence of recurrence of nasal obstruction is 20% in group B patients as compared to non in group A.
DISCUSSION:

The aim of turbinate surgery is to reduce the size of the inferior turbinates in order to create sufficient space (5). More than 10 surgical techniques have been used over decades to treat hypertrophy of the inferior turbinate, but there is no single complete therapy. The evidence supporting the efficacy of these procedures remains debatable. None of them are able to produce satisfactory long term results in pathological turbinate hyperplasia for a reasonable number of patients. In addition, the evaluation of the results is more difficult because of a lack of good evidence based on randomized controlled trials for inferior turbinate surgery detailing surgery with defined outcomes (6).

One of the main drawbacks of inferior turbinate surgery is a high rate of recurrence of symptoms with time. Most studies agree that total turbinate resection has long term effectiveness (7,8,9). Total turbinectomy is not recommended as the method of choice due to potential adverse effects and it is considered carefully. Total turbinectomy is considered if all other treatment attempts do not succeed (10). According to a study, inferior turbinoplasty is the best method of turbinate reduction with good results and least complications.(11)

One of the aims of the study was to evaluate the patient’s subjective symptoms and adverse effects of the surgical procedure and compare the outcome. Our investigation revealed the following observations.

The result of this study is consistent with Mabry (1988) report, which says that inferior turbinoplasty is not sufficient to alleviate the nasal obstruction associated with posterior tip enlargement and reported 25% return of nasal blockage postoperatively. (5)

The most common complication noted was bleeding in 2 patients (6.7%), who underwent total turbinectomy. The bleeding was managed by anterior nasal packing no other intervention was required. Crusting was noted in 8 (26.7%) patients who had undergone total turbinectomy and 1 patient (3.3%), who had undergone turbinoplasty. Nasal douching and endoscopic suction clearance was all that was required to reduce the crusting. Synechiae occurred in 4 patients (13.3%) following total turbinectomy and in none of the patients who had undergone turbinoplasty. Synechiae was managed by releasing it after packing the nose with local anaesthesia.

CONCLUSION

Both the total turbinectomy and turbinoplasty have comparable success rates in experienced hands, but the amount of inferior turbinate removed by total turbinectomy is more substantial compared to turbinoplasty. Turbinoplasty gives symptomatic relief in the immediate post operative period but is less effective as compared to total turbinectomy on long term basis. Total turbinectomy is considered if all other treatment attempts do not succeed.

DISCLOSURES:
(a) Competing interests/Interests of Conflict- None
(b) Sponsorships – None
(c) Funding - None
(d) Written consent of patient- taken
(e) Animal rights- Not applicable

REFERENCES:
ABSTRACT:

Background: Treatment guidelines for allergic rhinitis (AR) recommend use of intranasal corticosteroids (INSs) as mono or adjunctive therapy. However, the adverse event (AE) profiles of oral glucocorticoids, which result largely from systemic absorption of these agents, have raised concerns about their safety. These concerns persist for INSs despite marked clinical differences between them and systemic corticosteroids in absorption and among the INSs in bioavailability, mechanism of action, and lipophilicity, which may contribute to differences in AEs.

Objective: To study the safety profile of different topical intranasal steroids used for treatment of allergic rhinitis and comparison of their efficacy and adverse events.

Study design: Prospective study

Setting: This study was conducted in ENT department at Era’s Lucknow Medical College and Hospital, Lucknow

Patients: 135 patients of allergic rhinitis.

Results: The statistical tests applied were repeated measures ANOVA and the chi squared tests.

Conclusions: From this study it can be concluded that the three INS showed beneficial effect on allergic rhinitis. However, with respect to side effects and diminution of symptom scores, nasal endoscopy score and AEC count no significant difference among the groups was found. All three groups were almost similar in their treatment efficacy and side effect profile.

Keywords: Intranasal steroids (INS), allergic rhinitis (AR), adverse events (AE), Fluticasone propionate (FP), Mometasonefuroate (MF), Fluticasone Furoate (FF).

INTRODUCTION:

Allergic rhinitis (AR) is a highly prevalent, chronic disease, with variable reported rates. It was previously regarded as a trivial disease and was often ignored, however, in recent literature its prevalence has been reported to range from 10% - 30% of all adults and as many as 40% of children (Wallace et al., 2008). In some populations its prevalence rate is reported to be as high as 50% (Bauchau et al., 2005; Katelaris et al., 2012). According to some studies in India (Chhabra et al., 1998; MOEF, 2000; Gaur et al., 2006), the prevalence of allergic rhinitis in India is around 11-30%.

The approach for treatment of AR is based on the patient’s age and symptoms severity. Patients are advised to avoid known allergens and they should be educated about their condition. Intranasal corticosteroids have been reported to be the most effective treatment and should be first-line therapy for mild to moderate disease. Moderate to severe disease not responsive to intranasal corticosteroids is treated with second-line therapies, including antihistamines, decongestants, leukotriene receptor antagonists, intranasal mast cell stabilizers and other therapies like nasal irrigation. Immunotherapy is considered in patients with a less than adequate response to usual treatments (Sur et al., 2010).
The use of intranasal corticosteroids has been found to be highly effective in treating both intermittent and persistent allergic rhinitis. The control of nasal symptoms is achieved in at least 75% of patients, with comparable results in children and adults. Intranasal corticosteroid administration reduces all symptoms of allergic rhinitis including rhinorrhea, itching, sneezing, and blockage, and in some cases relieves eye symptoms. (Welch, 1993)¹.

Currently, the following intranasal corticosteroids are commercially available and approved by FDA for treatment of AR, viz. beclomethasone dipropionate (BDP), budesonide (BUD), flunisolide, fluticasone propionate (FP), mometasone furoate (MF), and triamcinolone acetonide (TAA) (Herman, 2007)⁹.

Although topical intranasal steroids are the suggested first line of therapy for AR, however, response to different topical intranasal steroids for treatment of AR is varying (Mandl et al., 1997; Kariyawasam & Scadding, 2010; Aneeza et al., 2013)¹⁰, ¹¹, ¹². However, systematic reviews and some clinical studies indicate that almost all the commercially available topical intranasal steroids have a similar efficacy in treatment of AR and only differences in sensory attributes, documented safety during pregnancy, and cost may contribute to better patient’s acceptance of one versus another and promote better adherence to therapy (Herman, 2007; Varshney et al., 2015)⁹, ¹³.

Keeping in view, the lack of a definitive conclusion regarding the comparative safety profile of different topical intranasal steroids in AR, the present study was carried out with an attempt to focus on the efficacy, adverse events and compliance related with different topical intranasal steroids in our settings.

**RESEARCH QUESTION**

What is the safety profile of various intranasal steroids used for treatment of allergic rhinitis?

**AIMS AND OBJECTIVES**

The present study was carried out with the following aim and objectives:

**AIM**

- To study the safety profile of different topical intranasal steroids used for treatment of allergic rhinitis.

**OBJECTIVES**

- To compare the efficacy of different topical intranasal steroids in patients with allergic rhinitis
- To assess the adverse events of different topical intranasal steroids in patients with allergic rhinitis
- To evaluate the compliance of patients with allergic rhinitis using different topical intranasal steroids

**METHODS:**

The present study was conducted in the ENT department at Era’s Lucknow Medical College and Hospital, Lucknow to compare Mometasone Furoate (MF), Fluticasone Furoate (FF) and Fluticasone Propionate (FP) intranasal sprays given in management of allergic rhinitis patients.

**Study Design:** A Prospective study.

**Study Period:** 24 Months (January 2015 to January 2017)

**Sample size:** The sample size for the study was calculated from the Department of Community Medicine, Era’s Lucknow Medical College based on the study of Gross et al. (2002).

The Sample size came out to be, n = 45 in each group.

**Inclusion Criteria**

- Patients presenting with symptoms and signs suggestive of both intermittent and persistent allergic rhinitis between 10 years to 60 years of age.

**Exclusion criteria**

- Patients with severe DNS causing nasal obstruction, nasal polyp.
- Patient who had taken oral or topical steroid in the last 3 months.
- Any systemic disease (Hypertension, Diabetes Mellitus)
- Any chronic illness (Tuberculosis, Asthma).
- Pregnant and lactating women.

**Subjects**

The patients having allergic rhinitis attending ENT OPD were invited to participate in this study. The diagnosis was made on the basis of history and clinical examination. Out of these, 135 patients of allergic rhinitis fulfilling the inclusion criteria and not falling into the domain of exclusion criteria were included in the study. Before inclusion into study, patients were properly informed regarding the nature of disease process and the proposed interventions. Written and informed consent was taken. Patients were randomly divided in three groups of 45 patients each, and were administered three proposed medications as under:

**Medications:**

1. **Group I:** 45 patients were administered Fluticasone Furoate 110 microgram once daily, administered as two actuation in each nostril once daily (each spray delivers 27.5 microgram of drug).
2. **Group II:** 45 patients were administered Fluticasone Propionate 200 microgram once daily, administered as two actuation in each nostril once daily (each spray...
delivers 50 microgram of drug).

3) Group III: 45 patients were administered Mometasonefuroate

4) 200 microgram once daily, as two actuation in each nostril once daily (each spray delivers 50 microgram of drug).

**METHODOLOGY**

Patients were selected consecutively as and when they presented during the study period considering the inclusion and exclusion criteria and randomly allotted to the groups by computer generated software.

**Procedure**

A detailed history and clinical examination of patients of allergic rhinitis was done. Subjective scoring for rhinitis symptoms, diagnostic nasal endoscopy and absolute eosinophil count was done in all the patients and was repeated at every visit. On subsequent visits the patients were also enquired about the onset of action and any adverse events. All the demographic data, investigative findings were compared among the above groups.

**Evaluation of nasal symptoms**

The subjective scoring of rhinitis symptoms was done using the Visual Analog Scale of 1 to 10, with 1 representing ‘least’ and 10 ‘worst’. Symptom score was assessed for following four symptoms nasal obstruction, watery nasal discharge, sneezing, and nasal itching. Mean of the symptom scores for the four individual symptoms were calculated on each visit.

**Nasal endoscopy score**

Diagnostic nasal endoscopy was performed on each patient with a 4 mm 0° endoscope. Before endoscopy both nostril were packed with gauze soaked in 4% xylocaine for 20 minutes. The nasal endoscopic findings were graded for following signs: Discharge (Scores of 0, none; 1, mucoid discharge present), Nasal mucosa color (0, pink; 1, pale or bluish), Swollen edematous turbinates (0, absent; 1, present). The scores of right and left nasal cavities were calculated separately and were averaged to obtain combined DNE score.

**Absolute eosinophil count**  The absolute eosinophil count was performed on venous blood drawn from patients’ cubital vein using standard technique. The eosinophil count of more than 440 cells/cumm was considered as positive for blood eosinophilia.

**Adverse events**  Patients were asked to record any adverse event of the drug and to seek immediate consultation if they were serious. Patients were enquired for any adverse events on each visit.

**Follow up**

Patients were followed for 3 weeks, with visits to hospital as follows.

- 1st visit- at the start of treatment
- 2nd visit-after 7 days
- 3rd visit-after 14 days
- 4th visit-after 21 days

**STATISTICAL TOOL EMPLOYED**

The statistical analysis was done using SPSS (Statistical Package for Social Sciences) Version 23.0 statistical Analysis Software. The statistical tests applied were repeated measures ANOVA and the chi squared tests. The values were represented in Number (%) and Mean ± SD.

**RESULTS:**

This study was carried out in the ENT Department, Era’s Lucknow Medical College & Hospital, Lucknow comparing Fluticasone furoate (FF), Fluticasone Propionate (FP), MometasoneFuroate (MF) nasal spray for management of allergic rhinitis. A total of 154 patients were enrolled in the study and 19 patients were lost in follow up. A total of 135 patients fulfilling the inclusion criteria and not falling into the domain of exclusion criteria were enrolled in the study. These patients were randomly divided into three groups as under:

**Table 1: Distribution of Study Population.**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Group Used</th>
<th>No. of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-</td>
<td>Group I</td>
<td>Fluticasone furoate</td>
<td>45</td>
</tr>
<tr>
<td>2-</td>
<td>Group II</td>
<td>Fluticasone propionate</td>
<td>45</td>
</tr>
<tr>
<td>3-</td>
<td>Group III</td>
<td>Mometasone furoate</td>
<td>45</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>135</td>
</tr>
</tbody>
</table>

Out of 135 patients included in the study, 45 (33.33%) were administered Fluticasone furoate (Group I), another 45 (33.33%) were administered Fluticasone propionate and rest 45 (33.33%) were administered Mometasonefuroate.

On Visit 1, average symptom score was found to be maximum for Group II (7.51±1.16) followed by that for Group III (7.47±1.27) and minimum for Group I (7.36±1.21). Difference in average symptom score among the above three groups was not found to be statistically significant (p = 0.811).
On Visit 2, average symptom score of Group III (4.96±1.13) was found to be higher than that of Group II (4.95±1.07) and Group I (4.91±1.12) but difference in average symptom score among the groups was not found to be statistically significant (p=0.976).

On Visit 3, average symptom score of Group I (3.98±1.08) was found to be higher than that of Group III (3.91±1.06) and Group II (3.89±1.05) but difference in average symptom score among the groups was not found to be statistically significant (p=0.918).

On Visit 4, average symptom score of Group I (2.78±0.93) was found to be higher than that of Group II (2.73±1.07) and Group III (2.73±0.89) but difference in average symptom score among the groups was not found to be statistically significant (p=0.969).

On comparing the average symptom scores of the three Groups from the first visit to the fourth visit, the decrease in average symptom scores was found to be highly significant (p<0.0001) in all the three Groups.

On Visit 1, nasal endoscopy score for Group I (2.87±0.34) was higher than that of Group II (2.76±0.43) and Group III (2.78±0.42). Difference in nasal endoscopy score among the above three groups was not found to be statistically significant (p=0.384).

On Visit 2, nasal endoscopy score of Group II (1.82±0.68) was found to be higher than that of Group III (1.33±0.64) and Group II (1.31±0.60) but difference in nasal endoscopy score among the groups was not found to be statistically significant (p=0.943).
On Visit 4, nasal endoscopy score of Group I (0.78±0.60) was found to be higher than that of Group II (0.69±0.56) and Group III (0.67±0.52) but difference in nasal endoscopy score among the groups was not found to be statistically significant (p=0.61).

On comparing the nasal endoscopy scores of the three Groups from the first visit to the fourth visit, the decrease in nasal endoscopy scores was found to be highly significant (p<0.0001) in all the three Groups.

On Visit 1, absolute eosinophil count for Group I (522.22±191.77) was higher than that of Group II (517.22±163.32) and Group III (512.33±144.04). Difference in absolute eosinophil count among the above three groups was not found to be statistically significant (p=0.962).

On Visit 2, absolute eosinophil count of Group II (469.33±94.83) was found to be higher than that of Group I (465.56±104.65) and Group III (461.56±92.86) but difference in absolute eosinophil count among the groups was not found to be statistically significant (p=0.931).

On Visit 3, absolute eosinophil count of Group I (451.44±94.26) was found to be higher than that of Group II (447.51±66.53) and Group III (431.33±62.37) but difference in absolute eosinophil count among the groups was not found to be statistically significant (p=0.452).

On Visit 4, absolute eosinophil count of Group II (437.00±94.26) was found to be higher than that of Group I (425.11±56.56) and Group III (423.22±54.62) but difference in absolute eosinophil count among the groups was not found to be statistically significant (p=0.427).

On comparing the absolute eosinophil count of the three Groups from the first visit to the fourth visit, the decrease in absolute eosinophil count was found to be significant (p<0.001) in all the three Groups.

No side effect was observed in majority of patients included in the study (85.9%). Headache (5.9%) was the most common side effect in the study population followed by throat irritation (n=7; 5.2%), nasal burning (n=4; 2.9%) and the least common side effect was epistaxis which was found in none of

Table 3: Intergroup Comparison of Nasal Endoscopy Scores at different time interval.

<table>
<thead>
<tr>
<th>Visit</th>
<th>Group I mean</th>
<th>sd</th>
<th>Group II mean</th>
<th>sd</th>
<th>Group III mean</th>
<th>sd</th>
<th>ANOVA F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visit 1</td>
<td>2.87</td>
<td>0.34</td>
<td>2.76</td>
<td>0.43</td>
<td>2.78</td>
<td>0.42</td>
<td>0.965</td>
<td>0.384</td>
</tr>
<tr>
<td>Visit 2</td>
<td>1.80</td>
<td>0.63</td>
<td>1.82</td>
<td>0.68</td>
<td>1.73</td>
<td>0.65</td>
<td>0.225</td>
<td>0.799</td>
</tr>
<tr>
<td>Visit 3</td>
<td>1.36</td>
<td>0.61</td>
<td>1.31</td>
<td>0.60</td>
<td>1.33</td>
<td>0.64</td>
<td>0.059</td>
<td>0.943</td>
</tr>
<tr>
<td>Visit 4</td>
<td>0.78</td>
<td>0.60</td>
<td>0.69</td>
<td>0.56</td>
<td>0.67</td>
<td>0.52</td>
<td>0.496</td>
<td>0.610</td>
</tr>
<tr>
<td>F</td>
<td>180.377</td>
<td></td>
<td>165.31</td>
<td></td>
<td>176.7</td>
<td></td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>p-value</td>
<td>&lt;0.001</td>
<td></td>
<td>&lt;0.001</td>
<td></td>
<td>&lt;0.001</td>
<td></td>
<td>&lt;0.001</td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Intergroup Comparison of Absolute Eosinophil Count at different time.

<table>
<thead>
<tr>
<th>Visit</th>
<th>Group I mean</th>
<th>sd</th>
<th>Group II mean</th>
<th>sd</th>
<th>Group III mean</th>
<th>sd</th>
<th>ANOVA F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visit 1</td>
<td>522.22</td>
<td>191.77</td>
<td>517.22</td>
<td>163.32</td>
<td>512.33</td>
<td>144.04</td>
<td>0.039</td>
<td>0.962</td>
</tr>
<tr>
<td>Visit 2</td>
<td>465.56</td>
<td>104.65</td>
<td>469.33</td>
<td>94.83</td>
<td>461.56</td>
<td>92.86</td>
<td>0.071</td>
<td>0.931</td>
</tr>
<tr>
<td>Visit 3</td>
<td>451.44</td>
<td>94.26</td>
<td>447.51</td>
<td>66.53</td>
<td>432.33</td>
<td>62.37</td>
<td>0.799</td>
<td>0.452</td>
</tr>
<tr>
<td>Visit 4</td>
<td>425.11</td>
<td>56.56</td>
<td>437.00</td>
<td>51.22</td>
<td>423.22</td>
<td>54.62</td>
<td>0.855</td>
<td>0.427</td>
</tr>
<tr>
<td>F</td>
<td>17.84</td>
<td></td>
<td>14.47</td>
<td></td>
<td>24.11</td>
<td></td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>p-value</td>
<td>&lt;0.001</td>
<td></td>
<td>&lt;0.001</td>
<td></td>
<td>&lt;0.001</td>
<td></td>
<td>&lt;0.001</td>
<td></td>
</tr>
</tbody>
</table>
the (0%) patients. Side effects were found in higher proportion of patients of Group II (20%) as compared to Group I (11.11%) and Group III (11.11%). Incidence of headache was found similar in patients of Group I (6.67%) and Group II (6.67%) as compared to Group III (4.44%). Incidence of throat irritation was higher in Group II (6.67%) as compared to Group I and Group III (4.44%). Incidence of nasal burning was higher in Group II (6.67%) as compared to Group III (2.22%) and Group I (0.00%). Difference in incidence of side effects in above three groups was not found to be statistically significant (p=0.678).

DISCUSSION:

Allergic rhinitis (AR) is an inflammatory condition of the upper airways that occurs in response to exposure to airborne allergens (typically tree, grass, and weed pollens and some molds) in sensitized individuals. It has an adverse effect on quality of life, sleep, cognition, emotional life and work performance. In present study, at admission average symptom scores were 7.36±1.21, 7.51±1.16 and 7.47±1.27 respectively in FF, FP and MF groups (Table 2). Considering the fact score 1 represented least concern and 10 most concern, these scores were above the midpoint and hence were skewed towards higher concern. However, on first follow up itself (visit 2), the scores were at or close to midpoint values viz. 4.91±1.12, 4.95±1.07 and 4.96±1.13 respectively in FF, FP and MF groups. On every week the extent of decline in average symptom score showed an incremental pattern. On final follow up at week 3 (visit 4), the mean scores in FF, FP and MF groups were 2.78±0.93, 2.73±1.07 and 2.73±0.89 respectively, thus indicating that the scores were skewed towards least concern.

On comparing the average symptom scores of the three Groups from the first visit to the fourth visit, the decrease in average symptom scores was found to be highly significant (p<0.0001) in all the three Groups. All the groups encountered a significant reduction from trends towards most concern to trends towards least concern. A similar efficacy of MF and FP with respect to reduction in symptom score was also observed by Mandlet et al. (1997) in their study on adult patients with moderate to severe perennial allergic rhinitis. In their study the extent of reduction was 37% and 39% for MF and FP. In present study extent of reduction in symptom score was much higher 63.45% for MF and 63.6% for FP. Gupta and Gupta (2004) in their study on adult patients with moderate to severe perennial allergic rhinitis compared MF and FP nasal sprays also observed significant reduction in symptom scores but did not find a significant difference between two drugs, a finding similar to present study. Thus the findings of present study also endorsed the findings of these studies which failed to find out a significant difference in symptom score reduction among the different drugs being evaluated in present study.

In present study, at baseline nasal endoscopy scores in FF, FP and MF groups were 2.87±0.34, 2.76±0.43 and 2.78±0.42 respectively (Table 3). At baseline the groups were matched. These scores were obtained for presence of three features, viz., nasal discharge, nasal mucosa color and swollen/edematous turbinates, i.e. the maximum possible total score was 3. The mean scores, thus indicated the presence of all the 3 symptoms in majority of cases (mean values > 2.5 for all the three groups) and as such a high order of severity. For these signs too, a significant reduction was observed from first follow up (visit 2) itself when mean scores in three groups

### Table 5: Intergroup Comparison of Side Effects in Study Population.

<table>
<thead>
<tr>
<th>Side Effects</th>
<th>Total</th>
<th>%</th>
<th>Group I (n=45)</th>
<th>Group II (n=45)</th>
<th>Group III (n=45)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No side effect</td>
<td>116</td>
<td>85.93</td>
<td>40</td>
<td>88.89</td>
<td>36</td>
</tr>
<tr>
<td>Any side effect</td>
<td>19</td>
<td>14.07</td>
<td>5</td>
<td>11.11</td>
<td>9</td>
</tr>
<tr>
<td>Epistaxis</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Headache</td>
<td>8</td>
<td>5.92</td>
<td>3</td>
<td>6.67</td>
<td>3</td>
</tr>
<tr>
<td>Nasal burning</td>
<td>4</td>
<td>2.96</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Throat irritation</td>
<td>7</td>
<td>5.19</td>
<td>2</td>
<td>4.44</td>
<td>3</td>
</tr>
</tbody>
</table>

χ²=3.9128 (df=8); p=0.678
became $1.80 \pm 0.63$, $1.82 \pm 0.68$ and $1.73 \pm 0.65$ respectively. By the last follow up (visit 4), mean scores in three groups became $0.78 \pm 0.60$, $0.69 \pm 0.56$ and $0.67 \pm 0.52$ respectively.

On comparing the baseline nasal endoscopy scores of the three Groups from the first visit to the fourth visit, the decrease in average symptom scores was found to be highly significant ($p<0.0001$) in all the three Groups. The efficacy of the three study groups was found to be similar at all the study intervals. Thus findings of nasal endoscopy score also reflected similar pattern of changes as observed for symptom scores. Similar to present study, Tsang et al. (2003) in their study also showed that endoscopic scores follow similar trend of change as observed for clinical symptom scores among patients with allergic rhinitis undergoing treatment with topical corticosteroids. In present study, we used multiple criteria for validation. Although symptom scores are often criticized for their subjectivity, however, endoscopic scores are a better and more objective in nature. But, the pattern of response for three drugs did not alter.

Most of the studies in past have focused only on the symptomatic response, however, in present study we intended to correlate the symptomatic response with physiological changes too.

With respect to side effect profile, in present study majority of patients did not have any side effect ($n=116; 85.93\%$) (Table 5). Headache was the most common side effect ($n=8; 5.92\%$) followed by throat irritation ($n=7; 5.19\%$), nasal burning ($n=4; 2.96\%$) and epistaxis ($n=0; 0\%$). Statistically, no significant difference among groups was observed with respect to side effects and their types. The side effects of nasal steroids are mild and may include headache, throat irritation, mildly unpleasant smell or taste or drying of the nasal lining. In some people, nasal steroids cause irritation, crusting, and bleeding of the nasal septum, especially during the winter. Use of a proper spray pattern can help to reduce these side effects. In present study, a careful demonstration of method of use was carried out and each patient was explained about the proper angulation and distance from nasal septum in order to avoid the problem of irritation and stinging. No major side effects were noticed in present study. None of the patient had to discontinue from study owing to presence of side effect. A low occurrence of adverse events while using FF and FP for treatment of perennial/seasonal AR was also reported by Meltzer et al. (2008).

On the basis of observations made in present study, all the three topical corticosteroids displayed similar efficacy and side effect profile. In present study, using multiple outcome criteria, it was established that all the three corticosteroids in question have a good efficacy in both symptomatic as well as physiological attenuation of seasonal allergic rhinitis. It is one of the pioneering studies that not only studied the outcome through various subjective as well as objective criteria but was also able to establish an association among different outcome criteria.

**CONCLUSION:**

The present study was carried out to compare Fluticasone furoate (FF), Fluticasone propionate (FP), Mometasonefuroate (MF) intranasal steroids for management of allergic rhinitis (AR). For this purpose a total of 135 patients of AR were selected. The following were the findings of this study:

1. At baseline (Visit 1) as well as at different follow up intervals (Visits 2 to 4) statistically no significant difference among the groups was observed with respect to average symptom score.

2. In all the groups, a declining trend of average symptom scores was observed with significant decline in average symptom scores from first follow up (visit 2). Mean change from baseline was maximum at 4th visit in all the groups.

3. At baseline (Visit 1) as well as at different follow up intervals (Visits 2 to 4) statistically no significant difference among the groups was observed with respect to average nasal endoscopy score.

4. In all the groups, a declining trend of average nasal endoscopy scores was observed with significant decline in mean endoscopy scores from first follow up (visit 2). Mean change from baseline was maximum at 4th follow up in all the groups.

5. At baseline (Visit 1) as well as at different follow up intervals (Visits 2 to 4) statistically no significant difference among groups was observed with respect to absolute eosinophil count.

6. In all the groups, a declining trend of absolute eosinophil count was observed with significant decline in mean value from first follow up (visit 2). Mean change from baseline was found to be maximum at 4th follow up in all the groups.

7. Majority of the patients did not have any side effect ($n=116; 85.93\%$). Headache was the most common side effect ($n=8; 5.92\%$) followed by throat irritation ($n=7; 5.19\%$), nasal burning ($n=4; 2.96\%$) and epistaxis ($n=0; 0\%$). Statistically, no significant difference among groups was observed with respect to side effects and their types. On the basis of above findings it can be concluded that all the three topical intranasal steroids showed a beneficial effect on allergic rhinitis. However, with respect to side effects...
and diminution of symptom scores, nasal endoscopy score and AEC count no significant difference among the groups could be found. All the three groups were almost similar in their treatment efficacy and side effect profile.

DISCLOSURES:
(a) Competing interests/Interests of Conflict- None
(b) Sponsorships – None
(c) Funding – None
(d) Written consent of patient- Taken

REFERENCES:


CASE REPORT

PRESENTATION OF AN UNCOMMON LESION IN THE NASAL CAVITY- NEUROENDOCRINE CARCINOMA

*Tushar Kanti Ghosh, **Srijoy Gupta

HOW TO CITE THIS ARTICLE

Date of receipt of article - 04.03.2018
Date of acceptance – 14.04.2018
DOI- 10.21176/ojolhns.2018.12.1.9
DOI URL- https://doi.org/10.21176/ojolhns.2018.12.1.9

ABSTRACT:

Introduction: Neuroendocrine carcinomas are very rare be it in the nasal cavity, paranasal sinuses or nasopharynx. A lesion more common in the lungs with the extra-pulmonary forms accounting for only 4% of cases.

Case report: A male patient aged 62 years with complaints of long standing nasal obstruction with intermittent episodes of epistaxis for almost 4 months

Discussion: A nasal endoscopic evaluation suggested a mass arising from the posterior nasal cavity and extending to the nasopharynx, which did not appear to bleed on probing. Surgical debulking of tumour along with histopathological examination was done, suggestive of poorly differentiated carcinoma. Immunohistochemistry confirmed the diagnosis of poorly differentiated neuroendocrine carcinoma. Patient was soon after taken up for chemoradiotherapy.

Conclusion: Extrapulmonary Neuroendocrine carcinomas due to their rare incidence have posed a dilemma in their diagnosis and management. Their presentation in advanced stages worsens the prognosis. This lesion should be differentiated from other lesions such as Olfactory Neuroblastoma which show similar features. A surgeon must be thorough with nasal endoscopic examination to evaluate a long standing nasal obstruction associated with epistaxis

Keywords: Nasal cavity mass, Neuroendocrine carcinoma, Immunohistochemistry.

INTRODUCTION:

Nasopharynx and the sinonasal tract is the location for a wide variety of benign and malignant tumours. The use of nasal endoscopes and radiological imaging enhancements has helped in the detection and diagnosis of these lesions. One such lesion is the Neuroendocrine carcinoma. They are defined as epithelial neoplasms with predominant neuroendocrine differentiation\(^1\). Primary small cell neuroendocrine carcinoma (SNEC) of the nasal cavity and sinuses is an extremely rare tumour and difficult to diagnose by conventional methods of histological examination\(^2\). First described by Ray Chowdhuri as a differentiated histological entity in the paranasal sinuses in 1965\(^3\), it accounts for just 4% of all cases of neuroendocrine carcinomas\(^,4,5\).

At first thought to arise from the lung due to similar features to anaplastic small cell carcinomas of lung\(^6\), they are now considered to be completely different due to their behavioural differences in relation to metastasis and local spread. They should be differentiated from olfactory neuroblastomas which show similar clinical and morphological features.\(^7,8\) Sinonasal malignancies such as SNEC present with an undifferentiated or poorly differentiated morphology and are composed of small, medium, and large round or polygonal atypical cells.\(^8\) These lesions pose significant diagnostic difficulties for the surgical pathologist, especially with limited biopsy material. The role of immunohistochemistry is of vital nature. Depending on their histopathological and biological characteristics they are classified into well differentiated and poorly differentiated carcinomas.\(^6\)

No specific treatment exists at present for Neuroendocrine tumours of the head and neck and despite improved histological classification they are mostly treated as conventional squamous cell carcinomas or less often as...
small cell carcinomas of the lung. These tumours are aggressive with a poor prognosis and frequent local recurrence and distant metastasis despite multimodal therapy.

CASE REPORT:

A 62 years of age male patient presented with nasal obstruction with intermittent episodes of nasal bleeding for almost 4 months. Patient had been examined and evaluated previously several times in other hospitals but no clear diagnosis had been reached. On nasal endoscopic examination...

Fig.-1 nasal endoscopic picture. S – Nasal Septum. Star sign depicts the mass in the posterior Nasal cavity and Nasopharynx.

Fig.-2 CT scan showing homogenous soft tissue Mass involving posterior nasal cavity and nasopharynx.

Fig.-3 histopathological examination suggestive of poorly differentiated Sinonasal Carcinoma.

Fig.-4 Cytokeratin staining.

Fig.-5 Synaptophysin staining.
Patient was found to have a proliferative tumour mass in the posterior aspect of the nasal cavity and extending to the nasopharynx [Fig.-1]. Computed Tomography scan revealed a soft tissue mass extending from the posterior aspect of the nasal cavity to the nasopharynx predominantly on the right side. [Fig.-2]

Patient was moderately built and nourished, with normal gait and satisfactory vital signs. There was no history of smoking, drinking alcohol or exposure to radiation or environmental irritants.

Endoscopic debulking of the mass to relieve nasal obstruction and also to obtain biopsy was done. The histopathological examination was suggestive of a poorly differentiated carcinoma [Fig.-3]. Immunohistochemistry of the lesional cells were positive for Cytokeratin (CK) [Fig-4], Synaptophysin [Fig-5], Chromogranin and CD 56 and were negative for p63 and CD45. Ki67 labelling index was found to be about 95% [Fig-6]. These features were suggestive of a poorly differentiated neuroendocrine carcinoma or a small cell neuroendocrine carcinoma and potentially ruled out nasal lymphoma.

**DISCUSSION:**

Small cell neuroendocrine carcinoma (SNEC) is one of the subtypes of Neuroendocrine carcinoma with the others being Carcinoid, atypical carcinoid and Large cell neuroendocrine carcinoma. These tumours are mainly located in the lungs, and account for 20% of all lung carcinomas. Extrapulmonary SNECs represent 4% of all SNECs. It is a rare tumour with no sex, racial or geographic predilection and no known association with smoking or radiation. The age range is from 26 to 77 years with a mean of 49 years. Most commonly it arises in the superior or posterior nasal cavity, and often extends into the maxillary or ethmoid sinuses. Secondary involvement of nasopharynx is present in a minority of patients as in this case. Advanced tumours can involve the skull base, orbit or brain. Rarely elevated serum levels of adrenocorticotropic hormone and calcitonin may be seen.

Of great importance is to distinguish SNEC from Olfactory Neuroblastoma (ONB). Their relationship remains confusing and controversial. In most cases, SNEC should be readily differentiated from low grade ONB. Sinonasal SNEC lacks lobular architecture, fibrovascular septa, neurofibrillary stroma, and does not contain neural or olfactory rosettes. The anaplastic cells of SNEC are small to intermediate in size with negligible cytoplasm, high nucleo/cytoplasmic ratio, round or oval dense hyperchromatic nuclei, numerous mitotic figures and apoptotic cells accompanied by extensive areas of necrosis. Immunohistochemistry appears to play a significant role to distinguish the two entities. SNEC lacks the S-100 positive cells and is negative for Neurofilaments. Strong staining has been reported with synaptophysin and CD 56 nerve cell adhesion molecule as was noticed in our case. A high Ki67 labelling index also favours the diagnosis of SNEC.

Clinical features and behaviour of these lesions are like any other tumour of the sinonasal tract. It usually presents with epistaxis, nasal obstruction, followed by opthalmic signs (exophthalmos, visual acuity trouble and limitation of eye movement) due to orbital involvement. Local pain, anosmia and cervical node metastasis have also been described. Our patient too presented with complaints of nasal obstruction and intermittent episodes of epistaxis which goes on to show the importance of thoroughly evaluating these patients with a nasal endoscope.

Radiographically, the tumour always involves the nasal cavity and multiple paranasal sinuses. In our case a predominantly right sided nasal cavity mass extending to the nasopharynx was observed. CT scan can help to diagnose the malignant nature of the tumour, as it can reveal the presence of an osteolytic lesion. The signal of these tumours are homogenous isodense or mild hyperdense on CT. MRI with T1, T2 using I.V gadolinium improves differentiation between...
inflammatory reaction, tumour and liquid retention and also involvement of the Meninges. Other lesions can be distinguished on CT scan such as, Inverted Papilloma which has a lobulated or cerebriform configuration, squamous cell carcinoma of sinonasal cavity with bony erosion, adenoid cystic carcinoma shows bony erosion and sclerosis and Olfactory neuroblastoma which is located high in the nasal cavity with peripheral areas of cystic degeneration and calcific foci.

Kadish classification: the initial location of the tumour is rarely precise, usually because of its late discovery. This is why the Kadish classification is often used. The extensive involvement of the nasopharynx and nasal cavity proper pushes the staging to Stage C in our case. Factors such as cerebral invasion, lymph node involvement, visceral metastasis and associated endocrine syndrome renders the usage of the Kadish classification as unreliable.

The limited number of cases published, difficulties of diagnosis and heterogeneity of treatment approaches hamper evaluating the ideal treatment strategy. Though previously surgery followed by radiotherapy and chemotherapy was preferred, recent studies recommend neoadjuvant chemotherapy followed by Radiotherapy with surgery only reserved for non-responders. However Mitchell et al in their study concluded that a favourable response to Chemotherapy could be used to stratify patients either for definitive surgical resection of disease or Radiotherapy. In our case as the patient complained of significant nasal obstruction, debulking of the tumour was done first using a microdebrider under endoscopic guidance and also tissue for biopsy was obtained. Patient is currently undergoing Chemotherapy using cisplatin and Etoposide and radiotherapy for the disease.

Prognosis seems more favourable in the case of nasal and paranasal locations with 67-100% of patients alive at 5 years dropping to 77% at 10 years.

CONCLUSION:

Extrapulmonary Neuroendocrine carcinomas due to their rare incidence have posed a dilemma in their diagnosis and management. Their presentation mainly in advanced stages worsens the prognosis. SNEC should be differentiated from other lesions such as Olfactory Neuroblastoma which show similar features. Proper histopathologic diagnosis is of utmost importance to dictate appropriate therapy. A systemic therapy may be warranted in most cases due to a late presentation. A surgeon must be thorough with nasal endoscopic examination to evaluate a long standing case of nasal obstruction especially when associated with epistaxis.

REFERENCES:


PAPILLARY SQUAMOUS CARCINOMA OF PARANASAL SINUS-AN UNCOMMON HISTOLOGICAL VARIANT

*Dipak Ranjan Nayak, **Amrutha Gudiseva, ***Kanthilatha Pai, ****Suraj Nair, *****Suresh Pillai

ABSTRACT:

Papillary Squamous cell carcinoma is an uncommon histological variant Squamous cell carcinoma (SCC) of the upper aero-digestive tract (UADT). It rarely involves the paranasal sinuses. We report an aggressive case of papillary SCC of the left maxillo-ethmoid complex in a 59 year old male, who presented with rapidly progressive left cheek swelling and nose block. Biopsy revealed diagnosis of Papillary Squamous cell carcinoma arising in a transitional papilloma. The contrast enhance CT scan showed heterogeneously enhancing large lobulated soft tissue mass is seen involving the left maxillary sinus, left nasal cavity, left ethmoidal sinuses and left frontal sinus with extensions as.

Superiorly, there was destruction of inferior wall of left orbit with loss of fat plane between the inferior oblique and inferior rectus muscles possibly infiltrating and pushing the globe superolaterally. Inferiorly, with destruction of inferior wall of left maxillary sinus and extending along alveolar process of left maxilla is seen.

Patient underwent left subtotal maxillectomy (Pre-maxilla preservation) and orbital exenteration with endoscopic fronto-sphenoidal clearance. The resected margins were found to be free from tumour. The patient underwent postoperative Chemo-radiotherapy. Patient developed recurrence at orbital apex with extension to Middle cranial fossa after four months following post operative radiotherapy with a histopathological diagnosis of well differentiated carcinoma and was advised cyber knife treatment at another center. The patient did not undergo cyber knife treatment and came back after one month and was started on palliative chemotherapy, but expired after 2 months. The case is presented for its rarity and aggressive behavior.

Key words: Papillary, Squamous cell carcinoma, upper aero-digestive tract (UADT).

INTRODUCTION:

Squamous cell carcinoma (SCC) if found at the top of the list among the wide variety of malignancies of head and neck encountered with majority of them being of the conventional type. Other histological variants of SCC include spindle-cell (sarcomatoid), basaloïd, verrucous, papillary, and adenosquamous carcinoma. These comprise up to 15% of all SCCs of UADT with Papillary Squamous cell carcinoma (PSCC) accounting to less than 1% of all the cases. The PSCC of the head and neck regions conventionally has an excellent prognosis however that of paranasal sinus has the worst outcome. A case of papillary type SCC of the left maxilla-ethmoid complex with unusual clinical behavior is presented.

CASE REPORT:

A 57 year old male with no co-morbidities, presented with left cheek swelling of 20 days duration which was sudden in onset and rapidly progressive. Patient also had left sided nose block and hyposmia. On clinical examination, a 6x6 cm swelling was seen in the right cheek and malar area and the overlying skin was edematous and fixed to subcutaneous
tissue. The eye was pushed upward and outward but the vision and extra ocular movements were normal. A diagnostic nasal endoscopy was done which revealed a granular friable mass in the left nasal cavity anterior to the middle turbinate and arising from the middle meatus. Contrast enhancement CT scan showed heterogeneously enhancing large lobulated soft tissue mass is seen involving the left maxillary sinus, left nasal cavity, left ethmoidal sinuses and left frontal sinus with involvement of orbit and orbital contents (Fig-1). Biopsy was taken from the mass and the histopathology revealed transitional type of epithelium thrown into papillae, with fibro-vascular core, focally exhibiting marked nuclear pleomorphism, hyperchromasia and squamous differentiation with atypical mitotic figures, bizarre cells and large areas of necrosis. A diagnosis of papillary type of SCC arising in a transitional papilloma was made. Patient underwent left sub-total maxillectomy with preservation of the pre-maxilla and left orbital exenteration via modified Weber Ferguson incision (sub-conjuctival) with Lynch extension (Fig-2). Fronto-ethmoido-sphenoidal clearance was done under endoscopic supervision. Histopathology showed papillae and anastomosing sheets of malignant squamous cells with pleomorphic nucleoli, coarse chromatin, atypical mitosis, with numerous keratin pearls and horn cysts consistent with papillary SCC (Fig-3). Resected margins, optic nerve, frontal and the sphenoid sinus were free of tumour infiltration. Patient was treated with adjuvant radiotherapy of 60gy divided into 30 fractions over a period of 6 weeks. At 4 months post-surgery, nasal endoscopy revealed a polypoidal mass in the lateral wall of left sphenoid sinus. Biopsy sent for histopathology showed infiltrating nests and sheets of malignant cells, having pleomorphic nuclei, abundant eosinophilic cytoplasm, and suggestive of moderately differentiated SCC. PET-CT showed recurrent tumour in orbital apex extending into sphenoid sinus and middle cranial fossa, reaching till cavernous sinus. Patient was started on palliative chemotherapy with carbopaxol but expired after 2 months of palliative CT.

**DISCUSSION:**

Crissman et al first proposed the term papillary carcinoma to this rare variant of SCC. PSCC are de novo malignancies which can arise from a pre- or a co-existing benign lesion occasionally can develop in benign squamous papillomas. In view of their rare occurrence, the etiopathogenesis still remains undetermined. Papillary SCCs develop through different etiologies with a greater proportion probably secondary to Human Papilloma Virus of high risk types mainly 16 and 18. Most common sites of involvement

**Fig-1.** CECT showing heterogeneously enhancing large lobulated soft tissue mass is seen involving the left maxillary sinus, left nasal cavity, left ethmoidal sinuses and orbit.

**Fig-2.** Showing (a) post resection defect and (b) resected specimen.

**Fig-3.** Histopathology showed papillae and anastomosing sheets of malignant squamous cells with pleomorphic nucleoli, coarse chromatin, atypical mitosis, with numerous keratin pearls and horn cysts.
include the larynx and the sinonasal tract, which are also the common sites of benign HPV-related lesions like papillomas. Papillary SCCs are common in men in 6th and 7th decade. But HPV related SCCs have early age at presentation of about 59.6 years compared with the HPV negative carcinomas which are about 68 years. Two-thirds of papillary SCCs were immunoreactive to antibody p16 and 68% of these immune-positive lesions harbor high-risk HPV. About 73% of HPV related papillary SCCs arise in oropharynx (base of tongue and palatine tonsils), with rare occurrence in nose, paranasal sinuses and larynx.

Macroscopically papillary SCC appears as an exophytic tumour or polypoidal lesion which is usually friable, soft to firm in consistency, arising from a broad base. Most tumours present at early stage (T1orT2), although multifocality has been described.1,4

Microscopically PSCC have complex papillary fronds growing into the surrounding tissue, thereby making it difficult to assess the degree of infiltration into the surrounding tissue. These papillary projections consist of a central fibrovascular core layered with stratified squamous epithelium which exhibits surface keratinization, nuclear pleomorphism, increased nuclear-cytoplasmic ratio, loss of cellular polarity and increased mitotic figures which are all classical features of SCC.1,4

On immunohistochemistry, papillary SCC shows increased expression of Ki-67, p53 and loss of heterozygosity for a microsatellite marker found characteristically on the long arm of chromosome 11.5

The treatment guidelines follow those of SCC. Wide excision with adequate margins with neck dissections in nodal positive patients in lesions involving larynx and oral cavity +/- radiotherapy and radiotherapy with/without chemotherapy in case of oropharyngeal lesions are the primary treatment modalities. Lesions can be locally aggressive and difficult to fully resect, especially when they involve the sinonosal tract because of the intricate anatomy and vicinity of vital structures like skull base and carotids which precludes adequate margins for clearance. Such lesions often eventually progress to invasive malignant neoplasm and have higher chances of recurrences.4

Owing to its minimal invasion and less aggressive behavior, patients with PSCC tend to have better results as compared to conventional SCC with same stage at presentation. Distant metastases are very rare in these cases. About one-third of patients develop recurrence, which resemble the primary tumour histopathologically, but in our case it was a conventional type of moderately differentiated SCC. The reason why the recurrence was different from the primary remains unexplained. It probably would have been a radiation induced malignancy or a second primary.

CONCLUSION:

UDAT tumors related to HPV infection seem to have a better prognosis than those related to alcohol and smoking. Papillary SCC is a low to moderate grade malignancy. It is presumed that distant metastasis of PSCC is rare. It has a better prognosis than conventional SCC of the similar clinical stage but worse than that for verrucous carcinoma. This report presents an unusual aggressive behavior of this histological type with recurrence despite surgery and post-operative radiotherapy. This case report enlightens the need for further studies on the behavior and treatment protocols of this papillary variant of SCC.

DISCLOSURES:

(a) Competing interests/Interests of Conflict- None
(b) Sponsorships – None
(c) Funding - None
(d) Written consent of patient- taken
(e) Animal rights- Not applicable

REFERENCES: