

OTOLARYNGOLOGY

HEAD & NECK SURGERY

AUGUST 2015

Contents

Editorial

- COCHLEAR IMPLANT; AN INNOVATIVE ADVENT IN THE HISTORY OF MEDICAL SCIENCE 33
 Kalimullah Thahim
 Karachi - Pakistan

Original Articles

- RISK FACTORS FOR ORAL CANCER IN YOUNG PATIENTS AGED 40 YEARS AND BELOW IN KARACHI PAKISTAN 35
 Shaukat Malik, Mohammed Ayub Musani, Itrat Jawaaid, Rida Shaukat.
 Karachi - Pakistan

- EFFECTS OF POST-MANEUVER RESTRICTIONS ON EFFICACY OF EPLEY MANEUVER IN BENIGN PAROXYSMAL POSTIONAL VERTIGO 39
 Shoaib Ahmed, Faisal Manzoor, Uzma Bashir
 Gujranwala - Pakistan

- ESTIMATION OF SERUM IRON IN ORAL SUBMUCOUS FIBROSIS PATIENTS AND ITS COMPARISON WITH HEALTHY CONTROLS. 43
 Faisal Hameed, Irfan Ali, Zia-ur-Rehman Khan, Mohammad Aqeel Aslam, Nabeel Hafeez, Syed Mahmood Haider, Adil Rizwan
 Karachi - Pakistan

- COMPUTED TOMOGRAPHY OF PARANASAL SINUSES-AN IMPORTANT GUIDELINE FOR ENDOSCOPIC SINUS SURGERY 47
 Kiran Rao
 Amritsar - India

- ROLE OF PRE-OPERATIVE HIGH RESOLUTION COMPUTED TOMOGRAPHY OF TEMPORAL BONE IN SQUAMOUS CHRONIC OTITIS MEDIA 51
 Vanita Sarin, Tanya Kaur, Arvinder Singh Sood
 Amritsar - India

Case Reports

- KABUKI SYNDROME; A RARE ENTITY 56
 Nabil-Ur-Rahman, Iqbal A. Muhammad Khyani, Atif Hafeez Siddiqui
 Karachi - Pakistan

- INFRA-ORBITAL NERVE SCHWANNOMA WITH SINO - ORBITAL INVOLVEMENT : A CASE REPORT 59
 Atiqah Farah Zakaria, Mohamad Bin Doi, Mohd Razif Muhammad Yonus, Mawaddah Azman
 Kuala - Lumpur Malaysia

- INFRA-TEMPORAL FOSSA GROWTH; EXCISION WITH SURGICAL EXPERTISE AND LESS MORBIDITY : A CASE REPORT 61
 Beenish Nisar Ahmed, Syed Iqbal Hussain, Muhammad Waqas Nisar Ahmed
 Karachi - Pakistan

Cochlear Implant; An Innovative Advent in the History of Medical Science

Kalimullah Thahim

Thirty years ago no one thought of cochlear implant to deaf patients or providing improvement in a patients with moderate to severe hearing loss would be provided with improvement in hearing loss. Yet there were efforts on the part of sound being heard, thirty years ago the efforts turned out with a positive mood. Initially there was reluctance to implant electrode into cochlea for multiple reasons. First, given the complexity of human hearing, the likelihood of cochlear implants enabling anyone to achieve serviceable hearing appeared slim. Second, there was great interest in hair cell regeneration, and it was argued that implanting the cochlea with an electrode might somehow preclude regeneration. However as of today, the cochlear implant is widely accepted as a well-established procedure contemplated routinely both in cases of children as well as adults¹. The single channel electrode has been modified to multichannel cochlear implant with multi-disciplinary group of auditory, speech scientists, electro physiologists, and otologists. They wanted to understand how the devices worked and what we could do to improve performance. The research team continued their efforts to improve and expand, though it was started with some skepticism and concerns, yet it reached to a conclusion that a multichannel device proved better than single channel through a post aural approach^{2,3}.

The age of pediatric candidates for cochlear implant has dropped from 2 years to as young as 12 months, and eligibility criteria for adults continue to expand.

Cochlear implants bypass most of the peripheral auditory system which receives sound and converts that sound into movements of hair cells in the cochlea; the inside-portion of these hair cells release potassium ions in response to the movement of the hairs, and the potassium in turn stimulates other cells to release the neurotransmitter, glutamate, which makes the cochlear nerve send signals to the brain, which creates the experience of sound. Instead, the devices pick up sound and digitize it, convert that digitized sound into electrical signals, and transmit those signals to electrodes embedded in the cochlea. The electrodes electrically stimulate the cochlear nerve, causing it to send signals to the brain^{2,3}.

The surgical procedure is usually done under general anesthesia. There might be few risks of procedure such as infection and otitis media with effusion⁴. People with bilateral hearing loss having cochlear implant in both ears, give better results⁵. The incidence of tinnitus has gradually decreased in the recent years due to advance technology⁶. In the year 2015 a study was conducted to assess the Cochlear implant with patients having auditory neuropathy spectrum disorder found that diagnosis was too heterogeneous to make a claim that Cochlear implant was safe and effective way to manage^{7,8}.

A single channel implant was implanted 29 years ago into a deaf adult. The researchers received thrilling results and patient could hear the sound with multichannel implant. No one thought about thirty years ago that cochlear implant would enable the individual to hear about 70 to 90 % of words with moderate-to-severe hearing loss.

It can be said without exaggeration that cochlear implant works as reliable as the patient with normal hearing. However we still need to improve fitting to maximize individual performance. There is no doubt about the fact that even with children under the age of one year the programm strategies developed and give better result in terms of hearing and speech development. Furthermore, hybrid

implants aimed at stimulating high-frequency regions while preserving low-frequency acoustic hearing have the potential to widely expand the benefits of electrical hearing with their ability to improve speech perception for a much larger population.

REFERENCES:

1. Roche JP, Hansen MR. On the Horizon: Cochlear Implant Technology. *Otolaryngology Clinic North Am.* 2015;48(6):1097-116. Review. PMID 26443490
2. NIH Publication No. 11-4798 (2013-11-01). Cochlear implant. National Institute on Deafness and other communication disorder Retrieved 18,2016.
3. Yawn R, et al Cochlear implantation: a biomechanical prosthesis for hearing loss. *F1000 Prime Rep.* 2015; 2; 7:45. Review. PMID 26097718 PMC article
4. Bruijnzeel H, et al. Systematic Review on Surgical Outcomes and Hearing Preservation for Cochlear Implantation in Children and Adults. *Otolaryngology Head Neck Surg.* 2016; 16. Review. PMID 26884363
5. Raman G, et al. Effectiveness of Cochlear Implants in Adults with Sensorineural Hearing Loss [Internet]. Agency for Healthcare Research and Quality (US); 2011; 17.PMID 25927131.
6. Ramakers GG, et al. The effect of cochlear implantation on tinnitus in patients with bilateral hearing loss: A systematic review. *Laryngoscope.* 2015; 125(11):2584-92. Review. PMID 26153087.
7. Cabral Junior F et al. Cochlear Implantation and Single-sided Deafness: A Systematic Review of the Literature. *Int Arch Otorhinolaryngology.* 2016; 20(1):69-75.PMID 26722349.
8. Harrison RV, et al Auditory neuropathy spectrum disorder (ANSD) and cochlear implantation. *International J Pediatrics Otorhinolaryngology.* 2015; 79(12):1980-7. Review. PMID 26545793.

SWALLOWING DISORDERS: FROM COMPENSATION TO RECOVERY, PRE-CONGRESS COURSE: NEW APPROACHES TO NEUROGENIC DYSPHAGIA

01st - 03rd OCTOBER 2015
BARCELONA

Info : www.myessd.org

Risk Factors For Oral Cancer in Young Patients Aged 40 Years And Below in Karachi Pakistan

Shaukat Malik, Mohammed Ayub Musani, Itrat Jawaid, Rida Shaukat.

ABSTRACT: **OBJECTIVE:** To determine the potential risk factors associated with oral cavity Squamous Cell Carcinoma in young patients aged 40 years and below. **STUDY DESIGN:** Case control study. **PLACE AND DURATION OF STUDY:** Department of ENT and Head & Neck Surgery, Karachi Medical & Dental College and Abbasi Shaheed Hospital, Karachi, from March 2010 to March 2011. **PATIENTS AND METHOD:** One hundred cases and 100 controls were recruited during one year of study. Cases were patients with biopsy proven oral cancer and controls were age and sex matched individuals of same locality with similar life style. Data collection procedure was in the form of interview, clinical examination and high resolution CT/MRI. Demographic data like age and sex were recorded. **RESULTS:** The average age was 33 ± 6.09 . Males were 73%. The ethnicity variable showed that Urdu speaking were 75% followed by Punjabi 9%, Balauchi 8%, Sindhi 4%, and Pathan 2%. Majority of the cases consumed gutka and smoking followed by pan with tobacco. In a comparative study it was found that pan with tobacco was consumed in 85% of case but only 40% of the controls (p-value 0.0001). Gutka alone was consumed in 73% of case but only 26% of the controls (p-value 0.0001).

CONCLUSION: Gutka and pan with tobacco were strong predictors of oral cancer in young population 40 years and below.

Key Words : Oral young patients cancer, risk factors, (STATISTICAL ANALYSIS: SPSS version 15 was used for Data analysis.)

INTRODUCTION : Oral cavity squamous cell carcinoma (SCC) is one of the commonest cancer in the world with approximately, 274,300 new cases and 127,000 deaths occurring each year. The highest incidence rates have been observed in the Indian subcontinent¹. Although oral cavity is located in a part of body that is readily assessable for early detection, still most lesions remain undiagnosed until they reach advance stage. The early diagnosis is crucial for better five year survival rate, yet the majority of the patients seen in the out-patient clinics are in their third or fourth stage. Tumors of oral cavity show varying incidence worldwide, depending on environment and cultural habits. Cancer of the oral cavity account for 2 to 6 % of all cancers, and 30% of all head and neck cancer diagnosed annually in the United States but in South Asia and Indian subcontinent, cancer of the oral cavity is the leading malignancy diagnosed in men, accounting for up to 20% of all cancers. The habit of chewing areca nut with or without tobacco is the principal cause and the most common site is the buccal mucosa². Oral cavity squamous cell carcinoma typically occurs in elderly patients during the fifth through eighth decade of life throughout the world, but there is a recent increase in the incidence of oral cavity squamous cell carcinoma in young patients aged 40 years and below³. Several studies indicate that the incidence of oral cavity squamous cell carcinoma in young adults accounts for 0.4 to 3.6% of all cases of this disease^{3,4}. It is also observed that young patients are considered to have more aggressive disease as compared to the patients in the older age group^{5,6}. Several studies have shown that young patients tend to present a greater loco-regional recurrence and a decreased five year survival rate when compared to older patients^{7,8}.

Chewing of pan tobacco quid is the strongest predictor for oral cavity squamous cell carcinoma with the highest risk estimates observed among female chewers in Indian subcontinent⁹. In a study from India, the males had an adjusted relative risk of 6.14 associated with chewing 10 or more pan tobacco quid per day compared to those who never chewed¹⁰. In a study from Vietnam where betel quid chewing is common, 70% of the patients who had oral cancer took betel nut quid in comparison to controls in whom 30% took betel nut quid¹¹. In other studies from rest of the world smoking cigarettes and drinking alcohol is considered as main predictors for oral cavity SCC^{4,12}. Tobacco is responsible for nearly 1/3rd of all cancer deaths worldwide. The overall risk is related to the amount of tobacco a person smokes each day, the intensity of smoking, the age at which smoking began, the number of years a person has smoked and a smoker's second hand smoke exposure. It exhibits a clear linear dose-response carcinogenic effects in which duration is more important than the intensity of exposure¹³. Tobacco smoke contains approximately 4000 different chemicals including about 60 that are known to be carcinogenic. Chewing of betel quid with tobacco is the most common form of smokeless tobacco in south central Asia (India, Pakistan, Bangladesh, & Sri Lanka) and Southeast Asia (like Indonesia) and encompasses type such as nass, naswar, khaini, mawa, mishri and ghutka¹⁴. It appears to greatly increase cancer risk for the oral cavity^{15,16}. Regular alcohol consumption, along with combined tobacco and areca nut increases risk of oral cancer and other upper aero digestive tract cancers several folds^{17,18}. Alcohol is the second most important global risk factor for oral and head & neck cancer.

Extensive epidemiological evidence, both from western world and Southeast Asia suggests that it potentiates the carcinogenic effect of tobacco^{5,19}. This interaction appears to be multiplicative rather than additive, with high level of exposure²⁰. Alcohol is also an independent risk factor for Head & Neck cancer. It does not appear that alcohol is a carcinogen on its own but described as a co-carcinogen, or tumor promoter. The chewing of betel quid is an important risk factor for oral cancer throughout the Indian subcontinent and Southeast Asia⁶. It is estimated that there are 600 million betel quid chewers worldwide²¹. Betel quid with tobacco was first designated as a carcinogens by the IARC in 1985 and more recently betel quid without tobacco has also been classified as a human carcinogen²². For oral cavity cancer overall, chewers of pan with tobacco had a more than eight fold higher risk than non-chewers^{17,23,24}. In Karachi, oral cancer is 2nd most common in all malignancies among both males and females with the highest reported incidence in the world. In the absence of alcohol use, chewing of products of betel, areca, and tobacco remain the main etiological risk factors. These products include paan, chaalia, ghutka and naswar²⁵. Although in western developed countries, the oral cancer is mostly found in the sixth and seventh decade but in India and Pakistan the incidence in younger age group is on the rise. Data from Karachi institute of radiation and nuclear medicine shows steep rise in oral cancer in Karachi. In 2005, the total number of new registrations was 593, while in 2007 it had swollen to 818 new cases, a rise of 40%. The 41 % of these were below 45 years of age, while the world literature shows incidence in younger population from 0.4 to 3.6% only^{2,3}. As the statistics from Pakistan are not available and only few studies are found in the world literature regarding oral cancer, this is the reason to choose the study for research and to identify the predictors of oral cavity SCC preferably in younger age group under the age of 40 years.

SUBJECTS AND METHODS: This case control study to determine the predictors of oral cancer in patients 40 years and less in our population was conducted at the ENT department of Karachi Medical & Dental College and Abbasi Shaheed Hospital from March 2010 to March 2011. All the cases of oral cavity squamous cell carcinoma proved by histopathology of either gender were included in this study and were considered as cases. An equal number of controls were recruited. Controls were patients who do not have the disease (oral cancer). Controls were with matching age and sex of attendants living in the same locality and having the same life style and who do not have the disease.. Data collection on variables was derived from interview, physical examination, laboratory tests, and high resolution CT or MRI. Demographic data like age, sex, socio-economic status were recorded. A written consent was taken from cases and controls, who were participating in the study.

Inclusion Criteria:

Cases: All consecutive adult patients but less than 40 years of age, coming to department of ENT and Head and Neck surgery of Abbasi Shaheed Hospital with histopathologically proven carcinoma of oral cavity were included in this study.

Controls: An equal number of age, gender matched

controls living in the same locality, with same life style, and who do not had the disease, were included as controls.

Exclusion Criteria:

1: Patients with simultaneous other lesions like tuberculosis, syphilis

2: Patients with concurrent carcinoma in any other part of the body.

3: Previously treated patients of oral cavity carcinoma.

Data Analysis Technique:

A descriptive analysis of the cases and controls was performed by SPSS version 15. Categorical variables were presented as proportions (%), and continuous variables were presented as mean $\pm$ standard deviation. The characteristics of cases and controls were compared. Chi square was used to compare categorical variables, and t - test to compare continuous variables. p value < 0.05 was considered as statistically significant.

RESULTS: One hundred cases and 100 controls were studied during the study period in the outpatient of ENT, Abbasi Shaheed Hospital. Overall, the data showed that the average age was 33 ± 6.09 , males were 73%. The ethnicity variable showed that Urdu speaking were 75%, followed by Punjabi (9%), Baluchi (8%), Sindhi (4%) and Pathan (2%). Majority of the population consumed ghutka followed by pan with tobacco. Consumption of ghutka and smoking was 51% and smoking alone was 16.5%, respectively. In a comparative analysis between the cases and controls, it was found that pan and tobacco was consumed in 85% cases but only in 40% of the controls (p-value 0.0001). Ghutka alone was consumed in 73% cases and 26% controls (p-value 0.0001). Ghutka and smoking was consumed by 51% of cases and 26% of controls (p-value 0.0001). Characteristics of patients with oral cancer among those who had oral cancer, Urdu speaking were 75%, Punjabi were 9%, Sindhi were 5%, Baluchi were 8% and Pathan were 2%. Among the cases, 16.5% were smokers, while among the controls 10.7% were smokers (p-value=0.236). The characteristics of cases and controls were significantly different regarding consumption of ghutka (alone), the use of paan and tobacco, and gutka plus smoking. The use of paan and tobacco was found to be 85% in cases and only 40% in controls (p-value=0.0001). The consumption of Ghutka (alone) was 73% among cases, and 26% in controls (p-value=0.0001). The smoking and ghutka usage was found in 51% of cases and 24% of controls (p-value 0.0001).

DISCUSSION : Head and neck cancer is becoming a serious health hazard in many Asian countries and it has become one of the leading causes of death in Asian pacific countries. The highest incidence rates have been observed in the Indian sub-continent¹. In this study the male: female ratio was 2.7: 1. It may be because the habits of ghutka, paan with tobacco and smoking were mostly found in males as compared to females. It is in contrast to two case control studies from India where chewers were compared with non-chewers, a much higher risk of oral cancer was found in women chewers of paan with tobacco as compared to men paan chewers with tobacco^{26,27}. Another study on oral cancer from Abbotabad, Pakistan showed 60% males and 40% females²⁵. The other study from different parts of the world show male preponderance as far as oral cancer is concerned. The

Variables	Patients with Oral Ca. (Cases) Mean $\pm$ SD or %	Patients with No. Cancer (Controls) Mean $\pm$ SD or %	p values
Age	33 $\pm$ 5.97	32 $\pm$ 6.2	0.55
Gender:			
Male	73%	73%	0.515
Ethnicity:			
Urdu Speaking	75%	76%	0.850
Punjabi	9%	8%	
Sindhi	5%	2%	
Baluchi	8%	8%	
Pathan	2%	3%	0.236
Smoking	16.5%	10.7%	
Paan and Tobacco	85%	40%	
Ghutka (alone)	73%	26%	
Ghutka and smoking	51%	24%	0.0001

Table-1 : Comparison of characteristics of cases versus controls.

Characteristics	Odds Ratio	p values
Age (per year increase)	0.98 (0.94-1.03)	0.62
Gender:		
Male (reference female)	1.05 (0.56-1.99)	0.86
Ethnicity: (Ref Others)	1.30 (0.68-2.5)	0.42
Urdu Speaking		
Others	1.0	
Smoking	1.71 (0.87-3.37)	0.11
Paan and Tobacco	8.5 (4.20-17.0)	0.0001
Ghutka (alone)	8.03 (3.61-17.85)	0.0001
Ghutka and smoking	8.41 (4.10-16.7)	0.0001

Table-2 : Binary logistic regression analysis of factors associated with the risk of oral cancer:

incidence of oral cancer in Michigan is 3.3 times in males²⁸ while in our study it is 2.7 times in males.. One study from Indians living in South Africa found a 1: 1.6 male to female ratio among oral cancer patients²⁹. The ethnicity variables showed that Urdu speaking were 75% followed by Punjabi (9%), Baluchi (8%), Sindhi (4%) and Pathan (2%). Rests were from other communities. The justification of this result lies in the fact that this study was conducted in Abbasi Shaheed Hospital, situated in the center of Urdu speaking population. Majority of the patients attending this hospital are from Urdu speaking population. So this variable only shows local statistics and don't represent whole country. The average age was 33 $\pm$ 6.09. The majority of the cases and controls were from poor and lower middle class, 64.38%, and 31.51% respectively. This clearly indicates that the habits of ghutka, smoking and paan with tobacco are rampant in poor population.

This study is different from other studies of the world as the main factors in western world are smoking and drinking, while in this study the main factors belong to smokeless tobacco, that is ghutka and paan with tobacco. Similarly smoking alone was observed only in 16.5% of cases and 10.7% of controls (p-value=0.236), however ghutka and smoking was observed in 51%, followed by paan with tobacco 35.6%. In a comparative analysis between cases and controls, it was found that paan and tobacco was consumed in 85% of cases but only in 40% of the controls (p-value 0.0001). Ghutka was consumed in 73% of cases and 26% of controls (p-value 0.0001). This clearly indicates that pan with tobacco and ghutka are strong predictors of oral cancer in this part of the world. Although cigarette smoking is a known predictor of oral cancer worldwide but in our study only 16.5% of cases and 10.7% of controls were habitual of smoking. The oral cancer is most prevalent in parts of subcontinent and Southeast Asia where the use of betel nut and various forms of oral tobacco are widespread⁵⁴.

A descriptive analysis of 116 cases of oral cancer in patients 45 years and under. It revealed recent increase in young patients with oral cancer. According to this study oral cancer in the young may be a disease distinct from that occurring in older patients with a different etiology and disease progression⁴. Recent evidence from a case series suggests an absence of traditional factors in a significant population of younger patients. Moreover the time span for tobacco and alcohol to exert a detrimental effect in these younger patients is relatively short. The author suggested examining other potential risk factors like genetic, environmental, stress, previous viral infections and other carcinogens. In this study 47% of all cases were SCC of tongue. The mean age in males was 39 years and in females was 38 years⁷. In our study the mean age was 33 years with standard deviation of 6.09. The most common site in our study was cheek followed by tongue and floor of mouth. Majority were either ghutka eaters, paan with tobacco eaters or smokers. According to IARC monogram volume 85, percentage of oral cancer diagnosed in Asia was always higher than the usually found in western countries, where the habit of chewing betel quid with or without tobacco is virtually unknown³⁰. A case control study, India, with 591 cases of oral cancer and equal number of controls showed relative risk of 4.2 in betel quid chewers which increased to 6.1 in betel quid chewers with tobacco smoking³¹. Another study by Znoar et al³² has shown relative risk of 2.2 in betel quid chewers which increased to 5.1 in betel quid chewers along with tobacco smoking. In our study those who consume paan and tobacco, were 8.5 times more likely to have oral cancer (OR 8.5; CI 95%; p-value 0.0001) when compared to nonconsumers. Similarly compared to those who did not consume ghutka, those who did were 8 times more likely to develop oral cancer (OR 8.0; CI 95%; p-value 0.0001). In India, it has been shown that chewing the mixtures containing areca nut and tobacco, which is becoming more and more popular among the youth, is causing an increase in oral cancer at younger age^{33,34}. In another study from India, male bidi smokers who also chewed paan with tobacco regularly, had a 7 fold greater risk of cancer of the tongue or floor of the mouth, a more than 16 fold greater risk of gingival cancer and a more than 21 fold greater risk of cancer of buccal and labial mucosa than men not using any tobacco. (P < 0.05)³⁵. The use of areca nut among the youth is increasing mainly due to availability of packaged, readymade forms of areca nut preparations like ghutka, mawa, paanmasala, etc. Habits ghutka, smoking and paan with tobacco are rampant in poor population. Another factor is their intensive advertising and marketing. Dry products like ghutka, mawa and paanmasala are based on the idea of betel quid containing multiple ingredients minus the betel leaf. Although gutka has been banned in Pakistan but it is freely available on every paan shop all over Pakistan at a very cheap rate.

CONCLUSION : The consumption of paan with tobacco and use of ghutka alone were significantly associated with the risk of developing oral cancer. The other independent variables age, gender ethnicity and smoking did not show a significant association.

REFERENCES:

1. Farley J., Bray F., Pisani P: cancer incidence, mortality and prevalence worldwide. IARC cancer base no 5 version 2.0 Lyon: (IARC press 2004)
2. Garavello W., Spearficio R., Gaini RM., Oral tongue cancer in young patient: A matched analysis. *Oral oncol*.2007;43:894-7.
3. Hirota SK., Fabio PF., Braga, Sibeles S. Risk factors for oral SCC in young and old Brazilian patients: A comparative analysis. *Med Oral Patol Oral Cir Bucal*.2008;13(4):E227-31.
4. Llewellyn CD., Linklater K., Bell J. Squamous cell carcinoma of the oral cavity in patients aged 45 years and under: a descriptive analysis of 116 cases diagnosed in the South East of England from 1990-97. *Oral Oncol* 2003;39:106-14.
5. Perez SR., Marquese S., Aparecido R. Epidemiological study of squamous cell carcinoma of mouth and oropharynx . *Int Arch Otolaryngol* 2007;11(3);41-8.
6. Rodriguez R., Alteri A., Chatenoud L., Gallus S. Risk factors for oral and pharyngeal cancer in young adults. *Oral Oncol* 2004;40(2):207-13.
7. Llewellyn CD., Linklater K., Bell J. An analysis of risk factors for oral cancer in young people: A case control study. *Oral Oncol* 2004;40:304-13.
8. Muwonge R., Ramadas K. Role of tobacco smoking, chewing and alcohol drinking in the risk of oral cancer in Trivandrum, India: *Oral Oncol* 2008; 44:446-54.
9. Richart PA., Nguyen XH., Klinikum V. Betel quid chewing, oral cancer and other oral mucosal diseases in Vietnam. *J Oral Pathol Med*. 2008; 37(9):511-4.
10. Carvalho DM, Singh B., Spiro RH, Shah JP. Cancer of the oral cavity: A comparison between institutions in a developing and a developed nation. *Head Neck* 2004;26(1):31-8.
11. Casby RJ, Morton T, Epstein J. Proliferative verrucous leukoplakia and its progression to oral carcinoma: A review of the literature. *J Oral Pathol Med* 2007;36:255-61.
12. Najeeb T., Clinicopathological presentation of tongue cancer and early cancer treatment. *J Coll Physician Surg, Pak*. 2006; 16(3):179-82.
13. Watson CH, Polzin GM, Calafat AM. Determination of tar, nicotine, and carbon monoxide yields in the smoke of bidi cigarettes. *Nicotine Tob Res* 2003;5:747-53.
14. Coglian V. Smokeless tobacco and tobacco related nitrosamines. *Lancet Oncol*,2004; 5(12):708.
15. Johnson N: Tobacco use and oral cancer: A global perspective. *J Dent Educ* 2001;65(4):328-39.
16. US Department of Health and Human Services: The Health Consequences of Smoking: A report of the Surgeon General, US Center for Diseases Control and Prevention, 2004.
17. Wunsch FV. The epidemiology of oral and pharynx in Brazil. *Oral Oncol* 2002;38(8):737-46.
18. Llewellyn, Camie D, Johnson N. Factors associated with delay in presentation among young patients with oral cancer. *Oral Med* 2004; 97(6):707-13.
19. Lin WJ, Jiang RS, Wu SH. Smoking, alcohol and betel quid and oral cancer: A prospective cohort study. *J Oncol* 2011;2011: 525976. Epub 2011.
20. Hsu TC, Furlong C. The role of ethanol in oncogenesis of the upper aerodigestive tract. Inhibition of DNA repair. *Anticancer Res* 1991; 11:1995-8.
21. Betel-quid and areca-nut chewing. *IARC Monogr Eval Carcinog Risk Chem Hum* 1985;37:137-202.
22. Rajalalitha P, Vali S. Molecular pathogenesis of oral submucous fibrosis-A collagen metabolic disorder. *J Oral Pathol Med* 2005;34:321-8.
23. Rehman M, Sakamoto, Fukai T. Bidi smoking and oral cancer: A meta analysis. *Int J Cancer* 2003;106(4):600-04.
24. Boffetta P. Smokeless tobacco and cancer. *Lancet Oncol* 2008;9(7):667-82.
25. Bhurgri Y. Karachi Cancer Registry Data- Implications for the National Cancer Control Programme in Pakistan. *Asian Pac J Cancer Prev*2004; 5:77-82.
26. Levi F. Second primary oral and pharyngeal cancers in subjects diagnosed with oral and pharyngeal cancer. *Int J Cancer* 2006; 119(11):2702-4.
27. Sinha DN, Gupta PC, Pednekar M. Tobacco water: A special form of tobacco use in the Mizoram and Manipur states of India. *Natl Med J India* 2004;17:245-7.
28. Rutkow IM. The nineteenth century: Anesthesia. In *Surgery: An illustrated History*. St Louis Mosby,1993; 331-9.
29. Johnson JT. Perioperative antibiotic treatment for contaminated head and neck surgery in antibiotic therapy. In *Head and Neck surgery*, ed JT Johnson. New York: Marcel Dekker. 1987;51-5.
30. Silvio KH, Fabio PF, Braga. Risk factors for SCC in young and old Brazilian patients: A comparative study. *Med Oral Cir Bucal* 2008;13(4):227-31.
31. Reichart R, Nguyen XH. Betel quid use, oral cancer and other oral mucosal diseases in Vietnam: A review. *J Oral Pathol Med* 2008; 37(9):511-4.
32. Jacob BJ, Straif K, Thomas G. Betel quid without tobacco as a risk factor for oral precancers. *Oral Oncol* 2004;40:6970-04.
33. Daftary DK, Murti PR, Gupta PC. Oral squamous cell carcinoma: In Prabhu. *Oral Diseases in the Tropics*, Oxford Medical Publications: Oxford, 1992;429-48.
34. Gerrote LF. Risk factors for cancer of the oral cavity and oropharynx in Cuba. *Br J Cancer* 2001;85(1):46-54.
35. The World Bank. Health Nutrition and Population, Economics of Tobacco Control, Discussion paper tobacco series 2005 Jun.

Effects of Post-maneuver Restrictions on Efficacy of Epley Maneuver in Benign Paroxysmal Postional Vertigo

Shoaib Ahmed*, Faisal Manzoor**, Uzma Bashir**

ABSTRACT: **OBJECTIVE:** To compare the efficacy of Epley Maneuver with and without post-maneuver restrictions in patients of benign paroxysmal positional vertigo. **STUDY DESIGN:** Cross sectional study. **SETTING:** Department of ENT Head & Neck Surgery, Shifa Naval Hospital, Karachi. **DURATION:** It was a 13 months study carried out from 10th March, 2007 to 10th April, 2008. **SUBJECTS AND METHODS:** We recruited 60 patients with a history of positional vertigo and dizziness or unilateral positional nystagmus on Dix-Hallpike maneuver. Patients were divided in two equal groups of thirty each. Study group (Group I), received post-maneuver instructions while Control group (Group II), was not instructed. Measured outcomes included resolution of vertigo and positional nystagmus at follow-up after 72± 24 hours. **RESULTS:** No significant difference was found between Group I (with instructions) and Group II (without instructions) (p value = .584) **CONCLUSION:** Post-maneuver restrictions do not influence the efficacy of Epley Maneuver for BPPV management.

Key Words : Benign paroxysmal postional vertigo, Dix-Hallpike test, Epley maneuver, Post-maneuver restrictions.

INTRODUCTION : Vertigo can be described as an unreal sense of movement, or the illusion of rotational motion, is due to asymmetry in vestibular nucleus activity¹. It may be experienced as a sensation of spinning (subjective vertigo) or a sensation of the world spinning about one's self (objective vertigo)². It can be either episodic lasting for seconds to minutes or continuous lasting for weeks to months. Vertigo should be distinguished from dizziness, which describes any kind of altered sense of orientation, including light-headedness, unsteadiness, motion intolerance, imbalance, floating, or a tilting sensation. True vertigo is often due to inner ear disease, whereas non vertiginous symptoms may be due to CNS, cardiovascular, or systemic diseases. Benign paroxysmal positional vertigo (BPPV) is the most common cause of peripheral vertigo³, with an incidence that varies between 11 and 64 cases per 100 million, predominantly in the age range between 50 and 55 years in idiopathic cases⁴, and very rarely in childhood⁵. BPPV is characterized by brief spells of vertigo, nausea and/or positional nystagmus at head position change⁶. After the vertigo spell, a vague feeling of floating-like dizziness may persist for hours, or even days; the intensity of BPPV clinical manifestations and its recurrent character may impact a patient's professional, social and domestic activities⁶. In most cases, BPPV is found in isolation and termed "primary" or "idiopathic" BPPV. This type accounts for about 50%-70% of cases. The most common cause of "secondary" BPPV is head trauma, representing 7%-17% of all BPPV cases³. BPPV may be associated with inner ear surgeries in 1% of the cases, and the highest risk for its development is detected in stapes surgeries (stapedectomy and stapedotomy)⁷. As to the physiopathology, BPPV occurs due to the inappropriate stimulation of SCC hair cells, in response to the changes in head position with respect to the gravity, by sequestered otoconia³. There are two theories: cupulolithiasis, in which statocone debris are attached to the cupulla⁸, and canalolithiasis, in which the debris

float freely in the endolymph along the semicircular canal involved⁹. This condition presents as dizziness or vertigo of sudden onset that is provoked by certain changes in head position. An attack is usually triggered when the patient lies back on the affected side, rolls over onto that side, sits up quickly or tilts the head back while looking up. A latent period of few seconds after the head movement is followed by a severe vertigo, which usually lasts less than 1 minute. Dix-Hallpike testing is positive when a rotatory nystagmus is induced with the affected ear dependent, a response that is usually fatigable. The natural clinical course of BPPV is self-limiting and takes from weeks to months, and it normally does not respond to antivertigo drugs¹⁰. Advocated treatments are various: maneuvers of canalith repositioning¹¹. Epley maneuver is the most common one (success rate near 90%), liberatory maneuvers, Semont maneuver, vestibular habituation training³, and surgical treatments such as singular neurectomy or occlusion of posterior semicircular canal that are reserved to cases non-responsive to clinical treatment. BPPV is the most common cause of vertigo in our ENT out patient department and Epley's manoeuvre is one of most effective particle repositioning manoeuvre. In this study, conducted at PNS Shifa, restrictions after repositioning measures¹² are questioned, as many studies have been conducted to compare groups but no difference has been observed between the two study groups¹³. This will help to minimize the discomfort caused by the restrictions imposed on patients after performing of the procedure. Limiting of restrictions to one group does not carry an ethical issue as these restrictions are not a proven treatment modality and if they are found to be beneficial the second group can always be given the restrictions after the study.

SUBJECTS AND METHODS :

A prospective study has been conducted at PNS Shifa Karachi since March 2007 till April 2008. A total of 60 patients with BPPV were selected from general

*Department of ENT, Shifa Naval Hospital, Karachi, **Combined Military Hospital, Gujranwala, Pakistan.

population including mostly army personnel and their families, and a few civilians as well, reporting to the E.N.T. department PNS Shifa Karachi. Total 60 cases, divided in two equal groups of thirty each. Studied group (Group I), received post-maneuver instructions while Control group (Group II), was not instructed. Inclusion Criteria:

- Both sexes.
 - All patients of age between 15 to 65 years.
 - Patients with Positive Dix-Hallpike test.
 - Patients agreed to participate in the study.
- Exclusion Criteria:
- Presence of neck restrictions that will prevent conduction of Epley Maneuver.
 - Patients using anti-vertigo drugs.

Study was approved from Hospital Ethical Committee. A clear understanding of risk and benefit ratio (no risk involved) of the procedure was given to each patient before starting the maneuver and informed consent was taken. After approval of synopsis sixty patients presenting in Out Patient Department of PNS Shifa fulfilling the inclusion criteria were included. Patients were subjected to Dix-Hallpike test and it was considered positive in case of triggering of dizziness and/or presence of horizontal-rotation nystagmus, clockwise to left canal and anti-clockwise to the right canal, in Rose's position with hyperextension and lateral neck rotation. Patients with positive Dix-Hallpike test were submitted to Epley Maneuver. After repositioning, patients were randomized to two groups: Studied group (Group I), who have received post-maneuver instructions. Control group (Group II), who were not instructed. Patients were re-assessed 72 hours after the Epley Maneuver and were divided into two categories: asymptomatic and symptomatic (in both the groups). Patients were considered asymptomatic on exclusion of main complaint and absence of dizziness and/or nystagmus in Dix-Hallpike test. Patients were considered symptomatic that reported partial improvement or absence of improvement after the maneuver and showed positive Dix-Hallpike test. Data was collected in the carefully structured Proforma. Data Analysis:

Data was analyzed using Software SPSS-11. The variable in the study is presence of residual symptoms associated with positive result of Dix-Hallpike test. Chi-square test was used to assess the difference of results between the group that was instructed and the group without instructions. The level of significance was $p < 0.05$. Mean and standard deviation of age, frequency and percentage of sex were given.

RESULTS : The study was conducted on 60 patients with benign paroxysmal positional vertigo. In 30 cases after Epley's manoeuvre post-maneuver restrictions were given (Group I) and then compared for complete resolution of symptoms mainly vertigo, with the 30 cases which had not received any instructions (Group II). The age of patients in this study was from 32 years to 75 years with a mean age incidence of 53.22 ± 9.64 years. Mean age of patients in group I which were given instructions was $52.00 \text{ SD} \pm 9.727$. There was no significant difference between two groups with respect to age as shown in Table 1. Most numbers of patients were in age group 41-60 years (Fig 1). While assessing

post maneuver progression considering different age groups no statistically significant difference was found ($p=0.449$). Patients belonging to every class were included in this study but most of the patients were serving army personnel and their families. Out of these 60 patients 55% were males and 45 % were females. Out of those 30 cases that were given post-maneuver instructions (Group I) 46.66 % were males and 53.33 % were females. Out of those which were not given instructions (Group II) 63.33 % were males and 36.66 % were females as shown in Fig 2. The categorical data of the two groups regarding improvement of symptoms was analyzed and crosstabulation is shown in Table 2. The Chi-Square test was applied to compare improvement of symptoms in two groups and it proved the Null hypothesis to be correct. Hence the difference of results between the group that was instructed (Group I) and the group which was not instructed (Group II) was not statistically significant ($p=0.584$) as shown in Table 3.

DISCUSSION : Benign paroxysmal positional vertigo (BPPV) is the most common peripheral vestibular disorder in adults^{3,14}. This condition presents as dizziness or vertigo of sudden onset that is provoked by certain changes in head position. Rolling over in bed, bending over, and looking upward are the most common provocative movements¹⁵. Despite the seemingly simple and straight forward pathophysiology and treatment of benign paroxysmal positional vertigo, the diagnosis and treatment of this condition can be challenging^{3,16}. In this study the results indicates 40 (66.66%) of the 60 patients became asymptomatic after Epley's maneuver when assessed within 24-72 hours after conduction of the procedure. This data is in accordance with the literature, which suggests a success rate of the maneuver in about 60% to 90% of the cases as an effective treatment approach of BPPV^{9,17}. As to gender distribution, literature suggests female predominance¹⁸ but we observed slight predominance of male patients (55%), but this is note worthy that quite a significant number of female patients who were recruited in study didn't turn up for follow up and we had to drop them from the study. This is also interesting to note, studies report female predominance but when we consider younger age ranges, in which the main etiology is head trauma, as a secondary cause, the correlation between genders has no difference. Despite slight male predominance in our study, when we consider clinical response to treatment between males and females, results do not show statistically significant differences between genders. (Table 1 & Fig 2) The mean age of the studied population was 53.22 ± 9.639 years and 25 % of the patients in the sample were aged over 60 years as in other studies¹⁹. Because of associated co-morbid conditions in the elderly the diagnosis of BPPV is made more frequently. In this age group, the disease has more impact on patient's professional, social and domestic activities¹⁵. In our study 15 patients were above 60 years still it is interesting to note that even though the elderly were more exposed to the disease, the efficacy of repositioning maneuver is the same as the one observed in other age ranges²⁰. Despite the fact that there is no question regarding the efficacy of the liberatory manoeuvres⁹ still there are areas of divergence on which researchers are still not agreed. The use of mechanical

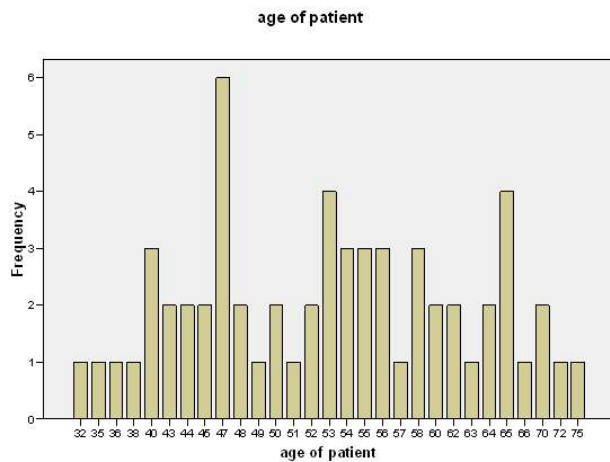


Fig-1 : Frequency of age of patients.

vibration of the mastoid bone and medication for sedation during Epley's maneuver are still controversial. Some professionals have continued to use this technique, whereas others do not²¹. Comparison of initial vertigo relief and long term resolution of symptoms does not demonstrate any advantage for those receiving vibration. Second area of controversy is variation in the literature on how many repositioning manoeuvres are performed in each treatment session. Some perform a set number of repositioning manoeuvres per session regardless of response²². Others perform manoeuvres until there is resolution of nystagmus or patient's discomfort prohibits continuing with treatment^{23,24}. A third group believes that only one manoeuvre should be performed per clinic visit²¹. In our study each patient received only one manoeuvre, however few older patients and some females were not co-operative during the manoeuvre and we had to discontinue and restart the manoeuvre. Like the first two scenarios another area of divergence is the activity limitations placed on patients after repositioning manoeuvres. Epley²³ suggested that his patients remain upright for 48 hours after CRP, and many professionals continued with this practice²⁵. Furthermore, another group of professionals, in addition to having patients remain upright, also suggested that patients avoid lying with their affected ear downward for 7 days after repositioning²². Nuti and colleagues in examined two sets of patients following the Seamount manoeuvre. Fifty-six patients with posterior canal benign paroxysmal positional vertigo underwent the Seamount manoeuvre and were checked after 20 minutes, 24 hours, and 1 week. The patients were told that they could sleep or move as they pleased, without any particular precautions. These two groups were compared retrospectively and no difference was found in short-term vertigo control. In a more recent study by Casqueiro and colleagues²⁶ in 2008 compared two groups of patients. Two hundred and they seven patients diagnosed during the first year of study were instructed to follow postural restrictions after repositioning maneuvers, and 184 patients who were diagnosed in the second year did not receive any postural restriction after treatment. The outcome measures were, number of maneuvers needed until symptoms resolved,

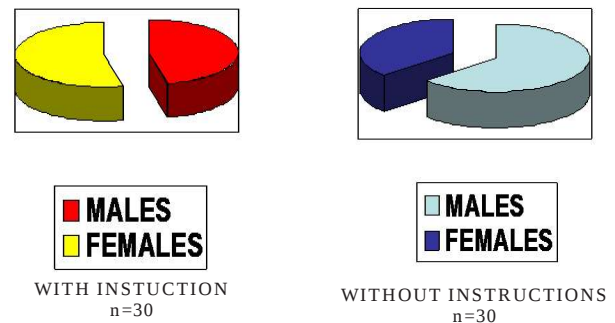


Fig-2 : Gender distribution.

Post maneuver Instructions	Improvement of symptoms		Total
	Asymptomatic	Symptomatic	
With instructions	21	9	30
Without instructions	19	11	30
Total	40	20	60

Table-2 : Improvement of symptoms in both groups (Crosstabulation).

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.300(b)	1	.584		
Continuity Correction(a)	.075	1	.784		
Likelihood Ratio	.300	1	.584		
Fisher's Exact Test				.785	.392
N of Valid Cases	60				

Table-3 : Improvement of symptoms in both groups (Chi-Square Tests).

recurrence rate, and subjective recovery at the end of treatment between both groups. There were no statistical differences found in respect of all these measures. In our study 21 out of 30 patients become asymptomatic after they were given post-maneuver restrictions as compared to the 19 out of 30 asymptomatic patients who didn't receive any instruction. This finding is consistent with an earlier prospective studies by Massoud and Ireland²⁵ and Cohen and Kimball in 2004²⁷, who also demonstrated that post'liberatory maneuver instructions were not efficacious.

All these instructions, though have anatomical and physiological basis make BPPV treatment very complex matter for the patient and he or she has to adopt a certain style of living for which they are not use to. Secondly another draw back of restrictions is that after their period is over, patients feel great anxiety to start the head movements once again, as they start considering them a cause of their disease. These changes in habits and life style significantly affect the older population who start experiencing muscular pain due to assuming a specific posture for long time and elderly population is significantly more affected by BPPV¹⁸. It is concluded that Epley's maneuver is a simple option for the treatment of BPPV with satisfactory outcomes, whether posture restrictions are advised or not. The actual cause of BPPV is still questionable, but it seems clear that the initial proposition that repositioned particles would tend to get back to the posterior semicircular canal as a response to the position of the head is debatable. Only time and conduction of studies on the topic will clarify these facts. As our results are in accordance with those

reported by other authors^{24,25} who did not detect better clinical evolution in patients submitted to different postures, it seems to be reasonable that there is no reason to submit our patients to these very uncomfortable recommendations. It is also recommended that further studies are required to carry out same maneuver in hospitalized patients with strict observations so that we can actually assess the impact of post-maneuver guidance on efficacy of this maneuver and secondly different neck and body movements performed by different patients may also be notified and compared with results.

CONCLUSION : The present study suggests that Epley's maneuver is an effective treatment option in the majority (70%) of patients of posterior canal BPPV. Post-maneuver postural restrictions have no significant effect on the efficacy of Epley's maneuver.

REFERENCES:

1. Body balance in patients with systemic vertigo after rehabilitation exercise. *J Physiol Pharmacol*. 2007 Nov;58 Suppl 5(Pt 1):427-36.
2. Vertigo - Part 1 - Assessment in general practice. *Aust Fam Physician*. 2008;37(5):341-7.
3. Parnes LS, Agrawal SK, Atlas J. Diagnosis and management of benign paroxysmal positional vertigo (BPPV). *CMAJ* 2003;169:681-93.
4. Hilton M, Pinder D. The Epley manoeuvre for benign paroxysmal positional vertigo: a systematic review. *Clin Otolaryngol* 2002;27:440-5.
5. Baloh RW, Honrubia V. Childhood onset of benign positional vertigo. *Neurology* 1998;50(5):1494-6.
6. Steenerson RL, Cronin GW, Marbach PM. Effectiveness of treatment techniques in 923 cases of benign paroxysmal positional vertigo. *Laryngoscope* 2005;115(2):226-31.
7. Atacan E, Sennaroglu L, Gene A, Kaya S. Benign paroxysmal positional vertigo after stapedectomy. *Laryngoscope* 2001; 111: 1257-9.
8. Schuknecht HF. Cupulolithiasis. *Arch Otolaryngol* 1969;90:765-78.
9. Simhadri S, Panda N, Raghunathan M. Efficacy of particle repositioning maneuver in BPPV: a prospective study. *American Journal of Otolaryngology* 2003; 24(6):355-60.
10. Kwanchanok Y, Srirompotong S, Srirompotong S. A randomized trial of the canalith repositioning procedure. *Laryngoscope* 2003; 113: 828-32.
11. Particle repositioning manoeuvre in benign paroxysmal positional vertigo: is it really safe? 2005; 34: 41-5.
12. Marciano E, Marcelli V. Postural restrictions in labyrintholithiasis. *Eur Arch Otorhinolaryngol* 2002; 259: 262-5.
13. Cohen HS, Kimball KT. Treatment on Epley Maneuver for benign paroxysmal positional vertigo. *Am J Otolaryngol* 2004; 25:33-7.
14. Hotson JR, Baloh RW. Acute vestibular syndrome. *N Engl J Med* 1998; 339:680-685.
15. Steenerson RL, Cronin GW, Marbach PM. Effectiveness of treatment techniques in 923 cases of benign paroxysmal positional vertigo. *Laryngoscope* 2005;115:226-31.
16. Katsarkas A. Benign paroxysmal positional vertigo (BPPV): idiopathic versus post-traumatic. *Acta Otolaryngol* 1999;119:745-9.
17. Ahmed Z, Akhter R, Ahmed T, Raza N, Ayub W. . 2003; 53: 160-3.
18. Mizukoshi K, Watanabe Y, Shojaku H, Okubo J, Watanabe I. Epidemiological studies on benign paroxysmal positional vertigo in Japan. *Acta Otolaryngol Suppl* 1988;447:67-72.
19. Froehling DA, Silverstein MD, Mohr DN, Beatty CW, Offord KP, Ballard DJ. Benign positional vertigo: incidence and prognosis in a population-based study in Olmsted County, Minnesota. *Mayo Clin Proc* 1991;66:596-601.
20. Wolf M, Hertanu T, Novikov I, Kronenberg J. Epley's maneuver for benign paroxysmal positional vertigo a prospective study. *Clin Otolaryngol* 1999;24:43-6.
21. O'Reilly RC, Elford B, Slater R. Effectiveness of the particle repositioning maneuver in subtypes of benign paroxysmal positional vertigo. *Laryngoscope* 2000; 110:1385-8.
22. Hain TC, Helminski JO, Reis I, Uddin M. Vibration does not improve results of the canalith repositioning maneuver. *Arch Oto HNS*, May 2000;126:617-22.
23. Epley J. The canalith repositioning procedure: for treatment of benign paroxysmal positional vertigo. *Otolaryngol Head Neck Surg* 1992; 107:399-404.
24. Nuti D, Nati C, Passali D. Treatment of benign paroxysmal positional vertigo: no need for postmaneuver restrictions. *Otolaryngol Head Neck Surg* 2000;122:440-4.
25. Massoud EA, Ireland DJ. Post-treatment instructions in the nonsurgical management of benign paroxysmal positional vertigo. *J Otolaryngol* 1996;25:121-5.
26. No More Postural Restrictions in Posterior Canal Benign Paroxysmal Positional Vertigo. *Otol Neurotol*. 2008 May 23.
27. Cohen HS, Kimball KT. Treatment on Epley Maneuver for benign paroxysmal positional vertigo. *Am J Otolaryngol* 2004; 25: 33-7.
28. Hall SF, Ruby RRF, McClure JA. The mechanisms of benign paroxysmal vertigo. *J Otolaryngol* 1979;8:151-8.

Estimation of Serum Iron in Oral Submucous Fibrosis Patients and its Comparison with Healthy Controls.

Faisal Hameed*, Irfan Ali**, Zia-ur-Rehman Khan***, Mohammad Aqeel Aslam****, Nabeel Hafeez*****, Syed Mahmood Haider*****, Adil Rizwan*****

ABSTRACT: **OBJECTIVE:** The present study aimed to determine the mean serum iron concentration among subjects with oral submucous fibrosis of different clinical stages and its comparison with healthy controls in our local population here in Karachi Pakistan. **SUBJECTS & METHODS:** 89 clinically diagnosed oral submucous fibrosis and 89 healthy controls were selected from maxillofacial surgery departments of Abbasi Shaheed Hospital and Civil Hospital, Karachi. 5 ml of venous blood was collected using aseptic measures in sterile vials for estimation of serum iron. Serum iron was estimated using calorimetric method using semi-auto analyzer. Means and standard deviations were calculated for serum iron levels in study and control subjects. Statistical analysis was done to determine the association of serum iron with oral submucous fibrosis and its predictability was tested alone and in stepwise method with other independent variables. **RESULTS:** Overall age range was 49 year, while OSF patient's age range was 23 years. Male 88.8% and female were 11.2%. Mean serum iron level differs significantly between patients and controls ($p < 0.05$). OSF patient exhibiting lower serum iron concentration (111.66 ± 18.43) in comparison to healthy controls (122.38 ± 17.04). Serum Iron concentration is also decrease as Functional Stage of OSF increases. Serum iron concentration is also found to be significant as the disease progress towards nil mouth opening, multiple fibrous bands anterior + posterior ($p < 0.05$). OSF which found to be only 8.5% but when combined with age it become 31.2% while age found to be best predictable variable for OSF 28%. **CONCLUSIONS:** Serum iron should be part of routine assessment of OSF patients, as a preventive measure for high-risk groups and strict follow up especially in those people which shows decreased serum iron in order to detect early malignant transformation of OSF into oral squamous cell carcinoma. Iron therapy along with other trace element and vitamins should be started as early as possible to correct the deficient state and getting benefits in overall treatment of oral submucous fibrosis with other treatment modalities. This helps in stopping or decreased further progression of the condition

Key Words : Oral submucous fibrosis, Serum iron, Clinical staging, Paan, Betel quid, Ghutka.

INTRODUCTION : Oral Submucous fibrosis is a pre-malignant, chronic progressive disease of upper aerodigestive tract submucosa which starts from oral cavity, soft palate or faucial pillars, and go on to involve other sub-mucosal areas of upper aerodigestive tract. OSF is clinically characterized by decreased mouth opening, blanching and stiffness of the oral mucosa, burning sensation and hypomobility of soft palate and tongue with decrease gustation. These features are due to pathological fibro elastic transformation of lamina propria, along with juxtaepithelial inflammatory reaction and epithelial atrophy, which leads to stiffness of oral mucosa, causing trismus and difficulty in eating or swallowing^{1,2}. Literature endorse the dose dependent relationship of habits^{3,4}, such as areca nut, ghutka, mawa chewing, its frequency and duration, but there is a need for a modality affording early diagnosis, or predicting worsening or potential for transformation into malignant disease⁵, for which trace elements could be investigated in relation to pre-malignant potential^{5,6,8}. Among many trace elements, copper, iron, selenium, and vitamin C have been investigated. These vital element play vital role in maintaining and functioning of body enzymatic reactions, and disparity of these bio-

chemical markers may be a reason for malignant transformation⁷.

Iron has been recognized as an important element for maturation of epithelium and it is well documented that iron deficiency is associated with epithelial abnormalities in addition to malignancies like post cricoid carcinoma and tumors of the pharynx and mouth⁸.

Serum iron content can be a predictor for the advancement of the condition⁹, and could possibly associated with carcinogenesis or transformation into malignant disease. Thus variation in serum iron concentration can be utilize as an indicator for prognosis and also can help in diagnosing those submucous fibrosis patients which have higher risk of transformation into malignant disease⁹.

It has been postulated that altered serum iron levels were observed among OSMF patients. Thus the present study aimed to determine and compare the serum iron concentration among subjects with oral submucous fibrosis of different clinical stages and healthy controls in our local population here in Karachi Pakistan. **SUBJECTS AND METHODS :** This study was conducted in two department i.e. Department of Oral and Maxillofacial Surgery, Abbasi Shaheed Hospital,

*Oral & Maxillofacial Surgery, Civil Hospital, Karachi. **Oral & Maxillofacial Surgeon, Almawasat Hospital Damam, Saudi Arabia. ***Department of Oral Medicine, Fatima Jinnah Hospital, Karachi, Pakistan. ****Department of Oral Medicine, Behira University Medical & Dental College, Karachi. *****Department of Oral & Maxillofacial Surgery, Mohammad Bin Qasim Medical & Dental College, Karachi. *****Department Oral & Maxillofacial, Surgery Abbasi Shaheed Hospital & KMDC Karachi.

Karachi and Civil Hospital Karachi from January 2009 to December 2014. This study include 89 clinically diagnosed oral submucous fibrosis and 89 healthy controls. Ethical clearance was taken from ethical committee of institute and written informed consent was obtained from all included subjects and controls. All those patients were excluded from study, which were concomitantly suffering from other chronic systemic diseases. Oral submucous fibrosis patients were diagnosed on basis of clinical presentation of disease while control group subjects were taken from outpatient department of hospital which do not had signs and symptom of oral submucous fibrosis and were not indulged rish factor habits and were willing to give informed consent, 5 ml of venous blood was collected using aseptic measures from median cubital vein and sent to laboratory in sterile vials for estimation of serum iron. The blood is allowed to clot at room temperature for 1 to 2 hours and then serum was separated by centrifuging at 3000 rpm for 10 minutes. Serum iron will be estimated using calorimetric method using semi-auto analyzer.

The staging of the OSMF was done according to the criteria of functional grading. Clinical staging was done depending on topography and extent of distribution of bands. Stage 1 subjects had faucial bands while those in stage 2 presented faucial and buccal bands and among individuals in stage 3, faucial, buccal and labial bands were involved. Data was entered and analyzed using Statistical package for Social Sciences (SPSS 19.0, Chicago., IL). Means and standard deviations were calculated for serum iron levels in study and control subjects. Independent samples 't' test was used to compare the mean values of serum iron between the study subjects and control group while one way analysis of variance (ANOVA) was used to assess the significance in difference between the mean iron levels based on the staging of OSMF. Step wise linear regression analysis was executed to assess the influence of various independent variables (age, gender, and iron levels) on the dependent variable (OSF or control group) RESULTS : The overall age range was 49 years with youngest patient was 18 years and oldest one was 67 years of age. Maximum numbers of patients were belonging to 20-30 years age group. Gender distribution was Male 88.8% (79) and female were 11.2% (10)(Fig-2). Mean serum iron level differs significantly between patients and controls ($p < 0.05$). OSF patient exhibiting lower serum iron concentration (111.66 ± 18.43) in comparison to healthy controls (122.38 ± 17.04)(Fig-3). Serum Iron concentration is also decrease as functional stage of OSF increases (Table 1&2). Serum iron concentration in patient who had redness of oral mucosa is only found to be significant as compared to other variables in study 102.71 ± 14.85 ($p < 0.05$), while patients with burning sensation had mean 112.90 ± 21.38 , Serum iron concentration is also found to be significant as the disease progress towards nil mouth opening, multiple fibrous bands anterior + posterior ($p < 0.05$) Stepwise linear regression model analysis performed to determine the predictability of serum iron in determining OSF which found to be only 8.5% but when combined with age it become 31.2% while age found to be best predictable variable for OSF (Table-5).

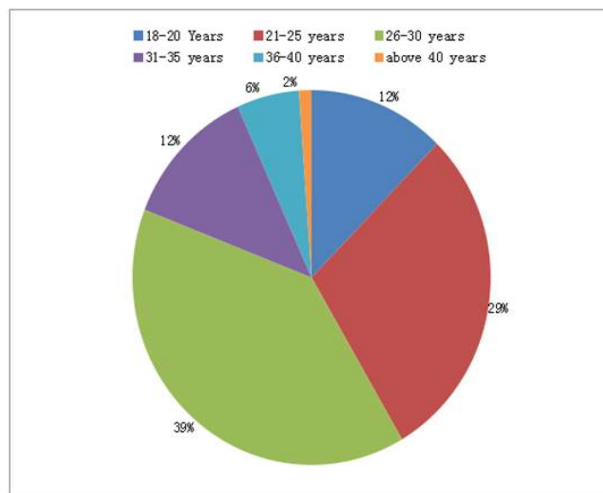


Figure-1 : Stratification of oral submucous fibrosis patients with respect to age.

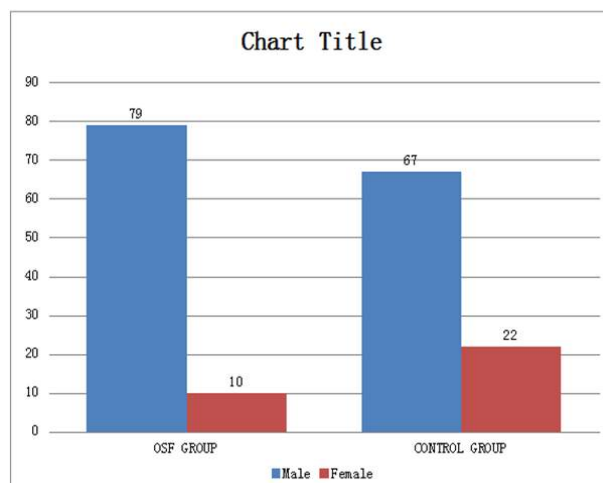


Figure 2 : Gender distribution in study and control groups.

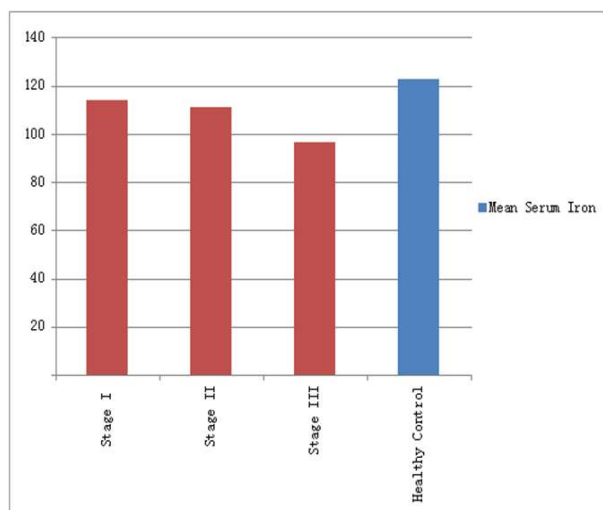


Figure-3 : Estimation of mean Serum Iron concentration with respect to functional staging.

Variables	Case or Control	N	Mean	Std. Deviation	Significance
Serum Iron	Control	89	122.5281	17.33172	Less than 0.001
	Case	89	111.6629	18.43782	

Table-1 : Cross tabulation of Serum Iron with OSF and Healthy Control Groups.

Variables	N	Mean	Std. Deviation	95% Confidence Interval for Mean		Min.	Max
				Lower Bound	Upper Bound		
Stage A Mouth opening more than 20 mm	56	113.87	18.02	109.05	118.69	76	160
Stage B Mouth opening Between 11-19 mm	26	110.92	19.17	103.17	118.66	77	146
Stage C Mouth opening Less than 10 mm	7	96.71	13.06	84.63	108.79	87	119
Total	89	111.66	18.43	107.77	115.54	76	160

Table-2 : Cross tabulation of Serum Iron with respect to functional staging of Oral Submucous Fibrosis.

Variables	N	Mean	Std. Deviation	95% Confidence Interval for Mean		Min.	Max
				Lower Bound	Upper Bound		
Clinical Stage 1 Faucial Bands	12	115.83	18.18	104.27	127.38	82	147
Clinical Stage 2 Buccal + Faucial Bands	38	114.84	18.11	108.88	120.79	76	160
Clinical Stage 3 Labial + Buccal + Faucial Bands	39	107.28	18.35	101.33	113.23	77	146
Total	89	111.66	18.43	107.77	115.54	76	160

Table-3 : Cross tabulation of Serum Iron with respect to Clinical staging of Oral Submucous Fibrosis.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.292a	.085	.080	.48092

a. Predictors: (Constant), Serum iron

Table-4 : Step wise multiple linear regression analysis with Iron levels as independent variable and groups (patients and controls) as dependent variable.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.529a	.280	.276	.42660
2	.559b	.312	.304	.41820

a. Predictors: (Constant), Age

b. Predictors: (Constant), Age, Serum iron

Table-5 : Step wise multiple linear regression analysis with age, gender, and Iron levels as independent variables and groups (patients and controls) as dependent variable.

DISCUSSION : Oral submucous fibrosis prevalence is increasing in Pakistan especially in southern areas due to increased consumption of areca nut, paan chewing as compared to northern areas of Pakistan¹⁰. In Indo-Pak region statistics for OSMF is more than five million individuals¹¹. Several reasons are proposed for rapid rise in disease statistics; among them attractiveness of commercially prepared pan/chalia in Pakistan and an high usage of pan/chalia by younger people due to easy availability, low price and marketing strategies are the possible explanations. The mean age of the Oral submucous fibrosis group in our study was 26.29 years, which is consistent with findings of 26.85 years of Karthik et al⁹. and slightly lower 29.04 years of Katharia et al¹². and 30 years of Maher et al¹³. A male predominance was seen in the subject group with Male 88.8% (n=79) and female were 11.2% (n=10). Serum iron is found

significantly lower in relation to control group i.e. (111.66±18.43) and (122.38±17.04) respectively (p<0.05 - independent t-test) which is consistent with the finding of Tadakamadla J et al. which shows 114.78 ± 23.47 (subjects) and 130.86 ± 31.01 (controls)¹⁴. Predictability of serum iron in progression of oral submucous fibrosis is 8.5% while other variable combination bring with association to 31.2% which is consistent with study by Tadakamadla J et al. i.e. 41.9%. Literature review reveals that pathogenesis of oral submucous fibrosis is a vicious cycle which begins with burning sensation, vesicle formation and later on minor ulceration which render patient to difficult chewing and swallowing (dysphagia), it resulted in decrease daily intake of food and poor nutrition. Decreased Iron concentration in serum (also other traces element) may result in initiation of anemia and altered cell-mediated immunity, which sequentially promote pre-existing submucous fibrosis in lamina propria¹⁵. Decreased factors further promote pathological fibrosis and shows inverse relation with serum iron concentration¹⁶. Hallmark of pathological Fibrosis dictates that OSF is chiefly a condition of collagen metabolism, in which lysyl oxidase upregulation enhances collagen cross-linking which results in development and progression of the condition¹⁷⁻¹⁹. Hydroxyproline in the hydroxylated form in hydroxylation reaction during collagen synthesis requires ferrous iron in addition to other essential elements²⁰⁻³.

LIMITATIONS : Limitations of this study are that we have studied single variable that is serum iron in OSF patients and its comparison was done with healthy people which were not absolutely matched. Other variable should also be investigated in determining the diagnostic and prognostic predictability. The findings of the present study could not be generalized to all the OSMF patients because of the regional and cultural variation that occurs within and between the countries. Further extensive studies with randomized control trials should be done to recognize the overall association between OSF and serum iron variation and also stagewise variation in OSF, which can be used as an indicator of malignant transformation in near future.

CONCLUSIONS : The current study gives emphasis on assessment of serum iron among patients with oral submucous fibrosis. Serum iron should be part of routine assessment of OSF patients, as a preventive measure for high-risk groups and strict follow up especially in those people which shows decreased serum iron in order to detect early malignant transformation of OSF into Oral squamous Cell Carcinoma. It is suggested that iron therapy along with other trace element and vitamins should be started as early as possible to correct the deficient state and getting benefits in overall treatment of oral submucous fibrosis with other treatment modalities. This helps in stopping or decreased further progression of the condition.

REFERENCES :

1. Pindborg JJ, Sirsat SM. Oral Submucous Fibrosis. Oral Surg Oral Med Oral Pathol. 1966;22:764-79.
2. Mehrotra R, Pandya S, Chaudhary AK, Singh HP, Jaiswal RK, Singh M, et al.. Lipid profile in oral submucous fibrosis. Lipids Health Dis. 2009;8:29.
3. Tilakaratne WM, Klinikowski MF, Saku T, Peters TJ, Warnakulasuriya S. Oral submucous fibrosis: review on aetiology and pathogenesis. Oral Oncol. 2006;42:561-8.

4. Zhang X, Li C, Liao Q, Reichart PA. Areca chewing in Xiangtan, Hunan province, China: interviews with chewers. *J Oral Pathol Med.* 2008;37:423-9.
5. Kumar K, Saraswathi TR, Ranganathan K, Devi M U, Elizabeth J. Oral submucous fibrosis: a clinico-histopathological study in Chennai. *Indian J Dent Res.* 2007;18:106-11.
6. Margalioth EJ, Schenker JG, Chevion M. Copper and zinc levels in normal and malignant tissues. *Cancer.* 1983;52:868-72.
7. Khanna SS, Karjodkar FR. Circulating immune complexes and trace elements (Copper, Iron and Selenium) as markers in oral precancer and cancer : a randomised, controlled clinical trial. *Head Face Med.* 2006;2:33.
8. Prime SS, MacDonald DG, Rennie JS. The effect of iron deficiency on experimental oral carcinogenesis in the rat. *Br J Cancer.* 1983;47:413-8.
9. Karthik H, Nair P, Gharote HP, Agarwal K, Bhat GR, Rajaram DK. Role of Hemoglobin and Serum Iron in Oral Submucous Fibrosis: A Clinical Study. *Scientif World J.* 2012;2012:1-5.
10. Haider SM, Merchant AT, Fikree FF, Rahbar MH. Clinical and functional staging of oral submucous fibrosis. *Br J Oral Maxillofac Surg.* 2000;38:12-5.
11. P. V. Angadi and S. S. Rao. Areca nut in pathogenesis of oral submucous fibrosis: revisited. *Oral Maxillofac Surg.* 2011;10:1-9.
12. Katharia SK, Singh SP, Kulshreshtha VK. The effects of placenta extract in management of oral submucous fibrosis. *Indian J Pharmacol.* 1992;24:181-3.
13. Maher R, Aga P, Johnson NW, Sankaranarayanan R, Warnakulasuriya S. Evaluation of multiple micronutrient supplementation in the management of oral submucous fibrosis in Karachi, Pakistan. *Nutrition Can.* 1997;27(1):41-7.
14. Tadakamadla J, Kumar S, Mamatha GP. Evaluation of serum copper and iron levels among oral submucous fibrosis patients. *Med Oral Patol Oral Cir Bucal.* 2011;16(7):870-3.
15. Ahmad M, Ali S, Ali A, Chaubey K. Epidemiological and etiological study of oral submucous fibrosis among gutkha chewers of Patna, Bihar, India. *J Ind Society Pedodon Preventive Dent.* 2006;24(2):84-9.
16. Rajendran R, Vijayakumar T, Vasudevan DM. An alternative pathogenetic pathway for oral submucous fibrosis (OSMF). *Med Hypotheses.* 1989;30(1):35-7.
17. Khanna SS, Karjodkar FR. Circulating immune complexes and trace elements (Copper, Iron and Selenium) as markers in oral precancer and cancer : a randomised, controlled clinical trial. *Head Face Med.* 2006;2:33.
18. Trivedy C, Warnakulasuriya KAAS, Hazarey VK, Tavassoli M, Sommer P, Johnson NW. The upregulation of lysyl oxidase in oral submucous fibrosis and squamous cell carcinoma. *J Oral Pathol Med.* 1999;28(6):246.
19. Shettar SS, Mubin. Estimation of Serum Copper and Zinc Levels in Patients with Oral Submucous Fibrosis. *Journal Ind Academy Oral Med Rad.* 2010;22(4):193-6.
20. Nayak AG, Chatra L, Shenai PK. Analysis of Copper and Zinc Levels in the Mucosal Tissue and Serum of Oral Submucous Fibrosis Patients. *World J Dent.* 2010;2(1):75-8.
21. Balpande AR, Sathawane RS. Estimation and Comparative Evaluation of Serum Iron, Copper, Zinc and Copper/Zinc Ratio in Oral Leukoplakia, Submucous Fibrosis and Squamous Cell Carcinoma. *J Ind Acad Oral Med Rad.* 2010;22(2):73-6.
22. Shivakumar. G.C, Sahana. S.. Clinical Staging of Oral Submucous Fibrosis: A Review. *Int J Oral Med Sci.* 2011; 10(3):216-9.
23. Guruprasad R, Nair PP, Singh M, Singh M, Singh MP, Jain A.. Serum vitamin C and iron levels in Oral Submucous Fibrosis. *Indian J Dent.* 2014;5(2):81-5.

Computed Tomography of Paranasal Sinuses-An Important Guideline for Endoscopic Sinus Surgery

Kiran Rao

ABSTRACT: A prospective study conducted on 50 patients in SGRD Institute of Medical Sciences & Research Amritsar, suffering from paranasal sinus diseases. This study correlated the findings of Computed Tomography (CT) using Siemens somatom emotion 6 slice CT machine with diagnostic nasal endoscopy or functional endoscopic sinus surgery (FESS). Infection of the paranasal sinuses is very common. Surgical clearance of these chronically infected sinuses while maintaining their ventilation and drainage is the treatment of choice. To achieve this goal, there should be some diagnostic modality which guides us towards exact diagnosis and safe intervention. CT proves to be the most reliable method of preoperative assessment of patients undergoing functional endoscopic sinus surgery (FESS). As it delineates the extent of the disease, define any anatomical variants and relationship of the sinuses with the surrounding important structures. Thus providing a road map for sinus surgery. This study proved that CT is the modality of choice for evaluation and planning the management of symptomatic patients of paranasal sinus pathologies.

Key Words : Paranasal sinus pathology , Conventional plain radiography, CT Scan, Diagnostic nasal endoscopy, Functional endoscopic sinus surgery.

INTRODUCTION : Pathological lesions of the paranasal sinuses include a wide spectrum of conditions ranging from inflammation to neoplasms; both benign and malignant. These sinuses are in close anatomical relationship with orbit, cranial fossa and pterygopalatine fossa. Hence early involvement of these areas is an important feature. Since clinical assessment is hampered by the surrounding bony structures, diagnostic radiology is of paramount importance¹. While conventional plain radiography readily demonstrates maxillary and frontal sinus disease. They provide limited views of the anterior ethmoid cells, the upper two thirds of the nasal cavity and the frontal recess². Computed Tomography (CT) imaging provides detailed information of the paranasal sinuses and is now well established as an alternative to standard radiographs³. CT scan has become modality of choice for evaluation of paranasal sinuses pathologies as it optimally displays bony details, air and outlines soft tissue as well. Infection of the paranasal sinuses is one of the commonest cause of patients visit to the otorhinolaryngologist. Surgical clearance of these chronically infected sinuses while maintaining their ventilation and drainage is the treatment of choice. To achieve this goal, there should be some diagnostic modality which guides us towards exact diagnosis and safe intervention. Over past decade, both CT and nasal endoscopy have been used successfully as diagnostic modality in sinus disease. The principle of the surgery should be oriented towards opening up any restriction which might impair natural mucociliary clearance. To perform functional endoscopic sinus surgery effectively and safely, the surgeon must have detailed knowledge of the anatomy of the lateral nasal wall, paranasal sinuses and surrounding vital structures. CT proves to be the most reliable method of preoperative assessment of patients undergoing endoscopic surgery as it delineates the extent of the disease, defines any anatomical variants and relationship of the sinuses with the surrounding important structures - thus providing a road map for

sinus surgery. As a rule, surgeons individualize their surgical approach according to the amount and location of disease they see on CT scan. Endoscopic techniques for paranasal sinus surgery have allowed detailed and complete visualization of sinus disease while promising minimum distress to the patient. The telescopic view shows detail of the sinus anatomy and its disease. It has been possible to see areas of the cribriform plate and orbital wall that are at risk to produce cerebrospinal fluid rhinorrhea and orbital complications during the surgery. Combination of diagnostic endoscopy and systematic understanding of the lateral nasal wall with CT in the coronal plane has become the corner stone in the evaluation of the paranasal sinuses disease⁴. This is the basis of the new concept of Functional Endoscopic Sinus Surgery.

AIMS AND OBJECTIVES :

1. To diagnose the various pathologies of paranasal sinuses like inflammatory disease, neoplasms and other miscellaneous conditions.

2. To correlate the findings of CT with those of Functional Endoscopic Sinus Surgery (FESS) /diagnostic endoscopy.

SUBJECTS AND METHODS:

A prospective study correlating findings of CT in paranasal sinus diseases with diagnostic endoscopy or FESS was conducted on 50 patients in the Department of Radiodiagnosis, SGRDIMS&R Amritsar in conjunction with Department of ENT, SGRDIMS & R, Amritsar.

Patients who attended the ENT outpatient department with symptoms like postnasal discharge, nasal obstruction, heaviness in the head or dull ache over sinus, anosmia, constitutional symptoms like malaise, mental apathy, recurrent sore throat, chronic cough, eustachian tube dysfunction etc. were first diagnosed for paranasal sinuses pathology with plain radiograph. Patients with positive findings and who were willing to undergo CT Scan, diagnostic nasal endoscopy/ FESS were included in the study. While doing CT scan slices of 1.25 mm were taken in axial planes. Coronal sections

were reconstructed as osteomeatal complex was best displayed by coronal plane. The anatomy in coronal plane is depicted in a way similar to what surgeon see as the nasal vault is approached with an endoscope. Contrast agent Omnipaque was used if indicated, at a calculated dose of 300 mg/kg weight as a single intravenous bolus injection after serum creatinine level was estimated.

The severity of paranasal sinus disease on Computed tomography findings was graded as:

Grade 0 : Less than 2 mm mucosal thickening on any sinus wall.

Grade 1 : All unilateral disease or anatomic abnormalities.

Grade 2 : Bilateral disease limited to the ethmoid or maxillary

Grade 3 : Bilateral disease with involvement of at least one sphenoid or frontal sinus.

Grade 4 : Pansinus disease.

This grading system was used for grading the disease according to CT SCAN findings. In this study CT findings were entered in the patient proforma.

0 Point	No abnormality
1 Point	Partial opacification
2 Points	Total opacification

Table-1 : Lund-Mackay staging system for chronic rhinosinusitis.

SINUS	No.	Partial	Total
	Abnormality	Opacification	Opacification
Ant. Ethmoid:	R 0	1	2
	L 0	1	2
Post. Ethmoid:	R 0	1	2
	L 0	1	2
Maxillary:	R 0	1	2
	L 0	1	2
Frontal:	R 0	1	2
	L 0	1	2
Sphenoid:	R 0	1	2
	L 0	1	2
	Not Obstructed	Obstructed	
Osteomeatal	R 0	2	
Complex:	L 0	2	

Table-2 : Total Score recorded to show the severity of inflammatory disease.

RESULTS :

Tasks force on Rhino sinusitis sanctioned by the American Academic of Otolaryngology used Lund - Mackay CT staging system by scoring method. This same staging system was used in our study as reference (Table-1&2). Endoscopic sinus surgery tailored according to the CT scan was carried out. Any polypoidal or mass lesions were debrided or biopsied for histopathological examination and fungal culture in selected cases. CT paranasal sinuses findings were correlated with diagnostic nasal endoscopic/ Functional endoscopic sinus surgery findings. Sensitivity and specificity of CT findings were calculated using Functional Endoscopic Sinus Surgery findings as standard.

50 patients. 8 patients were less than 20 years of age. 11 patients were between 21-30 years. 11 patients were between 41-50 years of age. Highest number of patients were in the range of 31-40 yrs. Youngest patient was 8 yrs and eldest patient was 85 years old (Fig-1). In present study, 24 (48%) of total patients were females and 26 (52%) of patients were males. Most of the patients had

nasal obstruction (60%) followed in decreasing order by headache (56%), nasal discharge (52%). The least common complaint was swelling in facial region.

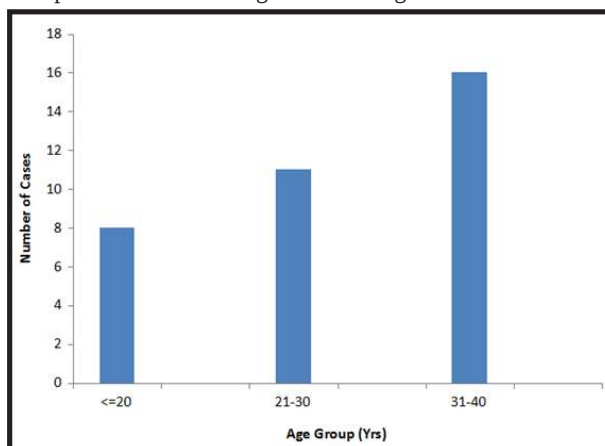


Figure 1 : Age distribution of patients studied.

Investigations	Number (N = 50)	Percentage %
Deviated Nasal Septum	28	56
No	11	22
Left	11	22
Right	22	44
Total		
Concha bullosa	41	82
No	5	10
Left	1	2
Right	3	6
Bilateral	9	18
Total		
Osteomeatal complex obstruction		
No	8	16
Left	15	30
Right	6	12
Bilateral	21	42
Total	42	84

Table-3 : Distribution of lesions according to CT paranasal sinuses.

Various pathologies of paranasal sinuses on CT scan were observed. Deviated nasal septum was seen in 22 (44%) patients with equal number of cases showing deviation on either side. Concha bullosa was noted in 9(18%) patients with unilateral left sided predominance. Osteomeatal complex obstruction was observed in 42(84%) patients with bilateral involvement seen in 21(42%) patients. Most commonly diseased sinus was anterior ethmoid sinus, followed in decreasing order were maxillary, posterior ethmoid, frontal and sphenoid sinuses (Table-3). Severity of inflammatory disease and grading is done. CT severity was assessed in 43 patients who had inflammatory diseases. Maximum number 16 (37.2%) of patients had grade 1 severity while grade 0 severity was found in none of the patients, least common was grade 2 seen in 6 (14%) of patients (Figure-2).

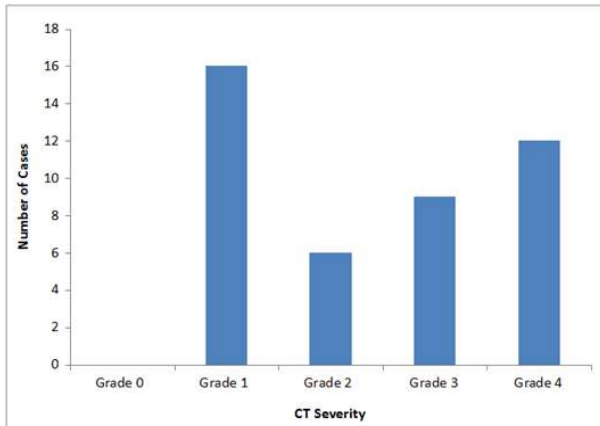


Figure 2 : Ct Severity Grading of Inflammatory Diseases.

Amongst the patterns of inflammatory disease on CT. Sinonasal polyposis(SNP) was the most common type of pattern involved (40%), followed by osteomeatal unit(OMU), infundibular, sporadic and sphenoethmoid recess(SER) patterns in decreasing order of involvement. Least common was sphenoethmoid type seen in 2% of cases (Fig-3). Endoscopic / Functional endoscopic sinus surgery findings were similar to CT findings in 44 (88%) patients and different from CT findings in 6(12 %) patients. These different findings were related to either fungal disease or inspissated secretions (Table-4). Is showing Lund Mackay scores of inflammatory diseases Maximum number 14 (32.6%) of patients had Lund Mackay scores between 11-15 and minimum number 6 (14%) each of patients had scores between 16-20 and 21-24. On correlating CT diagnosis with final diagnosis, chronic sinusitis has 86% sensitivity and 96.5% specificity. Polyps have sensitivity of 96.15% and specificity of 95.83%. Again for fungal sinusitis CT has lower sensitivity of 71.4% and specificity of 93.02% (Table-5). DISCUSSION : It is now generally accepted that CT is the optimum imaging method of demonstrating simple inflammatory disease to neoplasms in the paranasal sinuses⁵. Clinical assessment can be used to evaluate acute sinus infection and CT is used for the investigation of persistent and chronic sinus disease refractory to medical therapy. CT evaluates the osteomeatal complex

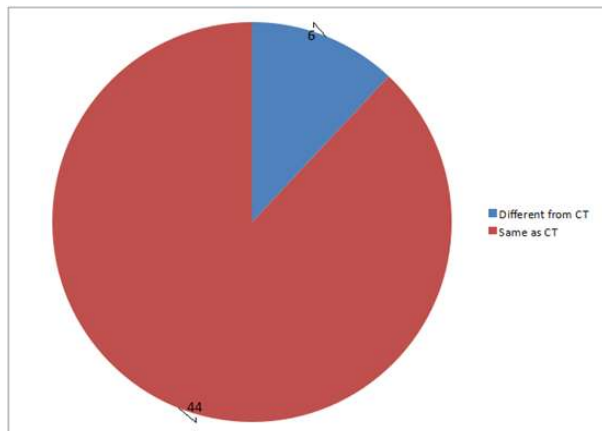


Figure 4 : Nasal Endoscopy/Functional Endoscopic Sinus Surgery Findings.

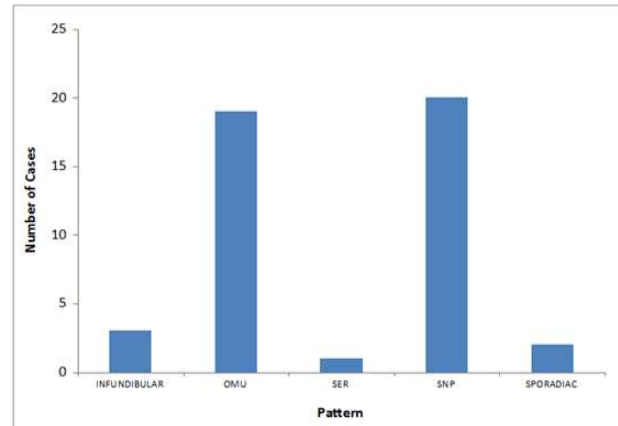


Figure 3 : Patterns of Inflammatory Disease on CT.

anatomy which is not possible with plain radiographs⁶. Removal of disease from osteomeatal complex region is the basic principle of Functional Endoscopic Sinus Surgery which is best appreciated on CT scan. This study was carried out to evaluate the pathological lesions of the paranasal sinuses by CT. A total of 50 patients were evaluated with CT Scan who were referred after clinical assessment and then correlated with diagnostic endoscopic/ Functional Endoscopic Sinus Surgery. In present study the patients age ranged between 8-85 years which was consistent with study done by Prabhakar S and others⁷. Maximum number of patients were aged between 31-40yrs. In present study 48% patients were females and 52% patients were males which was consistent with the study by Kirtane MV and others⁸. Deviated nasal septum was seen in 22 of 50 patients constituting 44%. Right deviated nasal septum was seen in equal no. of patients as left deviated nasal septum. Concha bullosa was seen in 9 (18%) patients and in literature it varied between 16-53%^{9,10}. Osteomeatal unit were involved in 42 (84%) patients and bilateral involvement was seen in more number of patients than unilateral involvement. Hence, the overall incidence of

Lundmackay Score	Number (N = 43)	Percentage %
≥5	7	16.3
6-10	10	23.3
11-15	14	32.6
16-20	6	14
21-24	6	14
Total	43	100
Mean ± SD	12.09+/-6.20	

Table-4 : Lundmackay score showing severity of inflammatory paranasal sinus diseases

Parameters	Sen.	SP.	PPV	NPV	ACCURACY
Chronic Sinusitis	86	96.5	94.7	90.32	92
Polyp	96.15	95.83	96.15	95.83	96
Fungal Sinusitis	71.4	93.02	62.5	95.23	90
Others	100	100	100	100	100

Table-5 : Correlation of CT with final diagnosis.

inflammatory disease in the Osteomeatal complex in symptomatic patients was no different with and without concha bullosa. Similar findings were observed in study by Maru YK, Gupta Y¹¹.

Most common sinus involved was anterior ethmoid sinus in 38 (76%) patients, followed by maxillary, posterior ethmoid, frontal and sphenoid sinuses in decreasing order. Studies in literature observed involvement of anterior ethmoid sinus and maxillary sinus more commonly⁷. Present study correlates well with former study, where the number of patients studied were 60 and all patients underwent Functional endoscopic sinus surgery. In all the studies sphenoid was least involved, which is also observed in this study (48%). Sinonasal polyposis was the most common type of pattern involved, followed by osteomeatal unit, infundibular, sporadic and sphenoethmoid recess patterns in decreasing order of involvement¹²⁻³. The CT severity assessed for 43 patients with inflammatory diseases showed highest number of patients with grade 1 ie 16 (37.2%) patients and lowest with grade 0 ie 0(0%) patient. Lund MacKay score between 11-15 was observed in most number of patients 14(32.6%). The mean score observed was 12.09+/- 6.20. Greatest pitfall in diagnosis of paranasal sinus diseases by CT is the fungal sinusitis. In this study 8 patients were studied among which 5 (71.4%) were diagnosed correctly and others were not diagnosed on CT. The sensitivity was 71.4% and specificity was 93.02% for CT to diagnose fungal sinusitis. The sensitivity described in literature was 76% by Zinreich SJ et al which was a retrospective study¹⁴. Endoscopic findings were almost all correlated with CT findings except in Fungal sinusitis. The findings of CT were similar to diagnostic endoscopy/FESS findings in 44 (88%) of patients and different in 6 (12%) patients. All the false positives or false negatives were related to fungal sinusitis. Except the fungal sinusitis, sensitivity and specificity of CT was high. On correlating CT diagnosis with final diagnosis, chronic sinusitis has 86% sensitivity and 96.5% specificity¹². Polyps have sensitivity of 96.15% and specificity of 95.83%¹³. Again for fungal sinusitis CT has lower sensitivity of 71.4% and specificity of 93.02%^{14,15}. For diagnosing benign and malignant lesions CT has 100% sensitivity, specificity, positive predictive value and negative predictive value with 100% accuracy¹⁶. This high sensitivity and specificity for benign and malignant masses could be due to small number of masses evaluated. Thus, CT plays an important role in diagnosing and also adding important findings for the better management of the patients with paranasal sinus diseases. It is cost effective and less time consuming modality compared to MRI, CT is the modality of choice¹⁷.

CONCLUSION: To conclude, this study proved that CT is the modality of choice for evaluation and planning the management of symptomatic patients of paranasal sinus pathologies. Fungal sinusitis and dense secretions are potential pitfalls on CT to differentiate them. It is the modality of choice in evaluating the bone erosion or destruction. CT evaluation of Paranasal sinus pathology in symptomatic patients helps in planning the further management of the patient.

REFERENCES:

1. Parsons C, Hodson N. Computed Tomography of paranasal sinus tumours. *Radiology*. Sep. 1979;132:641-5.
2. Zinreich SJ. Paranasal sinus imaging. *Otolaryngology head neck surgery*. 1990;130:863.
3. White PS, Cowan IA, Robertson MS. Limited CT scanning techniques of the paranasal sinuses. *The journal of laryngology and otology*. Jan. 1991;105:20-3.
4. Shroff MM, Shetty PG, Navani SB, Kirtane MV. Coronal screening sinus CT in inflammatory sino-nasal disease. *IJRI*. 1996;6:3-17.
5. Venkatachalam VP, Bhat A. Functional endoscopic sinus surgery- A newer surgical concept in the management of chronic sinusitis. *Indian Journal of Otolaryngology and Head and Neck surgery*. Dec. 1999;52(1):13-22.
6. Gliklich RE, Metson R. Techniques for Outcomes Research in Chronic Sinusitis. *Laryngoscope*. Apr. 1995;105:387-90.
7. Prabhakar S, Mehra YN, Talwar P, Mann SBS, Mehta SK. Fungal infections in maxillary sinusitis. *Indian Journal of Otolaryngology and Head and Neck*. June 1992;1(2):54-8.
8. Kirtane MV. Functional endoscopic sinus surgery (A preliminary study). *Indian Journal of otolaryngology*. 1991;43:126-9.
9. Asruddin, Yadav SPS, Yadav RK, Singh J. Low dose CT in chronic sinusitis. *Indian Journal of Otolaryngology and Head and Neck surgery*. Mar. 2000;52(1):17-22.
10. Lloyd GAS, Lund VJ, Scadding GK. CT of the paranasal sinuses and functional endoscopic surgery: a critical analysis of 100 symptomatic patients. *The Journal of Laryngology and Otology*. Mar. 1991;105:181-5.
11. Maru YK, Gupta Y. Concha bullosa: Frequency and appearances on sinonasal CT. *Indian Journal of Otolaryngology and Head and Neck surgery*. Mar. 2000;52(1):40-4.
12. Bhattacharyya N and Jones DT. The diagnostic accuracy of computed tomography in chronic rhinosinusitis. *Arch Otolaryngol Head Neck Surg*. Sep. 2004;130(9):1029-32.
13. Younis RT, Anand VK, Davidson B. The role of computed tomography and magnetic resonance imaging in patients with sinusitis with complications. *Laryngoscope*. Feb. 2002;112(2):224-9.
14. Zinreich SJ, Kennedy DV, Malat J. Fungal sinusitis: diagnosis with CT and MR imaging. *Radiology*. 1988;169:439-44.
15. Dhong HJ, Jung JY, Park JH. Diagnostic Accuracy in Sinus Fungus Balls: CT Scan and Operative Findings. *American Journal of rhinology*. Aug. 2000;14(4):227-30.
16. Matsubara K. Application of CT in diagnosing carcinoma of the maxillary sinuses. *AJ med*. 1982;44:57-67.
17. Aygun N and Zinreich SJ. Imaging for functional endoscopic sinus surgery. *OCNA*. 2006;39:403-16.

Role of Pre-operative High Resolution Computed Tomography of Temporal Bone in Squamous Chronic Otitis Media

Vanita Sarin, Tanya Kaur, Arvinder Singh Sood

ABSTRACT: **OBJECTIVE :** To study the role of High Resolution Computed Tomography (HRCT) of temporal bone as a diagnostic tool for pre-operative surgical management in cases of squamous chronic otitis media. **PATIENTS AND METHODS:** This pro-spective study included 40 patients of a tertiary care centre, their pre-operative HRCT temporal bone was compared with their peroperative findings to evaluate the accuracy, sensitivity and specificity of HRCT temporal bone in squamous chronic otitis media. **RESULT:** HRCT temporal bone is an excellent modality for diagnosing scutum erosion and presence of soft tissue mass in the middle ear cleft, it is good for diagnosing ossicular necrosis, tegmen erosion and lateral semicircular canal fistula. It's a poor diagnostic modality for facial nerve dehiscence and bony external canal erosion. **CONCLUSION :** The sensitivity, specificity and positive predictive value of HRCT temporal bone depends on the anatomical structures implicated in squamous chronic otitis media.

Key Words : HRCT temporal bones, Squamous chronic otitis media, Pre-operative, Per-operative.

INTRODUCTION : Chronic Otitis Media (COM) is the term used to describe any chronic inflammatory pathology of the middle ear. The relatively poor standards of living in developing countries lead to a higher incidence of COM. Chronic otitis media has been an important cause of middle ear disease since prehistoric times. Despite the valuable contribution of antibiotics, COM remains a common disease and its complications are challenging for both otologists and radiologists. Cholesteatoma is a non-malignant destructive lesion of the middle ear cleft who's short and long term sequelae may be devastating, the reason being the strategic location of the tympanomastoid compartment, separated from the middle and posterior cranial fossa by very thin bony partitions. Squamous type COM has the potential for intracranial and extracranial extension. Hence, it becomes very important to know the location and extent of the disease before proceeding to surgical treatment. Radiological examination of the temporal bone helps us to achieve this objective. It is the computed tomography (CT) which has made the most important contribution to radiology in otolaryngology. Though otitis media is essentially a clinical diagnosis but high resolution computed tomography (HRCT) is useful for showing evidence of bony erosion in acute and chronic mastoiditis, extent of pneumatization of the temporal bone and relationship of the pathology to adjacent critical neurovascular structures such as the dura, internal carotid artery, lateral sinus and facial nerve¹. It is now being claimed that a cholesteatoma, as small as 3mm in size can be diagnosed much earlier by the use of HRCT and also for a cholesteatoma behind an intact eardrum, imaging is important. The main benefit of HRCT comes in cases where the cholesteatomas were combined with scarring granulation tissue or post surgical changes in which the resulting soft tissue masses were indistinguishable. One set of conditions in which the indication of pre-operative scanning is quite clear when there are central nervous system complications of COM. Other reasonable uses of HRCT scanning include pre-operative facial paralysis, vertigo with positive fistula

test and when revision mastoidectomy is contemplated in the absence of details of the previous procedure. Its ability to determine the extent of soft tissue involvement of the antrum, middle ear and especially the posterior tympanic spaces may assist the surgeon in planning the extent of surgical procedure. Therefore, HRCT helps in guiding the ideal approach for surgery as well as emphasizing the need for surgery by revealing the extent of disease. Few authors recommend scanning as routine prior to all mastoid surgeries but others still feel it as an unnecessary financial burden on the patient. HRCT has a significant impact on the medical and surgical management of individuals with middle ear disease. It confirms and expands upon otoscopic findings, resolves clinical doubts, and in many circumstances, plays a significant role in determining surgical efficacy. However, routine HRCT scanning prior to all surgery of cholesteatoma can only be justified if it can be shown to influence clinical management. The routine use of CT was recommended in children, medically unfit patients, only or better hearing ears, patients in whom the tympanic membrane could not be adequately visualized, patients who have had previous mastoid surgery with no operative records and in patients with intratemporal and intracranial complications of the disease^{1,2}. Since a considerable number of patients with squamous COM, with/without cholesteatoma attend services of our hospital, it was felt necessary to study in detail, the HRCT evaluation of squamous COM. In this study, we evaluated the role of HRCT in squamous chronic otitis media, and compared the per-operative findings on surgery with the pre-operative HRCT findings, thereby implicating the usefulness of HRCT as an important tool for pre-operative assessment of patients of squamous type COM and yielding anatomical details imperative for surgery. To this objective, the present study was conducted to evaluate how accurately HRCT scanning could define the extent and severity of the underlying disease in patients with squamous type COM, thereby altering the surgical plan and outcome. Thus, this study aims to study the sensitivity and specificity of pre-

operative HRCT temporal bone in squamous type chronic otitis media.

PATIENTS AND METHODS : This prospective study included 40 patients of a tertiary care centre aged 8-70 years clinically diagnosed with squamous COM. It excluded patients with mucosal COM. All these patients underwent a pre-operative HRCT, Temporal Bone using Siemens Somatom Emotion 6 machine. Reformatting was done to a slice thickness of 0.69 mm. These patients then underwent mastoidectomy by senior faculty and the surgical findings were recorded and compared with pre-operative HRCT findings of the microanatomical structures of the middle ear cleft which included extent of the soft tissue in the middle ear cleft, degree of ossicular necrosis (malleus, incus, stapes), erosion of lateral semicircular canal, facial nerve dehiscence, tegmen and scutum erosion and erosion of the external auditory canal.

RESULTS : In our prospective study of 40 patients, 55% were females. The commonest age group involved in both males and females was 11-20 years group. 40% patients were found to be in this category. Ear discharge was the most common presenting symptom (97.5%) followed by hearing loss (80%). Less common symptoms were otalgia (25%), tinnitus (22.5%), vertigo (15%), headache (5%), facial paresis/ paralysis (5%) and nasal obstruction (2.5%). The most common presenting group of symptoms was the combination of ear discharge and hearing loss (37.5%). HRCT reported soft tissue density in the middle ear cleft in 35 patients, all correctly diagnosed i.e. there were no false positives. Soft tissue in the middle ear cleft was found in 37 patients intra-operatively which infers that HRCT missed 2 cases i.e. there were 2 false negative cases bringing the true positive count to 35 (Table-1). The sensitivity and specificity of HRCT for diagnosing soft tissue in the middle ear cleft pre-operatively was 94.59% and 100% respectively $p=0.157$ (Fig-1). Malleus necrosis was present in 20 patients intra-operatively while HRCT diagnosed the same in 19. This entity was over diagnosed by HRCT in 2 patients (false positives) and under diagnosed in 3 (false negatives). So the true positive count was 17 and the true negatives were 18 (Table-1) The sensitivity and specificity of HRCT for diagnosing malleus necrosis pre-operatively was 85% and 90% respectively. $p=0.655$ (Fig-1). Intra-operative incus necrosis was present in 31 patients. HRCT diagnosed the same in 28 patients with 3 false positives, missing this finding in 6 patients (false negatives). Thus the true positive count came down to 25 and true negative count to 6 (Table-1). The sensitivity and specificity of HRCT for diagnosing incus necrosis pre-operatively was 80.65% and 66.67% respectively. $p=0.317$. HRCT diagnosed 18 patients as having stapes

necrosis. The finding was confirmed in 15 patients intra-operatively with HRCT missing the necrosis in 7 patients (false negative) and over diagnosing it in 10 patients (false positive). The true positive count was 8 and true negatives were 15. The sensitivity and specificity of HRCT for diagnosing stapes necrosis pre-operatively was 53.3% and 60% respectively. $p=0.467$. Lateral SCC erosion was a feature that was seen in 4 patients on HRCT while present only in 2 intra-operatively. HRCT was accurate for 1 patient (true positive) who had this feature and for 35 patients (true negatives) who did not have this feature. The false positive counts for lateral SCC erosion were 3 and false negative count was 1. The sensitivity and specificity of HRCT for diagnosing lateral SCC erosion pre-operatively was 50% and 92.11% respectively. $p=0.317$. 19 patients had a dehiscent facial nerve intra-operatively. HRCT claimed the dehiscence in 6. There were 6 true positives, 21 true negatives. There were no false positives and 13 false negatives. Thus facial nerve dehiscence was a feature that was underdiagnosed by HRCT in 13, but was not over diagnosed in any. The sensitivity and specificity of HRCT for diagnosing facial nerve dehiscence pre-operatively was 31.58% and 100% respectively. $p=0.000$. Tegmen erosion was seen in 3 patients intra-operatively and was diagnosed in 6 patients intra-operatively. There was 1 true positive and 32 true negative cases. HRCT over diagnosed tegmen erosion in 5 patients (false positives) and under diagnosed the same in 2 patients (false negatives). The sensitivity and specificity of HRCT for diagnosing tegmen erosion pre-operatively was 33.33% and 86.49% respectively. $p=0.257$. During surgery, we found an eroded scutum in 29 patients. The same was

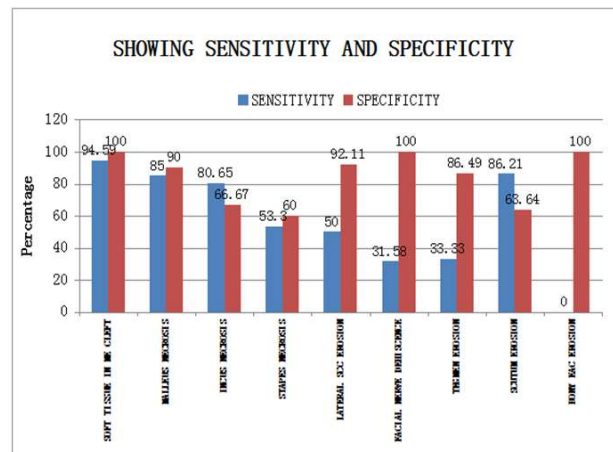


Figure 1 : Age distribution of patients studied.

S. No.	Feature	On HRCT n = 40	Intra-operative n = 40	False positives	False negatives	Sensitivity	Specificity	Positive predictive value	Negative predictive value	p value
1	Soft tissue in ME cleft	35 (87.5%)	37 (92.5%)	0	2	94.59%	100%	100%	60%	0.157
2	Malleus necrosis	19 (47.5%)	20 (50%)	2	3	85%	90%	89.47%	85.71%	0.655
3	Incus necrosis	28 (70%)	31 (77.5%)	3	6	80.65%	66.67%	89.29%	50%	0.317
4	Stapes necrosis	18 (45%)	15 (37.5%)	10	7	53.3%	60%	44.44%	68.18%	0.467
5	Lateral SCC erosion	4 (10%)	2 (5%)	3	1	50%	92.11%	25%	97.22%	0.317
6	Facial nerve dehiscence	6 (15%)	19 (47.5%)	0	13	31.58%	100%	100%	61.76%	0.000
7	Tegmen erosion	6 (15%)	3 (7.5%)	5	2	33.33%	86.49%	16.67%	94.12%	0.257
8	Scutum erosion	29 (72.5%)	29 (72.5%)	4	4	86.21%	63.64%	86.21%	63.64%	1.000
9	Bony EAC erosion	0 (0%)	5 (12.5%)	0	5	0%	100%	-	87.50%	0.025

Table-1 : Age distribution of patients studied.

the number diagnosed by HRCT. But of these 29, HRCT diagnosed accurately only in 25. There were 4 false positives and 4 false negatively diagnosed patients. The sensitivity and specificity of HRCT for diagnosing scutum erosion pre-operatively was 86.21% and 63.64% respectively. $p=1.000$. HRCT missed all 5 cases of bony external auditory canal erosion that were found intra-operatively, thus there were no false positive and false negative cases. The sensitivity and specificity of HRCT for diagnosing bony EAC erosion pre-operatively was 0% and 100% respectively. $p=0.025$. HRCT of temporal bone delineates the bony and the soft tissue anatomy with high accuracy. It is an excellent modality for diagnosing scutum erosion which is an earliest and confirmatory sign of presence of an attic cholesteatoma. HRCT has an added advantage in revision surgery and its complications.

DISCUSSION : Historically, mastoid surgery has been undertaken with otoscopy, audiometry and possible plain X-ray as the only pre-operative investigation. The advent of HRCT in 1980 has allowed excellent pre-operative imaging of anatomy, evidence of extent of disease and a screening for asymptomatic complications. It has however, not gained wide acceptance as an essential aid in planning surgery as most otologists reserve pre-operative scanning for selected cases such as squamous COM with complications, suspected congenital abnormalities or with loss of landmarks due to previous surgery. However, routine HRCT scanning prior to all surgeries for squamous COM can be justified only if it can be shown to influence the clinical management, thus helping to convert a surgical exploration into a planned procedure to a significant extent. In the present study named "Role of pre-operative HRCT temporal bone in squamous chronic otitis media", the age of patients varied from 9-65 years with maximum number of cases presenting between 11-20 years age group (40%). With reference to national and international studies, the commonest age group involved was similar and females were affected more than males^{4,5}. Though squamous COM has various clinical presentations, the most frequently reported symptom in our study was ear discharge in 97.5% patients followed by hearing loss in 80% and otalgia in 25% cases. Other less frequent symptoms were tinnitus in 22.5%, vertigo in 15%, fever in 5%, headache in 5% and nasal obstruction in 2.5%. But the commonest presentation in the outdoor was a combination of ear discharge with hearing loss in 37.5%. These series of symptoms of presentation can be well correlated with a study by Adel et al⁶ in 2004. In this prospective study of 40 patients, 87.5% patients showed a non-dependant homogenous soft tissue in the Middle Ear Cleft on HRCT whereas 92.5% patients were found to have soft tissue in middle ear cleft intra-operatively, thus proving the HRCT specificity of 100% while a sensitivity of 94.59% in detecting a soft tissue mass pre-operatively. A similar prospective study done by Garg et al² in 2012 showed similar results of HRCT sensitivity of 89.65% and specificity of 100% in detecting soft tissue in the middle ear cleft. Sirigiri et al⁷ in 2011, in his study, also showed HRCT sensitivity of 92% which is compatible with our study. After statistically analyzing

and comparing HRCT and intra-operative findings for soft tissue density in the middle ear cleft in our patients, $p = 0.157$ was not significant, making HRCT a good modality for diagnosing soft tissue in the middle ear cleft by HRCT pre-operatively. Tendency of cholesteatoma towards the destruction of bone and failure of non-surgical treatment for it have caused conditions in which a proper diagnosis and an appropriate surgical approach for dealing with it have become of great importance. In our study, HRCT detected malleus erosion in 47.5% patients while intra-operative findings showed malleus erosion in 50% patients. There were 2 false positive and 3 false negative cases, thus indicating that the sensitivity of HRCT for malleus erosion was 85% while its specificity was 90%. The findings of this study can be well collaborated with a study conducted by Rogha et al⁸ in 2014, who also reported HRCT sensitivity of 82.4% for detecting malleus erosion. Garg et al² have reported similar findings in their study of 60 patients showing 90.9% sensitivity and a specificity of 89.47%, thus recognizing malleus erosion or intactness. HRCT in our study has demonstrated to be within satisfactory norms with high sensitivity, specificity and negative predictive value. Similarly, Shah et al⁹ in 2014 have also reported a sensitivity of 81.3% and a 91.1% specificity which is comparable with our results. $p = 0.655$ was not significant making HRCT a good diagnostic modality for diagnosing malleus necrosis. Pre-operative erosion of incus was seen in 70% patients while 77.5% patients showed incus necrosis intra-operatively so there were 6 false negative cases, hence the HRCT sensitivity after calculation was 80.65% while specificity dropped to 66.67%. The findings of our study are comparable to a study by Shah et al⁹ in 2014 who also quoted a sensitivity and specificity of 90% and 66.7% respectively. Comparable results are also seen in a study conducted by Rai¹⁰ in 2014, by Zhang et al¹¹ in 2004 and by Chee and Tan¹² in 2001 who all show a HRCT sensitivity of 85% for incus erosion. Gomma et al¹³ in 2013 in their study of 56 patients have reported HRCT sensitivity of 85.7% for incus necrosis. Datta et al⁴ in 2014 has also reported in a study of 25 cases, sensitivity of HRCT for incus necrosis to be 87%. Rogha et al⁸ in 2014 have reported comparable results of 90.6% of sensitivity and 50% of specificity of HRCT in lieu of incus necrosis. So according to the above mentioned literature, our findings are comparable and compatible with previous studies. The calculated p value for incus necrosis, $p = 0.317$ was not significant. We can thus infer that HRCT is a good investigation for diagnosing incus necrosis pre-operatively. In studies on efficiency of HRCT in pre-operative detection of stapes necrosis, Rogha et al⁸ in 2014 and Garg et al⁶ in 2011 have found sensitivity of 61.9%, specificity of 66.7% and sensitivity of 40% and specificity of 26.67% respectively. According to literature, the reason for its low sensitivity and specificity is that stapes is not consistently visualized on HRCT and when seen, it appears as a structure of soft tissue density in the oval window niche. For this reason, it was not possible to distinguish between the destruction of stapes and its mere envelopment by soft tissue. This evidence supports low HRCT sensitivity and specificity of 53.3% and 60% respectively in diagnosing

stapes necrosis in our study. There were 10 false positive and 7 false negative cases in our study of 40 cases. The p value so calculated for stapes necrosis ($p=0.467$) was insignificant too, therefore, HRCT could diagnose stapes necrosis well. Labyrinthine fistula continues to be one of the most common complications of squamous COM. In nearly 90% of the patients, the labyrinthine fistula is located in the lateral semicircular canal. An extensive clinical examination supported by imaging studies is essential for its pre-operative diagnosis. Use of both the planes - coronal and axial, to be employed for detecting LSCC fistula. Lateral semicircular canal was eroded in 10% cases (4 patients) on HRCT and was found in 5% cases (2 patients) intra-operatively out of the 40 cases in our study. There were 3 false positives and 1 false negative case. Hence sensitivity and specificity in our study was 50% and 92.11% respectively showing moderate sensitivity of HRCT in diagnosing lateral SCC fistulas. A high false positive rate has also been reported, which is comparable to our study by Chee et al¹² in 2001. Comparable sensitivity of approximately 55% with regard to LSCC erosion has been reported by Parisier et al¹⁴ in 1991 and by Vanden, et al¹⁵ in 1993. Our findings of sensitivity and specificity of HRCT with regard to lateral semicircular canal erosion are consistent with Garget al⁶ who also report a sensitivity and specificity of 66.67% and 83.33% respectively. Gerami et al¹⁶ in 2009 too have reported a specificity of 95% for LSCC erosion which is comparable with our study. p value was calculated for lateral SCC erosion in our study. $p=0.317$ was insignificant, thus HRCT was a good pre-operative diagnostic modality to look for lateral SCC erosion. According to literature, the sensitivity of HRCT in detecting facial canal dehiscence was 25% according to Freng et al¹⁷. In our study, 15% patients (6 cases) showed facial nerve dehiscence on HRCT while 47.5% patients (19 cases) actually had facial nerve dehiscence intra-operatively. There were 13 false negative cases. The sensitivity and specificity of HRCT for facial nerve dehiscence in our study was 31.58% and 100% respectively. These non compliant results can be explained by the fact that the visualization of thin bony structures like facial nerve canal may be misleading due to errors in computer reconstruction of their images. These structures may appear eroded due to the fact that the computer averages their density with adjacent soft tissue and air¹. Our findings are consistent with Rai¹⁰ in 2014, who quotes a sensitivity of 33.33% and specificity of 100% for facial canal dehiscence. Similar results were found by Alzoubi¹⁸ in 2008 and by Garber¹⁹ in 1994. Almost similar sensitivity of 40% and specificity of 95% has been reported by Garg et al² in 2011. In our study, when p value was calculated for facial nerve dehiscence after comparing HRCT and intra-operative findings, it was found to be highly significant. p value of 0.000 made HRCT a very poor imaging technique for pre-operative diagnosis of facial nerve dehiscence. Tegmen tympani represents the roof of the middle ear cavity. Its erosion is well seen on coronal imaging. Compatibility of radiological and intra-operative results in diagnosing erosion on tegmen tympani in our study were found to be weak. There were 15% patients reported of tegmen erosion on HRCT while intra-operatively, 7.5% patients

showed tegmen erosion. Thus there were 5 false positive and 2 false negative cases in our study. On applying the above mentioned data of our study of 40 cases, HRCT sensitivity for tegmen erosion was 33.3% while its specificity for the same was 86.49%. According to review of the articles, HRCT was found to be poorly sensitive to detect tegmen tympani erosion which agrees with results by Gerami et al¹⁶ in 2009. Comparable results to our study have been reported by Rai¹⁰ in 2014 with 33.3% sensitivity and 100% specificity of HRCT in detecting tegmen erosion. $p = 0.257$ was not significant. We could thus conclude that HRCT could adequately diagnose tegmen erosion pre-operatively. The criteria indicating cholesteatoma as "blunting of the scutum's normally sharp tip which is often the earliest sign of attic cholesteatoma". Gurano et al²⁰ stated that signs indicating cholesteatoma in the attic include erosion or destruction of scutum and widening of the aditus and antrum with loss of the 'Figure of 8' appearance. In the present study, HRCT scans show blunting of scutum's normally sharp tip in 72.5% patients) while scutum erosion intra-operatively was also seen in 72.5% patients. However there were 4 false positive and 4 false negative cases, thus reducing the sensitivity and specificity of HRCT for this entity to 86.21% and 63.64% respectively. Thus, HRCT appears to be under acceptable sensitivity limits as per regards to scutum erosion. Rogha et al⁸ reported HRCT sensitivity of 96.4% and specificity of 87.5% in diagnosing scutum erosion. In a study conducted by Rai et al¹⁰ in 2014, HRCT could diagnose scutum erosion with 100% sensitivity and specificity. However, Keskin et al²¹ in his study in 2010 showed sensitivity and specificity of 80% and 90.4% respectively for scutum erosion. p value of 1.000 was very insignificant. Hence, HRCT was an excellent investigation for diagnosing erosion of scutum pre-operatively. After the above discussion with reference to national and international studies, it is our impression that HRCT has a role in evaluation of cases of squamous COM but must be interpreted with caution in view of its certain limitations. Both axial and coronal sections should be done as important structures are best seen after evaluating them in both the planes. This HRCT analysis and surgical correlation has shown that sensitivity, specificity and positive predictive value of HRCT scans depend on the anatomical structure implicated in squamous COM damage. Hence HRCT is valuable in diagnosing and in guiding the surgical management of squamous COM and its use by otologist is to be encouraged, especially in patients who are suspected of having complex problems and in whom maximum information is desirable, as an adjunct to better pre-operative assessment and better surgical outcome, thus reducing disease morbidity. Limitations of HRCT should be considered and improved by newer radiological modalities. In short, we can say that HRCT serves as a road map to assist the surgeon during surgery.

CONCLUSION : In this prospective study which included 40 patients attending a tertiary care centre and presenting with clinical picture of squamous COM, the following conclusions were made:

1. The most common age group to be affected by squamous COM is 11-20 years group.

2. Squamous COM affected females more than males, the male to female ratio being 1:1.2.
3. The most common presenting symptom for this disease was ear discharge seen in 97.5% patients.
4. The sensitivity, specificity and positive predictive value of HRCT scans depend on the anatomical structure implicated in squamous COM damage.
5. HRCT Temporal Bone is an excellent modality for diagnosing scutum erosion, which is the earliest as well as a confirmatory sign for the presence of an attic cholesteatoma.
6. It is a good pre-operative diagnostic modality for identifying the presence of soft tissue in the middle ear cleft, malleus, incus and stapes necrosis, for diagnosing erosion of the tegmen and the presence of a fistula in the lateral semicircular canal.
7. HRCT Temporal Bone could not diagnose, with adequate accuracy, the presence of erosion of the bony external auditory canal.
8. Facial nerve dehiscence was very poorly evaluated by HRCT Temporal Bone, making it a very unreliable imaging modality for diagnosing the same.

REFERENCES:

1. Swartz JD, Goodman RS, Russel KB. High resolution computed tomography of the middle ear and mastoid. Part II tubotympanic disease. *Radiology* 1983;148:455-9.
2. Garg P, Kulshreshtha P, Motwani G, Mittal MK, Rai AK. Computed tomography in chronic suppurative otitis media: value in surgical planning. *Indian J Otolaryngol Head Neck Surg* 2012 Jul;64(3):225-9.
3. Islam MR, Taous A, Hossain MM, Ekramuddaula AFM, Islam MS. Comparative study of tubotympanic and attic variety of chronic suppurative otitis media. *Bangladesh J Otorhinolaryngol* 2010;16(2):113-9.
4. Datta G, Mohan C, Mahajan M, Mendiratta V. Correlation of preoperative HRCT findings with surgical findings in unsafe CSOM. *Inter Organ Den Med Sci* 2014 Feb;13(1):120-5.
5. Karim A, Khany H, Gomma M, El-Hene A, Sadek A. Radiological evaluation of middle ear cholesteatoma otitis. *El-Minia Med Bul* 2010 Jan;21(1):72-8.
6. Adel MSM, Yehia MSEK. The role of high resolution computed tomography (HRCT) in evaluation of chronic suppurative otitis media with cholesteatoma; radiosurgical correlation. [Internet]. 2003. Available from: <http://mu.minia.edu.eg/publications/index.php/publications/publications-list.html?view=publication&task=show&id=5346>.
7. Sirigiri RR, Dwaraknath K. Correlative study of HRCT in atticotranal disease. *Indian J Otolaryngol Head Neck Surg* 2011 Apr;63(2):155-8.
8. Rogha M, Hashemi SM, Mokhtarinejad F, Eshaghian A, Dadgostar A. Comparison of preoperative temporal bone CT with intraoperative findings in patients with cholesteatoma. *Iran J Otorhinolaryngol* 2014 Jan;26(1):7-12.
9. Shah C, Shah P, Shah S. Role of HRCT temporal bone in pre-operative evaluation of cholesteatoma. *Int J Med Sc Pub Health* 2014 Jan;3(1):69-72.
10. Rai T. Radiological study of the temporal bone in chronic otitis media: Prospective study of 50 cases. *Indian J Otol* 2014 Apr;20(2):50.
11. Zhang X, Chen Y, Liu Q, Han Z, Li X. The role of high-resolution CT in the pre-operative assessment of chronic otitis media. *Lin Chung Er Bi Yan Hou Ke Za Zhi* 2004;18:396-8.
12. Chee NW, Tan TY. The value of pre-operative high resolution CT scans in cholesteatoma surgery. *Singapore Med J* 2001;42:155-9.
13. Gomma MA, Karim AR, Ghany HSA, Elhiny AA, Sadek AA. Evaluation of temporal bone cholesteatoma and the correlation between high resolution computed tomography and surgical findings. *Clin Med Ins Ear Nos Thr* 2013;6:21-8.
14. Parisier SC, Edelstein DR, Han JC. Management of labyrinthine fistulas caused by cholesteatoma. *Otolaryngol Head Neck Surg* 1991;104:110?5.
15. Vanden AD, Offeciers FE. Management of labyrinthine fistulas in cholesteatoma. *Acta Otorhinolaryngol Belg* 1993;47:311?21.
16. Gerami H, Naghavi E, Wahabi-Moghadam M. Comparison of pre-operative computerized tomography?scan imaging of temporal bone with the intra-operative findings in patients undergoing mastoidectomy. *Saudi Med J* 2009 Jan;30(1):104-8.
17. Freng A, Larsen PL, Nordshus T. Cholesteatomas of the temporal bone. Preoperative CT versus peroperative findings. *Scand Audiol Suppl* 1988;30:185?8.
18. Alzoubi FQ, Odat HA, Al-Balas HA, Saeed SR. The role of pre-operative CT scan in patients with chronic otitis media. *Eur Arch Otorhinolaryngol* 2009;266:807-9.
19. Garber LZ, Dort JC. Cholesteatoma: Diagnosis and staging by CT scan. *J Otolaryngol* 1994;23:121-4.
20. Gaurano JL, Joharjy IA. Middle ear cholesteatoma: characteristic CT findings in 64 patients. *Ann Saudi Med* 2004;24(6):442-7.
21. Keskin S, ?etin H, Tore HG. The correlation of temporal bone CT with surgery findings in evaluation of chronic inflammatory diseases of the middle ear. *Eur J Gen Med* 2011;8(1):24-30.

Kabuki Syndrome; A rare entity

Nabil-Ur-Rahman, Iqbal A. Muhammad Khyani, Atif Hafeez Siddiqui

ABSTRACT: Kabuki Syndrome is a multiple congenital anomaly/mental retardation syndrome of unknown cause. More than 500 cases of both Asian and non-Asian heritage have now been reported. Although a few associated cytogenic abnormalities have been described, the majority of patients have normal chromosomes and no cause has to date been identified. Diagnosis is based on characteristic dysmorphic features, visceral abnormalities, and clinical features. Ligamentous laxity and joint hyperextensibility have been described in 74-96% of the individuals with this syndrome. Joint dislocation is also present in up to 50 % of individuals with the syndrome. Recurrent patellar dislocation may result in significant disability and require surgical repair joint dislocation may involve middle ear ossicles and can lead to hearing impairment. We report a case of 24 years old girl presented with recurrent patellar dislocation and diagnosed as Kabuki Syndrome. Features are discussed and literature reviewed. Key Words : Kabuki syndrome, Congenital anomaly, Mental retardation.

INTRODUCTION : Kabuki Syndrome, was first described in Japanese children, in a pair of parallel reports in 1981^{1,2} with 20 cases reported in the medical literature by 1985³. It is a multiple congenital anomaly/mental retardation syndrome of unknown cause. More than 500 cases of both Asian and non-Asian heritage have now been reported⁴. Although a few associated cytogenic abnormalities have been described⁵, the majority of patients have normal chromosomes and no cause has to date been identified. The inheritance pattern of this disorder has not been established. Most cases are sporadic but a few families with multiple generations of affected individuals have been reported, suggesting autosomal inheritance⁶. Diagnosis is based on characteristic dysmorphic features, visceral abnormalities, and clinical features. Ligamentous laxity and joint hyper extensibility have been described in 74-96% of the individuals with Kabuki syndrome^{6,7,8}. Joint dislocation is also present in up to 50 % of individuals with the syndrome and is one of the individual features of this syndrome⁹. Recurrent patellar dislocation may result in significant disability and require surgical repair. Dislocation of middle ear ossicle may occur leading to

paracusis and hearing impairment. We report a diagnosed case of Kabuki Syndrome that presented with recurrent patellar dislocation.

CASE REPORT: A 24-year-old patient was admitted with a painful left knee joint, which according to the patient had "popped out". She also gave a history of right patellar dislocation a year previously. X-rays showed dislocation of the left patella with no other bony deformities (Fig.1, 2, 3). Past medical history revealed that she developed hearing impairment to low frequencies with bilateral eustachian tube insufficiencies when she was 4 years old, for which she had bilateral grommet insertion and antral washouts. Later on, she developed speech difficulties for which she had speech therapy for a considerable period of time. She also developed contractures of the ring and little fingers of both hands. X rays showed no bony abnormalities apart from flexion of the proximal interphalangeal joints of both hands. She had a global developmental delay and Griffith's assessment showed 2 years and 1 month when she was 3 years and 9 months. She also exhibited hyper-abduction of both hip joints. General physical examination revealed that she was micrognathic with large ears. Local examination revealed that she had a tender left knee



Figure-1 : Pt is diagnosed only on clinical grounds by ENT doctor.



Fig-2 : Dislocation of left patella.



Fig-3 : Patellar dislocation (lateral view)

joint with a laterally displaced and rotated patella. Knee movements were significantly restricted. The SHO on call tried unsuccessfully to reduce it in the accident and emergency department under intravenous sedation. The knee was manipulated under general anesthesia (Fig-4). The patient was sent home the next day and reviewed one week later in fracture clinic where it was noted that she was comfortable and movements of the knee joint were no longer restricted. She was referred to physiotherapy for further rehabilitation.

DISCUSSION : Kabuki Syndrome has been encountered in 1967 and reported in 1981^{1,2} bears its name because of facial similarities to that of the famous Japanese art form. Though reported initially in Japan, the syndrome has also been reported from South America and Europe. In the last thirty five years since the first description of Kabuki syndrome, over 500 cases in the literature have documented the major and minor malformations associated with this condition⁴. Although multiple authors have included descriptive data of the intellectual performance of patients in their series, no formal analysis of this condition has been undertaken. The etiology of the syndrome remains unknown, with familial occurrence estimated at approximately 2%. Few patients have been identified with abnormalities including X chromosome rings¹⁰, translocations /inversions¹¹, and duplications¹². The majority of the patients have normal chromosomes and no specific genes to date have been identified. Most of the patients have five cardinal manifestations, namely, the characteristic facial features, skeletal abnormalities, postnatal growth deficiency, mild mental retardation and dermatolyphic abnormalities. The commonly described facial features in this syndrome are arching eyebrows sparse in lateral half, long palpebral fissures, ectropion of lower eyelids, broad nasal tip, high arched palate, mal-occlusion of the teeth and short fifth finger^{1,2}. Other features such as low posterior hairline, epicanthal fold, pre-auricular dimple and micrognathia are also seen. Skeletal abnormalities are part of the diagnostic criteria for this condition. The initial reports cited short and incurved 5th digits and short fifth

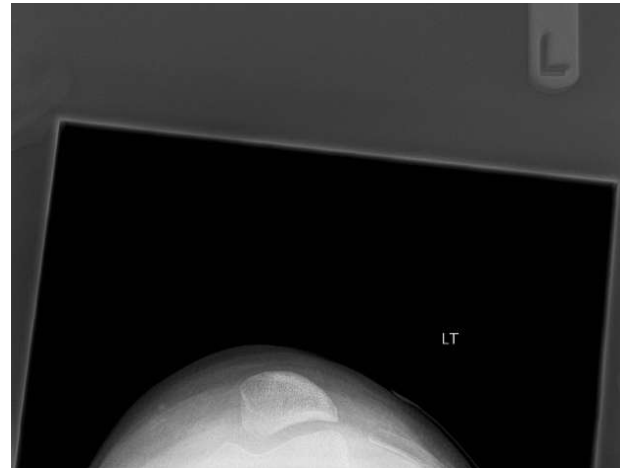


Fig-4 : Re-location under general anesthesia.

metacarpals, cone shaped epiphysis of the proximal second through fifth phalanges, and various vertebral anomalies (butterfly vertebra, sagittal cleft scoliosis and narrow inter vertebral disc space). Multi organ system has been described, including epilepsy with and without polymicrogyric changes^{13,14} hepatic involvement, including fibrosis and sclerosing cholangitis¹⁵, autoimmune disorders, malignancies such as leukaemia and endocrinopathies including diabetes and deficiency of growth hormone. Joint hyper-mobility is seen in one half to three quarters of the patients and joint dislocations are not uncommon, particularly of the hips, patellae and shoulders^{8,9}. However it has been found that joint hyper-mobility tends to improve with the age. Patellar dislocation is common among 18% of older children and young adults with this syndrome. The frequency is likely to be affected by reporting bias (overestimate) and an underestimate due to the lack of follow up records in most of the individuals reported. Conductive hearing loss is common in patients with this syndrome and as would be expected, is associated with poor verbal outcomes. Our patient had global developmental delay, developed speech difficulties and had recurrent hearing and upper respiratory infections. Digilio et al reported that 58 % of the patients with this syndrome had congenital heart diseases and considered these cardinal features¹⁶. In conclusion, patellar dislocation is frequent among older children and young adults with Kabuki Syndrome, especially among female obese individuals with lax knee joints. Research has shown that the sex ratio of individuals with Kabuki syndrome is even, while that of those with the syndrome and patellar dislocation is in favour of females. Although the number of the patients with patellar dislocation and the syndrome is limited, this indicates that being a female may be a risk factor for developing patellar dislocation among the individuals with Kabuki syndrome. The examining doctor should particularly consider this diagnosis in patients who present with distinctive facial features and skeletal deformities. Earlier detection of this syndrome may have important implications for the long-term prognosis of such patient.

REFERENCES :

1. Niikawa N, Matsuura N, Fukushima Y, Ohsawa T, Kajii t, Kabuki make up syndrome: a syndrome of mental retardation, unusual facies, large and protruding ears and postnatal growth deficiencies. *J Paediatr* 1981; 99:565-9.
2. Kuroki Y, Suzuki Y, Chyo H, Matsui I. A new malformation syndrome of long palpebral fissures, large ears, depressed nasal tip and skeletal anomalies associated with postnatal dwarfism and mental retardation. *J Paediatr* 1981; 99:570-3.
3. Ohdo S, Madokoro H, Sonoda T, Nishiguchi T, Kawaguchi K, Hayaka K, Kabuki make up syndrome (Niikawa and Kuroki) associated with congenital heart disease. *J Med Genet* 1985; 22:126-7.
4. Wessels MW, Brooks AS, Hoogeboom J, Niermeijer MF, Williams PJ, Kabuki syndrome: a review study of 300 patients. *Clin Dysmorphol* 2002; 11:95-102.
5. Lynch SA, Ashcroft KA, Zwolinski S, Clarke C, Burn J: Kabuki syndrome like feature in monozygotic twin boys with pseudodicentric chromosome 13. *J Med Genet* 1995; 32:227-30
6. Schrander-Stumpel C, Meineke P, Wilson G, Gillesen-Kaesbach G, Tinschert S, Konig R, Philip N, Rizzo r, Schrander J, Pfeiffer L, Maat Kievet A, Van der Burgt I, Van Essan T, Latta E, Hillig U, Verioes A, Journal H, Fryns JP. The Kabuki syndrome: further delineation of the phenotype in 29 non- Japanese patients. *Eur J paediatr* 1994; 153:438-45.
7. Wilson GN. Thirteen cases of Niikawa –Kuroki Syndrome: Report and review with emphasis on medical complications and preventive management. *Am J Med Genet* 1998; 79:112-20.
8. Kawame H, Hannibal MC, Hudgins L, Pagon L. Phenotypic spectrum and management issues in Kabuki syndrome. *J Paediatr* 1999; 134:480-5.
9. Ikegawa S, Sakaguchi R, Kimizuka M, Yanagisako Y, Tokimura F.. Recurrent dislocations of patella in Kabuki make up syndrome. *J Paediatr Orthop* 1993; 13:265-7.
10. Mc Ginniss MJ, Brown DH, Burke LW, Mascarello JT, Jones MC: Ring Chromosome X in a child with manifestations of Kabuki Syndrome. *Am J med Genet* 1997; 70:37-42.
11. Prasad C, Chudley AE: Genetics and Cardiac Anomalies: The heart of the matter. *Indian J Pediatr* 2002; 69:321-32.
12. Lo IF, Cheung LY, Ng AY, and Lam ST: International Dup (1p) with findings of Kabuki make up syndrome. *Am J Med genet* 1998; 78:55-7.
13. Powell HW, Hart PE, Sisodiya SM. Epilepsy and perisylvian polymicrogyria in a patient with Kabuki Syndrome. *Dev Med Child Neurol* 2003; 45:841-3.
14. Ogawa A, Yasumoto S, Tomoda Y, Ohfu M, Mitsudome A, Kuroki Y. Favourable seizure outcome in Kabuki make up syndrome associated with epilepsy. *J Child Neurol* 2003; 18:549-51
15. Nobili V, Marcellini M, Devito R, Capolino R, Viola L, Digilio MC., Hepatic fibrosis in Kabuki syndrome. *Am J Med Genet* 2004; 124:209-12.
16. Digilio MC, Marino B, Toscano A, Giannotti A, Dallapiccola B. Congenital heart defects in Kabuki Syndrome. *Am J Med Genet* 2001; 100:269-74.

Infra-orbital Nerve Schwannoma with Sino - Orbital Involvement : A Case Report

*Atiqah Farah Zakaria MD, **Mohamad Bin Doi,
*Mohd Razif Muhammad Yonus, *Mawaddah Azman

ABSTRACT: 52 yearS old lady was referred to our centre with complaint of left eye proptosis to upward gaze for past 6 months. Computer tomography (CT) brain and orbit showed heterogenous mass arising from left maxillary sinus extending into extraconal space of the left orbit. The floor of left orbit was eroded and the mass cause expansion and bowing of the walls of left maxillary sinus. Biopsy performed via sublabial approach revealed benign neural tumor. The mass was removed via open medial maxillectomy approach and orbital floor was reconstructed using titanium mesh. We report a case of schwannoma originating from infra-orbital nerve and review the literature.

Key Words : Schwannoma, Infraorbital nerve, Medial maxillectomy.

INTRODUCTION : Schwannomas are rare tumor arising from the schwann cells, the outermost layer that sheath the peripheral nerve. It can occur in all parts of the body. It constitutes 1-8% of all head and neck tumors and 1-4% of the orbital tumors. Mostly occur in 2nd to 4th decade of life¹.

CASE REPORT : A 52 years old lady was referred from ophthalmology department complaining of progressively worsening left eye proptosis to left upward gaze for the past 6 months associated with intermittent numbness over left cheek. No history of double vision or color blindness. No reported sinonasal symptoms. There was no history of trauma. Clinical examination showed proptosis of left eye anterolaterally and the globe is displaced superiorly, slight fullness over left cheek, non-tender and not inflamed. Vision was normal. No nystagmus and all cranial nerves were intact. No neck nodes palpable. Rigid nasal endoscopy performed and showed no evidence of sinusitis or intranasal mass. Systemic examination revealed no signs of hyperthyroidism or connective tissue disease. Other examinations were unremarkable. The CT orbit and brain showed heterogenous enhancing mass with epicenter within the left maxillary sinus. It measures 3cm x 3.5cm x 5cm. There was no calcification seen within. The mass cause expansion and bowing of the walls of the left maxillary sinus. The mass extend superiorly into the extraconal space of left orbit. There was erosion over floor of left orbit. The left osteomeatal complex was obliterated. The optic nerve were not affected bilaterally. Biopsy was taken via sublabial approach, reported as benign neural tumor, with differential of schwannoma originating from infraorbital nerve. She underwent open medial maxillectomy to remove the tumor with reconstruction of left orbital floor with titanium mesh. Intraoperatively there was a well capsulated mass occupying maxillary antrum extending to infraorbital region with partial erosion of orbital plate. The mass was not adherent to periorbital and left orbit was intact. Maxillary mucosa and membrane were normal. Lateral wall of left nose was left opened to create a connection with maxillary sinus. Post operatively, there was numbness over left cheek, ala of left nose and

left upper lip and minimal skin dimpling inferior to left orbital floor. The left eye was less proptosed and extraocular movements were normal with no diplopia. Patient was under our follow up for 24 months post-operatively and was disease free without evidence of recurrence.

DISCUSSION : Schwannomas account for 8 % of all intracranial tumors and most frequently arise from vestibular division of vestibular cochlear nerve. Other cranial nerves are less frequently involved. They can develop anywhere in the body, arising from myelin sheaths of peripheral motor, sensory, sympathetic and cranial nerves. Between 38 to 45% of all schwannomas occur in head and neck region². Presenting symptoms are varied and non-specific depending on the site of tumor. They are often not detected in the early stage due to the lack of early symptoms and because of their slow growing nature.

Orbital schwannomas also known as orbital neurilemmomas are rare tumors. They constitute 1-4% of orbital tumor¹. It usually arises from branches of the supra-orbital or supra-trochlear nerves, less commonly arises from infra-orbital, ciliary, oculomotor, trochlear or abducent nerves³. Schwannomas from infra-orbital nerve are very rare, only seven cases were reported up to date. They may occur at any age with no gender predilection⁴. They are localized and well encapsulated, usually unilateral and rarely become malignant⁵. In most cases, the nerve of origin is unable to be identified during surgery in almost 50% of cases¹⁻⁶. In this case, the nerve from which the tumor originate can be identified according to the pre or post-operative neural deficit. Patient complaint of numbness over the left cheek, left ala of nose and upper lip post-operatively thus confirmed that infra-orbital nerve is the nerve from where schwannoma originated. Most of the tumor originate from sensory nerves, so, they do not interfere with eye movements or vision unless they are located in the orbital apex and compress the optic nerve^{1,7,8}. Similar to our patient, she only complaint of left eye proptosis with upward gaze.

Schwannomas are benign, painless, slow growing and

*Department of Otorhinolaryngology, Head and Neck Surgery, University Kebangsaan Malaysia Hospital, Kuala Lumpur

**Department of Otorhinolaryngology, Jalan Puchong, Serdang Hospital, Selangor, Malaysia.

can affect adjacent structures by erosion of bone and direct extension. They push and erode walls by pressure effect. In this case, the orbital floor was pushed inferiorly, the tumor occupied the left maxillary antrum and extend superiorly to the extraconal space of left orbit. Post-operatively, it left a large space between the contents of the orbita and the orbital floor, thus, we constructed a new orbital floor using the titanium mesh.

Histopathological characteristics of orbital schwannomas are the same with other schwannomas of the head and neck. Antoni A and B (hypercellular and hypocellular area) with Verocay bodies are characteristic of these tumor and their differential diagnosis with neurofibromas is based on these histopathological findings⁷. Neurofibroma may be distinguished by the occurrence of calcification that is infrequently seen in schwannomas⁵. In CT scan, orbital schwannomas are seen as homogenous smooth bordered solitary, and are iso-intense with the brain, very rarely cystic masses^{1,9}.

Treatment of choice is surgical excision and the approach depends on the location and extension of the tumor. Imaging helps in deciding the approach route. In this patient open approach choosed as from the imaging showed that the tumor located in left maxillary sinus

with superior extension to the left extraconal space and erosion of floor of the left orbit. Total removal of the tumor is usually ample to prevent recurrence^{1,2,9}. The prognosis for this benign tumor is good and recurrence is rare if the tumor is removed completely.

REFERENCES :

1. Schick U, Bleyen J, Hasler W. treatment of orbital schwannomas and neurofibromas. *Br J Neurosurg* 2003; 17:541-5.
2. Schmitt E, Spoerri O. Schwannomas of the orbit. *Acta Neurochir (Wien)* 1980; 53: 79-85.
3. Shields J A. Diagnosis and management of orbital tumors. Philadelphia : Saunders, 1989; 152-7.
4. Konrad EA, Thiel HJ. Schwannoma of the orbit. *Ophthalmologica* 1984; 188: 118-27
5. Kurtkaya-Yapicier O, Scheithauer B, Woodruff JM. The pathobiologic spectrum of Schwannomas. *Histol Histopathol.*2003;18:925-34
6. Carroll GS, Haik BG, Fleming JC, Weiss RA, Mafee MF. Peripheral nerve tumors of the orbit. *Radiol Clin North Am* 1999 ; 37:195-202.
7. Williams HK, Cannell H, Silvester K, Williams HK. Neurilemmoma of head and neck. *Br J Oral Maxillofac Surg* 1993; 31: 32-5
8. Kaskel S, Muller WE, Herbst E, Bock A, Hoh H. subacute, unilateral vision loss. Schwannoma of the orbital apex. *Ophthalmologe* 2002; 99: 58-9.
9. Rootman J, Goldberg, Robertson W. Primary orbital schwannomas. *Br J Ophthalmol* 1982; 66: 194-204.

Infra-temporal Fossa Growth; Excision with Surgical Expertise and Less Morbidity : A Case Report

Beenish Nisar Ahmed, Syed Iqbal Hussain, Muhammad Waqas, Nisar Ahmed

ABSTRACT: Neoplastic lesions of infra-temporal fossa are presented with variegated pathologies. Lesions that involves the infra-temporal fossa more often originate as a result of extension from neighbouring structures and from primary tissues of fossa as well. Metastatic lesions are also common. Because of its enshrouded location, usually tumors presents lately. Clinical signs and symptoms are incidious. The close proximity of the area to the intra-cranial structures, the orbit, the paranasal sinuses, the nasopharynx, and the facial area demand meticulous surgical excision. Modern imaging techniques have made three-dimensional visualization of the extent of the pathology possible. Radical tumor excision with preservation of the quality of life remains the ultimate goal. We report a rare presentation of infra-temporal fossa growth. The patient underwent surgical excision and had uneventful recovery.

Key Words : Infra-temporal fossa, Radical tumor excision.

INTRODUCTION : The infra-temporal region because of its obscure location is inaccessible for clinical examination. Thus lesions other than malignant rapid growth pattern type may continue their growth for longer period and symptoms appeared late. Radiological investigations are usually first to diagnose the disease¹. Various pathologies have been experienced in this area. Treatment of infra-temporal growth depends upon the type and extension of disease. Basic aim is to clear the disease radically with less morbidity¹⁻³. Primary tumors of infra-temporal fossa include fibrosarcoma, haemangioma, Hodgkin's lymphoma meningioma, neurofibroma, rhabdomyosarcoma. Benign tumors include lipoma, meningioma, fibroma and schwannoma. Malignant tumors include adenoid cystic, adenocarcinomas and fibrosarcoma¹⁻⁵. Literature review showed that Conley, Shapsshay and Shaheen provided evidence that majority is of primary tumors²⁻⁸. Adenoid cystic carcinoma is the most commonly occurring malignant tumor. Indolent growth pattern leads to delayed diagnosis and late presentation. Signs and symptoms occurred according to the spread of tumor to surrounding structure i.e. nasal, ear and facial symptoms etc⁵⁻⁶. Approaches to infra-temporal fossa are multiple and needs surgically experience hand. Prognosis is highly influenced by the nature of disease and completeness of

the resection³⁻⁵.

CASE REPORT : 22 years old male presented to us with restricted mouth opening and difficulty in chewing for last three months. He is also complaining of reduced hearing from right ear for the same duration. His history was not significant for any other symptoms. Upon examination he was young, healthy, active and well orientated male. His other systemic examination was unremarkable. His local examination showed right ear conductive deafness and trismus with mouth opening one finger breadth. Other examination was unremarkable. His base line haematological investigations were normal. His CT showed soft tissue mass in right infratemporal fossa, 3.8x4.6x4.7 cm in AP,CC,TR dimensions. It was involving masticator muscles with loss of muscle plane. Anteromedially it was causing destruction of lateral pterygoid plate and, laterally extending to right maxillary sinus thinning of ramous of mandible due to bony erosion. Mass was also extending in to pterygomaxillary fissure to reach the lateral wall of right nasal cavity and superiorly it was abutting the base of right middle cranial fossa, inferiorly involving pterygoid muscles, posteriorly abutting the para pharyngeal fat and parotid gland. The mass lesion show no significant enhancement. The findings were suggestive of neoplastic lesion of infratemporal fossa. Surgical



Figure-1 : C.T Scan coronal view.



Figure-2 : C.T Scan sagittal view.

Department of Oto-rhino-laryngology, Head & Neck Surgery, Fedral Clinic and Hospital, Karachi, Pakistan.

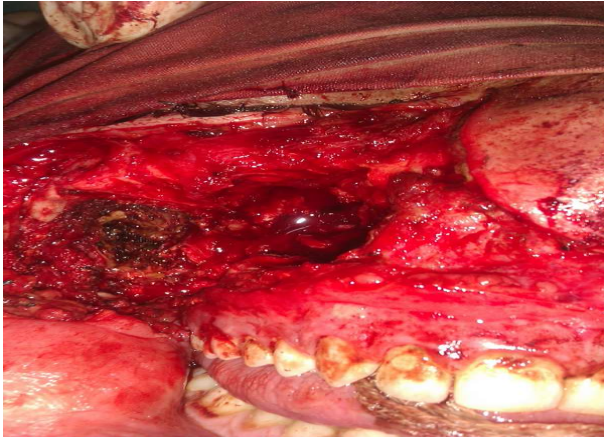


Fig-3 : Per-operative view of the region.

excision was planned. Informed consent have been taken. Patient underwent excision of growth via anterior transfacial approach using Weber Ferguson incision. Mass was extending from lateral pterygoid plate to maxillary sinus, nose lateral wall and abutting right middle cranial fossa. Lesion was resected completely but not in toto as the growth was firm. Mass removal was not easy because of extension to surrounding vital structures and bleeding. Lesion was cleared from its lateral, posterior, anterior and medial margins until normal tissue reached. Middle cranial fossa was also saved and no major vessel bleeds. It was not a vascular growth. After resection cavity was packed. Post-operative recovery was uneventful and patient was followed on regular basis. The histopathology report showed fibroma, benign growth of infra-temporal fossa. Patient recovered completely and he was on regular follow-up with repeat CT scans and showed no recurrence. Patient symptoms were also improved. Mouth opening size increased, hearing and chewing improved.

DISCUSSION : The infra-temporal fossa is an irregularly shaped cavity, situated below and medial to the zygomatic arch. Boundaries involved anteriorly, by the infra-temporal surface of the maxilla and the ridge which descends from its process, posteriorly, by the articular tubercle of the temporal and the spina angularis of the sphenoid, superiorly, by the greater wing of the sphenoid below the infra-temporal crest, and by the under surface of the temporal squama, containing the foramen, which transmits the mandibular branch of the trigeminal nerve, and the foramen spinosum, which transmits the middle meningeal artery inferiorly, by the medial pterygoid muscle attaching to the mandible, medially, by the plate and laterally, by the ramus of mandible, which contains the mandibular foramen, leading to the mandibular canal through which the inferior alveolar nerve passes. This also contains the lingula, a triangular piece of bone that overlies the mandibular foramen antero-medially. Finally, the mylohyoid groove descends obliquely transmitting the mylohyoid nerve the only motor branch of the posterior division of the nerve. Muscles found in this area are lower part of the temporalis and masseter muscles (origin of masseter muscle: lower margin of the inner surface of zygomatic bone insertion: outer surface

of the ramus of the mandible) lateral and medial pterygoid muscles. Internal maxillary artery branches found within the infra-temporal fossa including inferior and deep artery. Pterygoid venous plexus is found there¹⁻⁵. Nerves involve mandibular nerve, inferior alveolar nerve, lingual nerve, buccal nerve, chorda tympani nerve, and otic ganglion⁷⁻⁹. The foramen ovale and foramen spinosum open on its roof, and the alveolar canals on its anterior wall. At its upper and medial part are two fissures, which together form a T-shaped fissure, the horizontal limb being named the inferior orbital, and the vertical one the pterygomaxillary⁴⁻⁶⁻⁹. Approaches to temporal fossa are multiple and involve surgical expertise. Approaches includes anterior trans-facial approach using Weber Ferguson incision, transorbital, transpterygoid, transantral, transpalatine extended maxillectomy, maxillary swing, transoral via gingivolabial sulcus, pre-auricular transzygomatic, transcranial, transmandibular facial degloving, pre-auricular transtemporal, recently endoscopic approach are also gaining popularity³⁻⁵. Prognosis of disease is depended upon the final histopathology of tissue. In this case a young male presented with huge extensive growth but fortunately turn out benign and resected completely with good prognosis. The important aspect is the per operative surgical technique used to clear disease and the patience to clear it completely saving all vital surrounding structures.

CONCLUSION : Infra-temporal growth is difficult to handle per operatively because of the vital surrounding structures. It needs surgically experience hand to excise completely and providing less morbidity to patient. In this case what we found is the late presentation, extensive but benign lesion. Not easily but resectable completely with gentle care and skilled techniques per operatively.

REFERENCES :

1. Jump up^ Moore, Keith L & Dalley, Arthur (2006). Clinically oriented anatomy (5th ed.), Lippincott Williams & Wilkins.
2. AK, Jackler RK, Gutin PH. Lethal fibrosarcoma complicating radiation therapy for benign glomus jugulare tumor. *Am J Otol.* 1993 Jul;14(4):398-402. [PubMed].
3. Fisch U. Infratemporal fossa approach to tumours of the temporal bone and base of the skull. *J Laryngol Otol.* 1978 Nov;92(11):949-67. [PubMed].
4. Green JD, Jr, Brackmann DE, Nguyen CD, Arriaga MA, Telischi FF, De la Cruz A. Surgical management of previously untreated glomus jugulare tumors. *Laryngoscope.* 1994;104(8 Pt 1):917-921. [PubMed].
5. Woods CI, Strasnick B, Jackson CG. Surgery for glomus tumors: the Otology Group experience. *Laryngoscope.* 1993;103(11 Pt 2 Suppl 60):65-70. [PubMed].
6. Fisch U. Surgery for Bell's palsy. *Arch Otolaryngol.* 1981;107(1):1-11. [PubMed].
7. de Jong AL, Coker NJ, Jenkins HA, Goepfert H, Alford BR. Radiation therapy in the management of paragangliomas of the temporal bone. *Am J Otol.* 1995 May;16(3):283-9. [PubMed]
8. Boyle JO, Shimm DS, Coulthard SW. Radiation therapy for paragangliomas of the temporal bone. *Laryngoscope.* 1990 Aug;100(8):896-901. [PubMed]
9. Sobol SM, Dailey JC. Familial multiple cervical paragangliomas: report of a kindred and review of the literature. *Otolaryngol Head Neck Surg.* 1990 Apr;102(4):382-90. [PubMed]

PAKISTAN JOURNAL OF OTOLARYNGOLOGY, HEAD & NECK SURGERY

Patron

Shabih H. Zaidi

Chief Editor

M. Umar Farooq

Editors

Tariq Rafi

M. Saleem Marfani

Iqbal Hussain Udaipurwala

Associate Editors

S. Khalid Ashrafi

Syed Iqbal Hussain

Iqbal A. Muhammad Khyani

M. Shuja Farrukh

Assistant Editors

Atif Hafeez Siddiqui

Zafar Mehmood

Overseas Editors

Shahid Hassan

Hemant Ahluwalia

Managing Editors

Zeba Ahmed

Syeda Uzma Naqvi

Danish ur Raheem

Irfan Ahmed Shaikh

Sub Editors

Zubair Iqbal Bhutta (Punjab)

Asudomal Khemani (Sindh)

Asmatullah Kakar (Balochistan)

Asmatullah (Khyber Pukhtoon Khawa)

Allah Lok Sabir (AK/Gilgit)

Editorial Board

Azam H. Yousufain (Nawabshah)

Maj. Gen. M. Ashfaq (Rawalpindi)

Sultan Pradhan (India)

Reda Kamel (Egypt)

M. V. Kirtane (India)

Abbas Zafar (Karachi)

M. Usman (Karachi)

Brig. Amer Sabih Hydri (Karachi)

B.S. Gendeh (Malaysia)

Mumtaz Jamshed (USA)

M. Amjad (Lahore)

M. Ali Tirmizy (Faisalabad)

Farooq Ahmed Mian (Faisalabad)

Lokman Saim (Malaysia)

Laszlo Lujber (Hungary)

Isteraj Shahabi (Peshawar)

Brig. Zubair (Lahore)

Brig. Tahir Manzoor (Rawalpindi)

Bimal K. Sinha (Nepal)

Saeed Akhter (Karachi)

Sohail Awan (Karachi)

Ismail Hirani (Karachi)

Anjum Naveed (Karachi)

Zainullah Kakar (Quetta)

Salman Matiullah (Karachi)

Murtaza Ahsan Ansari (Karachi)

Talat Mehmood (Bahawalpur)

Scharukh Jalisi (USA)

Kalimullah Thahim (Karachi)

Business & Circulation

Raja Fahad Hussain

INDEXED AND ABSTRACTED BY PAKISTAN SCIENCES ABSTRACTS,
EXCERPTA MEDICA (AMSTERDAM), IMEMR (INDEX MEDICUS FOR
WHO EASTERN MEDITERRANEAN REGION) AND EMBASE,
RECOGNISED BY PMDC & HIGHER EDUCATION COMMISSION, PAKISTAN.
ISSN # : 0257-4985

Pakistan Journal of Otolaryngology is published in April, August and December

© 1999 Pakistan Journal of Otolaryngology. No part of this Journal may be reproduced in any form or by any means mechanical or electrical, including information storage and retrieval system without the written permission of the publisher.

Authorization to photocopy items for internal or personal use of specific clients is granted by Pakistan Journal of Otolaryngology for users registered with copyright clearance centre (CCC). Transactional Reporting Service provided that the base fee of US \$ 2.00 per copy is paid directly to CCC, 27 congress Street, Salem MA 01970 USA. For those organizations that have been granted a photocopy licence by CCC, a separate system of payment has been arranged. The fee code for users of the Transactional Reporting Service is 0257-4985 US \$ 2.00+0

Address:-

M. Umar Farooq

Chief Editor, PJO, Dept. of E.N.T. Head & Neck Surgery, Dow University of Health Sciences, Dow Medical College, and Civil Hospital, Karachi-Pakistan.

Phone: (92-21) 99215717, Cell : 0333-3225262

E-mail: pjorl.entsociety@gmail.com

VISIT PJORL ON www.pjorl.com