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Artificial Intelligence (AI) in Medical Education and Practice

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In recent years, the integration of artificial intelligence (AI) into various facets of healthcare has sparked a transformative revolution, particularly in medical training and practice. The intersection of cutting-edge technology and the age-old practice of medicine is reshaping the landscape of healthcare education, providing unprecedented opportunities for both aspiring and seasoned medical professionals. This editorial explores the multifaceted role of AI in medical training and its profound impact on enhancing clinical practice, diagnostics, and patient outcomes.

Artificial Intelligence refers to the simulation of human intelligence in machines programmed to perform tasks that typically require human intelligence. This includes learning, reasoning, problem-solving, perception, and language understanding.

Due to enhanced efficiency AI systems can analyze large datasets at incredible speeds, leading to faster and more accurate decision-making. Automation of repetitive tasks such as data analysis and administrative duties can be automated, freeing up time for healthcare professionals to focus on more complex aspects of patient care. AI can also predict disease outbreaks, patient deterioration, and treatment responses, allowing for proactive healthcare management. AI systems by continuous learning can adapt and improve their performance over time through machine learning, ensuring ongoing advancements in medical practices.

AI is designed to assist and enhance human abilities, rather than replace them. Promoting AI as a substitute for human creates feeling of insecurity and gives rise the ethical concerns. These concerns can hinder the wide spread acceptance and integration of AI technology. Consequently, people with such concerns are using their energy to oppose it rather to adopt it.

AI facilitates realistic virtual simulations for medical training, allowing students to practice procedures in a risk-free environment. AI-driven platforms by Personalized Learning Paths can tailor educational content to individual student needs, promoting more effective learning. AI can also analyze student performance data to identify areas for curriculum enhancement and optimization. AI applications can provide diagnostic training by simulating real-world patient cases, aiding in the development of diagnostic skills. AI-powered tools provide remote learning assistance which can enable students to access educational resources and interactive content from anywhere.

The challenges and considerations of AI include ethical concerns/issues related to data privacy, bias in algorithms, and ethical use of AI in decision-making. Another challenge is ensuring seamless integration and standardization of AI tools into medical education systems and establishing standards for their use. Regular monitoring and updating of AI algorithms is required to align with evolving medical knowledge and practices.

The incorporation of AI into medical training and practice represents a paradigm shift in healthcare education and delivery. As technology continues to evolve, the synergy between AI and human intelligence has the potential to redefine the landscape of medicine. By embracing these advancements responsibly and ethically, the healthcare industry can harness the full potential of AI to enhance medical education, improve diagnostic accuracy, and ultimately elevate the quality of patient care. As researchers and practitioners continue to explore the possibilities, the future of healthcare promises to be a harmonious blend of human expertise and artificial intelligence, working hand in hand to advance the well-being of individuals and communities worldwide.

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Randomized Control Trial: Ancillary Treatment Versus Co-amoxiclav in Bacterial Rhinosinusitis Management

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ABSTRACT OBJECTIVE: To compare ancillary treatment with co amoxiclav for management of bacterial rhinosinusitis. **METHOD:** This study is Randomized Clinical Trial conducted at Department of ENT, Head and Neck Surgery, Pakistan Institute of Medical Sciences, Islamabad, from 04 February 2022 to 03 August 2022. **METHODOLOGY:** After approval, 100 patients fulfilling selection criteria included in the study. Informed consent was obtained from all patients. Selected patients underwent thorough ENT examination including the anterior rhinoscopy. Patients were randomized into two study groups, namely group A and group B. Group A were those that received antibiotic treatment Amoxicillin- Clavulanate 625 mg TDS along with Xylometazoline for 5 days and ibuprofen for 5 days and Group B patients was given ancillary treatment, along with Xylometazoline for 5 days and ibuprofen was given for 5 days. Ancillary treatment includes nasal douching and oral hydration. Patients from both groups were assessed on day 0, after 1 week and after 2 weeks. **RESULTS:** We enrolled 100 patients in our study 50 in each group. Mean age was 36.58 years with male : female ratio of 1:1. There was no significant difference between the two groups in term of age ($p = 0.922$) and gender ($p = 0.841$). At baseline in group A and B total symptoms scores were 11.64 ± 2.13 vs 11.44 ± 1.96 , ($p = 0.626$) respectively. After one week of treatment scores for group A and B were 9.88 ± 2.72 vs 7.94 ± 2.41 ($p = 0.000$) and after two weeks were 9.20 ± 3.46 vs 5.68 ± 2.57 , ($p = 0.000$) respectively. **CONCLUSION:** Ancillary treatment for bacterial rhinosinusitis is better than treatment with antibiotics.

Key words: Efficacy, ancillary treatment, co-amoxiclav, bacterial rhino sinusitis, TSS Score

INTRODUCTION: One of most frequent ENT illnesses is rhinosinusitis. It places a significant financial strain on health-care system, not to mention human toll of misery and morbidity for patients suffering from severe symptoms. Mucus-secreting goblet cells, columnar cells and basal cells line paranasal sinuses, which are bordered with pseudostratified ciliated columnar epithelia.

Cilia are important for clearance of mucus and are part of respiratory system's innate defense system, which includes the paranasal and nasal sinuses. Mucus entrapment may occur when the mucus clearance from paranasal sinuses to meati of nose is stopped, increasing risk of the infection.

The RSV (respiratory syncytial virus), influenza, parainfluenza and rhinovirus are among the causes of common cold, with rhinovirus being most frequent. Streptococcus pneumoniae (41 percent) and Haemophilus influenzae (35 percent) are the most frequent species in ABRS (acute bacterial rhinosinusitis).¹

The "American Academy of Otolaryngology-Head

and Neck Surgery" recommends diagnosing the ABRS when signs or symptoms of the acute rhinosinusitis purulent nasal discharge accompanied by nasal obstruction, facial pain/pressure/fullness, or both persist without the evidence of improvement for minimum 10 days after onset of the symptoms, or when the signs or symptoms of the acute rhinosinusitis deteriorate within 10 days of starting improvement or milder phase of the illness "double sickening".

In individuals with symptoms of acute rhinosinusitis that does not improve after 7 days or worsen at any time, narrow-spectrum medicines like amoxicillin are indicated. At time of diagnosis, empiric antibiotic treatment is normally started in individuals with signs or symptoms of the ABRS. In children and adults, co-amoxiclav is preferable over the amoxicillin alone for the empiric treatment.^{2, 3}

Antibacterial resistance among these and other common respiratory pathogens is now widespread and of concern. Environmental factors predispose

patients to chronic rhinosinusitis. The rhinosinusitis pathophysiology continues to change. According to research various host factors and inflammatory pathways contribute to its pathogenesis. It is not just an infection, though pathogens with bacterial biofilms can certainly contribute to the inflammatory cascade.

Patients with the symptoms of mild to moderate (e.g., minor discomfort, fever < 101 F) should get symptomatic therapy with decongestants, analgesics and saline nasal irrigation. Reduction of the nasal mucosa inflammation, facilitation of the secretion outflow, and restoration of the mucociliary clearance inside sinuses are pillars of rhinosinusitis therapy.⁴

Ancillary sinusitis therapy starts at home, where many patients will use a combination of medicinal and nonmedical techniques to alleviate sinusitis symptoms. Because of large range of drugs and nonmedical equipment accessible to public without prescription, several kinds of treatment are conceivable.⁵

Pharmaceutical producer's main income generators include mucolytics, expectorants, antihistamines, decongestants and combinations of these. α -Adrenergic decongestants are often found over-the-counter for common cold, sinusitis treatments. Nasal irrigation has been shown to be an effective adjuvant therapy for acute sinusitis in children. In atopy youngsters, regular saline nasal irrigation also helps to alleviate allergy symptoms.^{6, 7}

By employing saline nasal irrigation that has been shown to be beneficial in individuals with rhinosinusitis, reason for treating inflammation is to decrease swelling of mucosa, it can subsequently relieve clogged sinus antrum and enhance outflow.⁸ Self-administered saline irrigation aids in the outflow of secretions by removing crusts, irritants and mucus. As a result, removing the biofilm manually would be an excellent therapy for a biofilm illness, which may be performed to some degree by the saline irrigation.

STUDY METHOD: It was a single-Centre, randomized clinical trial conducted on the Rhinosinusitis Patients presented in the Department of ENT, Head and Neck Surgery, Pakistan Institute of Medical Sciences, Islamabad from June 2021 to November 2021. Patients of age 12 to 60 years of age diagnosed as bacterial Rhino sinusitis and willing to participate in study were included. Patients who were immunocompromised,

nasal deformities, allergy to study medications, pregnancy and lactating mothers, previous paranasal sinus surgeries, cases with complications due to spread of the infection to surrounding areas, and space occupying lesions in nasal cavities were excluded. The sample size was calculated by using WHO sample size calculator with level of significance=5%, power of test=80%, pstandard deviation=0.76, test value of population, mean value of total symptom score (TSS) for nasal congestion in antibiotic group=1.14, anticipated population mean value of TSS score for nasal congestion in irrigation group=0.71. The sample size turned out to be 50 patients in each group and total of 100 patients was included in study. Non-probability consecutive sampling used in this study.

The patients aged above 12 years with clinical diagnosis of bacterial rhino sinusitis was taken up for the study. Informed consent was obtained from all patients. Selected patients were undergone thorough ENT examination including the anterior rhinoscopy. These patients were then randomized into two study groups, namely group A and group B. Patients were informed about their inclusion in the study, the procedure they will undergo, its benefits and risks involved. Data was collected on the proforma. Group A were those that received antibiotic treatment Amoxicillin- Clavulanate 625 mg TDS along with Xylometazoline for 5 days and Ibuprofen for 5 days and Group B patients was given ancillary treatment, along with Xylometazoline for 5 days and Ibuprofen was given for 5 days. The patients were blinded during the study period. Ancillary treatment includes nasal douching, oral hydration. Patients from both groups were assessed on day 0, after 1 week and after 2 weeks.

The data was analyzed in SPSS version 25. Descriptive statistics were calculated for the both qualitative and quantitative variables. Qualitative variables like gender and symptoms were presented as frequency with percentage.

Quantitative variables like age were presented as mean with standard deviation. T test was applied to compare improvement in symptoms between both groups. The P value ≥ 0.05 was taken significant

RESULTS: We enrolled 100 patients in our study 50 in each group. Mean age was 36.58 years with male : female ratio of 1:1. There was no significant difference between the two groups in term of age ($p = 0.922$) and gender ($p = 0.841$). At baseline in

group A the total symptoms score (TSS) was 11.64 ± 2.13 and in group B was 11.44 ± 1.96 with no statistically significant difference between the two groups ($p = 0.626$). After 1st week in group A the total symptoms score was 9.88 ± 2.72 and in group B was 7.94 ± 2.41 with significant p value ($p = 0.000$).

After 2nd week in group A the total symptoms score was 9.20 ± 3.46 and in group B was 5.68 ± 2.57 with significant p value ($p = 0.000$).

Total symptoms score in group B significantly decreased as compared with group A which showed that ancillary treatment is better than antibiotic treatment method.

DISCUSSION: Most patients with the viral URI (upper respiratory infections) heal within the seven

		Group		Total
Symptoms		Group A (Antibiotic Treatment)	Group B (Ancillary Treatment)	
Sneezing	No	12	11	23
	Symptom	24.0%	22.0%	23.0%
	Mild	9	12	21
	Symptom	18.0%	24.0%	21.0%
	Moderate	21	13	34
	Symptom	42.0%	26.0%	34.0%
Congestion	Severe	8	14	22
	Symptoms	16.0%	28.0%	22.0%
	Mild	17	13	30
	Symptom	34.0%	26.0%	30.0%
	Moderate	21	18	39
	Symptom	42.0%	36.0%	39.0%
Itching	Severe	12	19	31
	Symptom	24.0%	38.0%	31.0%
	Mild	9	18	27
	Symptom	18.0%	36.0%	27.0%
	Moderate	24	17	41
	Symptom	48.0%	34.0%	41.0%
Nasal Obstruction	Severe	17	15	32
	Symptom	34.0%	30.0%	32.0%
	Mild	15	18	33
	Symptom	30.0%	36.0%	33.0%
	Moderate	15	15	30
	Symptom	30.0%	30.0%	30.0%
Facial Pain	Severe	20	17	37
	Symptom	40.0%	34.0%	37.0%
	Mild	18	27	45
	Symptom	36.0%	54.0%	45.0%
	Moderate	19	13	32
	Symptom	38.0%	26.0%	32.0%
Rhinorrhea	Severe	13	10	23
	Symptom	26.0%	20.0%	23.0%
	Mild	16	14	30
	Symptom	32.0%	28.0%	30.0%
	Moderate	14	15	29
	Symptom	28.0%	30.0%	29.0%
	Severe	20	21	41
	Symptom	40.0%	42.0%	41.0%

Table-1: Results of symptoms at baseline in study groups

days, and around two-thirds of patients with ABRS improve without taking any antibiotic therapy.⁽¹¹⁾ Antibiotics should only be used for the patients who had symptoms for greater than seven days.^{9,12} Co-amoxiclave, cephalosporins (cefuroxime and cefixime) and macrolides (azithromycin and clarithromycin) have been studied extensively.^{10,13,14}

		Group		Total
Symptoms		Group A (Antibiotic Treatment)	Group B (Ancillary Treatment)	
Sneezing	No	17	21	38
	Symptom	34.0%	42.0%	38.0%
	Mild	9	12	21
	Symptom	18.0%	24.0%	21.0%
	Moderate	21	10	31
	Symptom	42.0%	20.0%	31.0%
Congestion	Severe	3	7	10
	Symptom	6.0%	14.0%	10.0%
	No	4	10	14
	Symptom	8.0%	20.0%	14.0%
	Mild	17	13	30
	Symptom	34.0%	26.0%	30.0%
Itching	Moderate	21	17	38
	Symptom	42.0%	34.0%	38.0%
	Severe	8	10	18
	Symptom	16.0%	20.0%	18.0%
	No	6	10	16
	Symptom	12.0%	20.0%	16.0%
Nasal Obstruction	Mild	9	17	26
	Symptom	18.0%	34.0%	26.0%
	Moderate	24	18	42
	Symptom	48.0%	36.0%	42.0%
	Severe	11	5	16
	Symptom	22.0%	10.0%	16.0%
Facial Pain	No	3	10	13
	Symptom	6.0%	20.0%	13.0%
	Mild	15	18	33
	Symptom	30.0%	36.0%	33.0%
	Moderate	15	15	30
	Symptom	30.0%	30.0%	30.0%
Rhinorrhea	Severe	17	7	24
	Symptom	34.0%	14.0%	24.0%
	No	5	10	15
	Symptom	10.0%	20.0%	15.0%
	Mild	18	27	45
	Symptom	36.0%	54.0%	45.0%
	Moderate	19	13	32
	Symptom	38.0%	26.0%	32.0%
	Severe	8	0	8
	Symptom	16.0%	0.0%	8.0%
	No	6	9	15
	Symptom	12.0%	18.0%	15.0%
	Mild	16	15	31
	Symptom	32.0%	30.0%	31.0%
	Moderate	15	16	31
	Symptom	30.0%	32.0%	31.0%
	Severe	13	10	23
	Symptom	26.0%	20.0%	23.0%

Table-2: Results of symptoms at 1st follow up in study groups

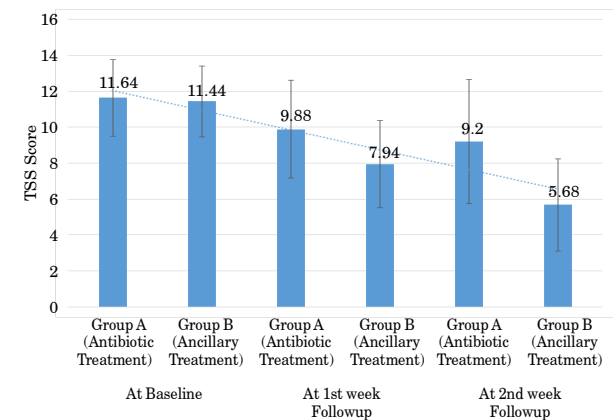
		Group		Total
Symptoms		Group A (Antibiotic Treatment)	Group B (Ancillary Treatment)	
Sneezing	No	22	26	48
	Symptom	44.0%	52.0%	48.0%
	Mild	4	16	20
	Symptom	8.0%	32.0%	20.0%
	Moderate	21	5	26
	Symptom	42.0%	10.0%	26.0%
	Severe	3	3	6
Congestion	Symptom	6.0%	6.0%	6.0%
	No	4	16	20
	Symptom	8.0%	32.0%	20.0%
	Mild	22	13	35
	Symptom	44.0%	26.0%	35.0%
	Moderate	18	16	34
	Symptom	36.0%	32.0%	34.0%
Itching	Severe	6	5	11
	Symptom	12.0%	10.0%	11.0%
	No	6	15	21
	Symptom	12.0%	30.0%	21.0%
	Mild	9	20	29
	Symptom	18.0%	40.0%	29.0%
	Moderate	28	14	42
Nasal Obstruction	Symptom	56.0%	28.0%	42.0%
	Severe	7	1	8
	Symptom	14.0%	2.0%	8.0%
	No	3	18	21
	Symptom	6.0%	36.0%	21.0%
	Mild	19	18	37
	Symptom	38.0%	36.0%	37.0%
Facial Pain	Moderate	14	10	24
	Symptom	28.0%	20.0%	24.0%
	Severe	14	4	18
	Symptom	28.0%	8.0%	18.0%
	No	7	18	25
	Symptom	14.0%	36.0%	25.0%
	Mild	17	28	45
Rhinorrhea	Symptom	34.0%	56.0%	45.0%
	Moderate	19	4	23
	Symptom	38.0%	8.0%	23.0%
	Severe	7	0	7
	Symptom	14.0%	0.0%	7.0%
	No	6	13	19
	Symptom	12.0%	26.0%	19.0%
	Mild	22	26	48
	Symptom	44.0%	52.0%	48.0%
	Moderate	10	7	17
	Symptom	20.0%	14.0%	17.0%
	Severe	12	4	16
	Symptom	24.0%	8.0%	16.0%

Table-3: Results of symptoms at 2nd follow up in study groups

The evidence to support use of the ancillary therapy for ABRS is weak.^{15,16} There have been no randomized controlled trials (RCTs) of ancillary treatment for ABRS using total symptoms score before and after treatment.

Therefore, we conducted this study at the Department of ENT, Head and neck surgery PIMS Hospital, Islamabad to compare the ancillary

TSS Score	Groups	N	Mean	SD	p value
At Baseline	Group A (Antibiotic Treatment)	50.00	11.64	2.13	0.626
	Group B (Ancillary Treatment)	50.00	11.44	1.96	
At 1st week	Group A (Antibiotic Treatment)	50.00	9.88	2.72	0.000
	Group B (Ancillary Treatment)	50.00	7.94	2.41	
At 2nd week	Group A (Antibiotic Treatment)	50.00	9.20	3.46	0.000
	Group B (Ancillary Treatment)	50.00	5.68	2.57	

Table-4: Results of TSS Score in study groups**Figure-1:** Results of TSS Score in study groups

treatment with co-amoxiclav treatment for the management of bacterial rhinosinusitis.

At baseline in group A and B total symptoms score was 11.64 ± 2.13 vs 11.44 ± 1.96 ($p = 0.626$), after 1st week was 9.88 ± 2.72 vs 7.94 ± 2.41 ($p = 0.000$) and after 2nd week was 9.20 ± 3.46 vs 5.68 ± 2.57 ($p = 0.000$). Total symptoms score in group B significantly decreased which showed ancillary treatment is better than antibiotic treatment method in management of bacterial rhinosinusitis. Although some trials suggest a reduction in symptoms, no therapies have been found to reduce the length of sickness. Until the symptoms go away, oral decongestants may be utilized. Decongestants have not demonstrated to significantly raise blood pressure in persons with the stable hypertension.¹⁷ In individuals with ischemic heart disease, glaucoma, or prostatic hypertrophy, decongestants must be taken with care.

Although topical decongestants have recommended in past, their usage is more debatable now. Some patients' symptoms have improved, however decreased mucosal blood flow can worsen inflammation.¹⁸ To prevent rebound

vasodilation, topical decongestants must not be administered for more than 5 days.

Antihistamines have not been shown to be effective in treatment of ABRs patients in the clinical trials. Despite the fact that histamine does not have role in this infectious disease, especially in people with a predisposed allergic rhinitis, these medications have anti-inflammatory properties that can be useful.¹⁹

Anticholinergic effects of the first-generation antihistamines, on other hand, may impede evacuation by the thickening mucus. Newer second-generation antihistamines have little or the no anticholinergic impact and may be useful in treatment of the chronic sinusitis and allergy patients, but they are not indicated for those with ABRs.²⁰

Ipratropium bromide topical anticholinergic agent, has used to reduce rhinorrhea in the patients with common cold, but there have been no studies in the patients with the ABRs. Ipratropium has potential to increase impair clearance and mucus viscosity, but this effect seems to be less pronounced than with the antihistamines.²¹

Intranasal steroids have not demonstrated to improve clinical outcomes in the patients with the ABRs in many investigations. Patients with nasal polyposis and chronic sinusitis, also ABRs, were included in such trials, which were often underpowered.²²

Fluticasone was compared to the placebo in treatment of individuals with ABRs in fresh RCT confined to the patients with history of the past chronic or recurrent sinusitis. For 3 days, both groups got topical xylometazoline and cefuroxime. Patients who got fluticasone improved faster (6.0 days vs. 9.5 days) than those who received placebo.²³

Mist humidification, nasal irrigation and spray of nasal saline have advised in past to enhance mucociliary clearance by lowering congestion, moistening nasal cavity, and eliminating crusty mucus. Many studies have small sample size, many were not the controlled, and methodologies varied, therefore evidence supporting their usage is only fair.

Saline irrigation is completely safe, with no known major side effects. In individuals with chronic sinusitis, hypertonic saline irrigation relieved symptoms and reduced medication usage. Saline sprays have found to improve rhinitis symptoms, but no trials have been done in individuals with ABRs. Mist usage in Upper respiratory tract

infection has not been shown to be beneficial in controlled research.²⁴

In patients with ABRs, there is inadequate evidence to advocate use of the vitamin C, zinc salt lozenges, or echinacea. A meta-analysis of eight clinical studies using zinc salt-lozenge therapy for the common cold, found no substantial improvement based on the outcome of cold symptoms after seven days.^{3, 24}

A minor advantage was observed in many studies using echinacea extract in treatment of common cold, but each experiment had major methodologic errors.²⁴

According to Nayak et al nasal spray, used twice daily as an ancillary therapy to the oral antibiotic treatment, was well tolerated and much more effective in lowering rhinosinusitis symptoms than antibiotic therapy alone.²⁵ These results matched with our study results.

CONCLUSION: Ancillary therapy to the oral antibiotic treatment, was well tolerated and much more effective in lowering bacterial rhinosinusitis symptoms than antibiotic therapy alone. So, we concluded that ancillary treatment for bacterial rhinosinusitis is better than treatment with antibiotics.

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Branchial Anomalies of Neck: An Experience of a Tertiary Care Hospital

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ABSTRACT: OBJECTIVE: The objective of this study is to review the clinical characteristics and surgical treatment outcomes of branchial anomalies, and to evaluate the usefulness and accuracy of preoperative CT scan in the diagnosis of branchial anomalies. **METHODS:** A retrospective review, single center experience at Dr. Ziauddin University Hospital **RESULTS:** Nineteen patients were reviewed, 9 (47%) were females and 10 (53%) were males. Out of 19 patients, 17 (89%) were presented as a swelling and two as a discharging sinus. Eleven patients (64%) on left side of neck while the rest had a swelling on right. CT scan was a preferred mode of investigation. All patients of second branchial cleft anomalies were treated surgically under general anesthesia. No recurrence was observed. **CONCLUSION:** Branchial cysts are more common on the left side. CT scan is adequate investigation to see the extent disease. If managed properly, recurrence rate is almost negligible.

Key words: Branchial anomalies, Branchial cyst, Branchial fistula, surgical procedure, CT Scan, recurrence,

INTRODUCTION: During embryonic life by the seventh week, enfold clefts or sinuses normally disappear giving smooth contour of the neck, if it fails to involute completely it will form an epithelium-lined cyst, called a branchial cyst.¹ There are multiple theories on pathogenesis to explain the development of branchial anomalies includes the branchial apparatus theory, cervical theory, inclusion theory and thymopharyngeal duct theory, out of these theories branchial anomalies is the most accepted theory that result from incomplete involution of the branchial apparatus.²

Depending on their anatomic location, branchial anomalies are classified into 1st, 2nd, 3rd and 4th anomalies. It has been estimated that 95% of branchial anomalies are derived from the 2nd branchial arch, pouch and cleft. The majority of the remaining 5% are derived from the first and the third branchial remnants. Fourth branchial remnants are extremely rare.^{3,4}

In this study, we present our experience of reviewing branchial cysts cases over a period of 6 years at tertiary care hospital.

STUDY METHOD: This is a retrospective study of branchial cysts managed at Dr Ziauddin University Hospital for a period of six years. Nineteen patients of branchial defects are included in this study. All ages and both gender

were included which were operated and had confirmed diagnosis of branchial cysts on histopathology. We excluded those cases which were clinically diagnosed branchial cysts but were not confirmed on histopathology or did not undergo surgery.

RESULTS: Nineteen patients were reviewed, out of which 9 (47%) were females and 10 were males. Hence the male to female ratio was almost 1:1. The age of presentation had a wide range; it varied from 2 months to 36 years but had a mean of around 22 years. Six cases were in their 30's (31%), while the rest were in their second and third decades. Only two cases were below one year and both were male.

Out of 19 patients, 17 (89%) presented as a swelling while two presented as a discharging sinus. Out of the 17 patients, 11(64%) had a swelling on left side while the rest had a swelling on right. Out of these 17 cases, 7 had various signs and symptoms of infection or an abscess formation in the cyst, like pain, fever and discharge.

Two cases presented as fistulas, one had a discharging sinus in the second branchial arch while the other was a case of the First Arch Syndrome.

On physical examination, it was found that majority of them were firm and fluctuant cystic lesions. Only 2 out of the 17 swellings were soft.

All swellings were mobile except 2. The majority presented in the anterior triangle. The mode of investigation employed by our department was either a CT scan or FNA or both. CT scan was a preferred mode of investigation as it also provided insight in the extent of surgical exploration needed and was more cost effective compared to MRIs. The surgical technique employed in all cases was excision of cyst along with ligation of sinus tract if present.

Almost all of the cysts were lined with squamous epithelium, only one had pseudostratified columnar epithelium. Most of them showed signs of inflammation (13 out of 19), either acute or chronic. In the remaining, 2 had lymphoid tissue and 2 had lymphocytic infiltrates. Only 2 cysts showed signs of hemorrhage.

DISCUSSION: The assessment of a patient with a neck mass in the out-patient department, the stepwise method is to proceed from a history, to physical examination, and eventually investigations depending on the clinical assessment. A patient of any age group can present with a congenital neck mass, which could be anything from a branchial cysts to a thyroglossal duct cyst, lymphangiomas, cystic hygromas, dermoid cysts, and hemangiomas.^{5,11}

In a study done by Robert L Tabdler et al⁶ and John. M. Buckingham et al⁷, the anomalies of branchial cysts were more common in males than females, whereas our study does not show any predilection for either sex. Apart from gender both of these studies also showed that these anomalies presented mostly during the first decade of their life whereas in this study the majority of patients presented in the second or the third decade which could be attributed to lesser medical awareness and the attitude of patients in Pakistan towards seeking medical advice.

Kalra VK, et al² showed that about 65% branchial anomalies were more on the right side. Another study done by Gaszyńska E, et al¹² showed that presentation of patients with a branchial cyst was more on right side where as in this study the majority of patient presented on left side.

As far as imaging was concerned a study conducted in Mount Sinai Hospital, USA⁹, showed that MRI was a superior modality as it provided a better plane of soft tissue resolution. Shekdar KV et al¹² showed that MR imaging is a better tool in the evaluation of neck lesions and provide a good information for planning the surgery. In this study it was seen that CT was preferred over MRI and

was usually advised due to cost effectiveness. Other diagnostic tools^{8,13} which have also helped in improving the accuracy of diagnosis is ultrasonography and FNA.

The surgical technique preferred in the various studies^{3,6,7,13} was complete excision under general anesthesia which was also the mode of treatment for the patients in current study.

Retrospective analysis of 50 patients by C Spinelli et al⁸ quoted recurrence rate of 4%. Another study Kalra VK et al² showed the recurrence rate of 2.12%, where as in this study the recurrence rate was zero over a follow-up of 5 years.

O. Dio et al¹⁰ showed the histological findings of either squamous or respiratory epithelium or mixed epithelium. They found presence of lymphoid aggregates in more than 50 % of the patients. Another study done by Hammarstedt et al⁽¹⁴⁾ showed a presence of cystic metastases were in 3% of patient. Another reference showed that branchial cleft cysts lined by stratified squamous epithelium in 90% of cases.⁽¹⁵⁾ Whereas in this study, the presentation was mostly with squamous epithelium, only 15% had Lymphoid aggregates on histopathological evaluation with no metastases.

CONCLUSION: We can conclude that brachial cysts are more common on the left side, presentation could be late and CT scan is adequate to see the extent. If managed properly, the recurrence rate is almost negligible.

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Neonatal Hearing Screening by Otoacoustic Emission: When To Do Rescreening?

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ABSTRACT OBJECTIVE: To determine the frequency of 'pass' in otoacoustic emissions test who were 'refer' at initial screening at birth. **METHOD:** This case series was conducted on newborns n=234 in Patel Hospital from December 2022 till June 2023. Newborns were screened using the Distortion Product Otoacoustic Emission DPOAE test at the first 24 hours after birth. The results were documented as "Pass" desirable or "Refer" undesirable. Neonates with undesirable results were re-screened during the next 2-3 weeks. **RESULTS:** From 234 neonates screened, 51.2% had a "pass" response and remaining 48.8% infants did not match "pass" criteria. The "refer" infants were either for bilateral ear involvement 24.7%, 6.8% infants were "refer" for unilateral ear involvement and 17% infants were labelled "refer" due to unavailability of meeting testing criteria either due to crying or not co-operating. The infants who were initially "refer" were followed up in 2 to 3 week's time, and the final "pass" percentage was 96.2%. **CONCLUSION:** In this study it is concluded that although at initial screening, about half of the total population in this study was "refer", but at follow up visits most of them showed a "pass" response. Those who were "refer" at subsequent follow up visits, were referred for further work up. Awareness is needed in the society and among the medical professionals regarding the efficacy and advantage of this screening test and proper follow up of initial "refer" patients is mandatory.

Key words: Neonates, Otoacoustic emission, Pass, Refer.

INTRODUCTION: The auditory function is crucial for children, impacting their speech and language acquisition, socialization, and cognitive development, as they learn to speak based on auditory input.¹ Significantly, over 80% of hearing impairments are either congenital or manifest during the perinatal period, underscoring the importance of hearing screening.^{2,3} The Universal Newborn Hearing Screening and Early Intervention Program UNHSEIP targets early identification of hearing loss in newborns to facilitate timely intervention, aiding in language, learning, and social development. Modern screening and diagnostic tools enable the quantification of hearing at initial stages, achievable through screening and/or diagnostic hearing assessments.⁴ Otoacoustic Emissions OAEs currently stand out as the preferred method for neonatal audiological screening. Various tests, such as Crib-O-Gram COG, automated Auditory Brainstem Response audiometry AABR, and OAE testing, are available for newborn hearing screening. Notably, OAE testing is the predominant method for assessing cochlear

integrity, providing a swift and objective screening test for the peripheral auditory system and cochlea, the areas most frequently implicated in sensorineural hearing loss.⁵ The primary objective of OAE tests is to assess cochlear status, particularly hair cell function.⁶

Early detection of hearing loss, the most prevalent pediatric disability, is imperative. At birth, peripheral auditory organs are fully developed, while auditory cerebral cortices mature within 2-3 years post-birth through sound stimulation. Beyond this critical period, the brain's plasticity diminishes, limiting language development despite hearing rehabilitation.⁷ Consequently, it is recommended that all newborns undergo hearing screening within one month of birth using an automated AABR test or OAEs test to ensure effective hearing development and rehabilitation.⁸ Four types of OAEs-Spontaneous OAEs (SOAE), Transient Evoked OAEs (TEOAE), Distortion Product OAE DPOAE, and Stimulus Frequency OAEs (SFOAE) are available.^{5,11}

Hearing loss very early in life can have multiple deleterious effects on the newborn, specifically the

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attainment of speech and language. Early identification has shown to improve prognosis, hence screening programs have been widely and strongly advocated.¹² The World Health Organization (WHO) estimates that 60% of hearing loss in children is due to preventable causes such as ear infections and vaccine-preventable diseases.¹³ While hearing loss in 40% of cases cannot be reversed, its impact can be reduced through the timely use of various approaches,^{7,14} like hearing assistive technology and therapies to develop spoken language or non-verbal communication, such as sign language.

Newborn hearing screening is pivotal for the early detection of hearing impairment, as without it, moderate to severe hearing loss is typically identified between 1 and 2 years of age, while mild hearing loss is only discernible before school age.^{15,16} However, a significant concern in newborn hearing screening is the false positive rate of 3% to 8%, potentially causing persistent anxiety and negatively impacting parent-child relationships.¹⁷⁻¹⁹ Hence, selecting an appropriate re-screening strategy and time points is crucial for newborns requiring hearing re-screening, an aspect seldom explored in prior studies. This study aims to determine the frequency of 'pass' in Otoacoustic Emissions tests for those initially classified as 'refer' at birth screening.

STUDY METHOD: This case series was conducted within the Department of ENT at Patel Hospital, Karachi, Pakistan. The study duration spanned 7 months, encompassing data collected from December 2022 to June 2023, with a determined sample size of $n=234$. Ethical clearance was obtained from the institutional review board before the initiation of the study. The study population comprised newborns born between December 2022 and June 2023, encompassing both genders. Only those newborns who underwent initial testing within 24 hours of birth were considered for inclusion. Exclusion criteria encompassed infants with gross external auricular deformities preventing probe placement in the external auditory canal and those without written informed consent.

PROCEDURE: Cochlear function in infants was assessed using the GSI Corti Instrument. The procedural steps included an otoscopic examination of the infant's ear canal before testing. The infant was kept in a quiet and calm state, preferably asleep. A gentle pull downward and backward was applied to straighten the ear canal.

Subsequently, the probe was inserted into the infant's ear canal, and the device was activated by clicking on the right or left arrow key to specify the ear to be tested. The Corti instrument automatically conducted calibration, and the results were presented graphically.

The data analysis was conducted utilizing SPSS version 21. Demographic variables were entered and summarized for qualitative analysis. Qualitative variables, such as gender, factors influencing inaccurate otoacoustic emission, as well as the outcomes of the initial screening and rescreening, were presented in terms of percentages and frequencies. The association between variables was examined using the chi-square test, with statistical significance set at a P-value less than 0.05.

RESULTS: A total of 234 newborns underwent testing in this study, comprising 72 males and 162 females. Of these, 121 newborns 51.7% passed the OAE test on the initial screening, while 113 were referred Table 1 . Notably, among the 113 referred cases, 95 infants were referred for both ears while 8 infants were referred for the left ear and 10 infants for the right ear during initial screening Table 2 .

At the two-week follow-up, the initially referred newborns were re-screened, resulting in 104 passing the test. Seven cases remained as previous, and 2 neonates dropped out from follow up. Carefully observing, a 'refer' test on the initial screening it was revealed that infants who were not calm and quiet were more likely to fail the test due to artifacts caused by vibrations in the instrument probe. During the initial screening, crying emerged as a common factor in 24.7% (28) of infants but no factor was identified in 75.22% (85) who were referred on initial screen. The overall results demonstrated that 96.2% of neonates passed the test, 3% were referred, and

	Frequency	Percentage
Pass	121	51.7%
Refer	113	48.3%
Total	234	

Table 1: Initial screening OAE

Total referred infants	Left ear referred	Right ear referred	Bilateral referred
113 48%8 3.4%	10 4.2	95 40.5	

Table 2: Infants with referred test on initial screening

	Pass	Refer	P-value
Syndromic child	-	3 2.7%	0.06
Preterm birth	-	2 1.8%	
None	121	108	

Table 3: Association of premature birth and syndromic child with abnormal OAE

1% did not follow (Figure 1). Consequently, 104 patients initially referred passed the test upon rescreening.

Furthermore, among the tested infants, two were preterm births, and three were syndromic, all of whom exhibited bilateral referred tests. Although these risk factors did not reach statistical significance (p-value 0.06) as shown in Table 3. It is noteworthy that out of the 7 infants who did not pass the test on rescreening, 5 were either premature deliveries or had a syndromic condition.

DISCUSSION: Early screening of hearing loss is crucial because hearing loss stands as one of the most leading causes of disability burden worldwide. It is estimated that unaddressed hearing loss poses an annual global cost of US\$ 980 billion. This includes health sector costs

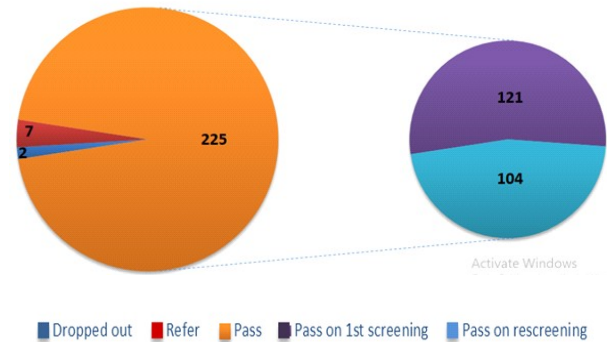


Figure 1: Rescreening OAE

excluding that of hearing devices, costs of educational support, loss of productivity, and societal costs.¹³ In addition, to being 21-39% less likely to attend college, people with hearing loss experience twice as much work stress and have lower labor participation rates than normal hearing individuals.²¹

Otoacoustic Emissions OAE has been used as a most useful tool for screening congenital hearing loss. A comparable referral rate on OAE in neonates was seen in our study. The total referral rate for OAE in our study was 3%, which is more or less similar to a study by Clemens et al from the University of North Carolina.¹⁴ Another

particular study done at Chennai showed only a 10.9% total OAE referral rate,²² and our results were almost similar. In our study, 3% of neonates had bilateral hearing loss, significantly lesser than bilateral hearing loss 74% reported by a study in Ahmedabad.²³

Another study by Payal S et al²⁴ at a tertiary care teaching hospital identified hearing loss in 137 of the 200 newborns screened, for a rate of 68.5%. They have reported a higher referral for OAE on the first screening, approaching up to 68.5%, similar to our study when initial screening resulted in referred cases approaching up to 48%. We attribute this relatively high rate to screening within 24 hours of birth. If we rescreened infants later, the rate would have been lower and consistent with previous reports, it would have resulted in only 7 out of 234 newborns being referred for outpatient rescreening.

It has been described in the literature for a long time that congenital hearing loss is especially associated with syndromic children, as shown by De Joya et al²⁵ when he reviewed 131 articles and revealed that half of patients with Usher syndrome is associated with deafness and blindness. It was also shown in our study that 5 out of 7 referred patients after rescreening were either premature deliveries or had any syndrome and this is statistically significant. Recently, in 2020, Lieu et al has also come up with similar findings.²⁶

This study has some limitations. First, we do not know the number of false-negative cases i.e., those newborns passing the screen and subsequently identified as hearing impaired. Second, our survey sample size is small, and generalizing the results to other populations should be done with caution. Third, the first screening led to a significantly high rate of referral, which was decreased later on; this might be due to the learning curve of our audiologist, but we are unable to determine the exact cause as no attempt was made for the comparison with another audiologist. There might be selection bias, as most of the parents who agreed to the test were actually more educated and have better awareness than those who refused the test.

CONCLUSION: The effectiveness and benefits of this screening test, as well as thorough follow-up of first "REFER" patients, need to be made more widely known in society and among medical professionals, to get the most out of this simple screening test. However, there are concerns about

high referral and false-positive rates. For this purpose delaying newborn hearing screening improves test results but may not be practical in all contexts. The use of more sophisticated OAE devices along with delay in screening may be useful approaches to ensure better performance of the OAE test in newborn hearing screening.

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Pharyngoesophageal Foreign Body: Protocol to Avoid Negative Endoscopies

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ABSTRACT: OBJECTIVE: To assess the frequency of pharyngoesophageal foreign body with no evidence on x-ray finding but definite history of foreign body and symptoms were present to avoid negative rigid esophagoscopy. **METHOD:** This prospective study was conducted in department of E.N.T, Head and Neck surgery Abbasi Shaheed Hospital and Karachi Medical and Dental College from February 2015 to September 2020. 152 cases came in outpatient department or emergency room with definite history of foreign body ingestion with symptoms but no sign of foreign body noted on radiological investigation. **RESULTS:** Male were 95(62.5%), and male to female ratio was 1.6:1. Highest incidence of foreign body impacted in pharyngo-esophagus was noted in 11-20 years age group was 39 (25.6%) followed by 21-30 years of age 38 (25.3%) cases. Dysphagia and odynophagia were the two most common symptoms noted in 123 (80.9%) patients and 92 (60.5%) patients respectively while only 2 (1.3%) patients presented with fever. 134 patients settled with conservative treatment (88%) while 18 patients (11.8%) required rigid esophagoscopy. Among those in 13 patients (8.5%) foreign was body removed from pharyngo-esophagus while in 5 patients (3.2%) no foreign body found. **CONCLUSION:** Foreign body in pharyngo-esophagus in negative X-ray findings manage with conservative approach. If symptoms persist or worst then do rigid esophagoscopy.

Key words: Foreign body in esophagus, X-ray neck and chest, rigid esophagoscopy.

INTRODUCTION: Ingestion of foreign body is defined as swallowed of any object in the upper gastrointestinal tract, by accident or intentionally.¹ Foreign body ingestion is a common clinical problem in ENT practice particularly in children.² An estimated 1500 to 2750 annually died in the United States due ingestion of foreign body.³ Although 80% of the ingested foreign body occur in children because children have tendency to put objects in head and neck orifice. Adults are also victim of ingested foreign body in psychiatric patients, edentulous patients and accidentally ingested foreign body.⁴ The type of ingested foreign body depends on age, site of impaction custom, food, geographic location and eating habits.⁵ Majority of foreign bodies will pass spontaneously without impaction through gastrointestinal tract.⁶ ⁷ Most (80–90%) of ingested foreign bodies pass through the esophagus spontaneously without impaction, while 10–20% of patients require removal.⁸ Cricopharynx is the commonest site of foreign body impaction which is about 15 cm from the upper incisor teeth.

Majority of ingested foreign body in infants and children is coin, marbles, batteries, buttons, bottle tops, seed and toys while in adults fish bone, metallic pins and wires have been reported. Diagnosis of foreign body is made on history, clinical examination and radiological investigation.⁹ To identify the radiopaque foreign body in pharyngo-esophagus, radiological imaging is the most reliable investigation.¹⁰

There are different methods to remove esophageal foreign body like Heimlich maneuver, flexible esophagoscopy, cervical esophagostomy and with the help of Foley's catheter.¹¹ The rigid esophagoscopy is the gold standard for the removal of foreign body¹² but it depends on patient condition, surgeon choice, and type of foreign body and location of the impaction.¹³

Complications of foreign body in pharyngo-esophagus may be fatal which may lead to compression of laryngotracheal airway, leading to airway emergency.⁹ Other possible complications include perforation of esophagus, retropharyngeal abscess, and mediastinal abscess.¹⁴ To prevent

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possible complications, the foreign body should be removed as early as possible.¹⁵

STUDY METHOD: This prospective study was conducted in department of E.N.T, Head and Neck surgery Abbasi Shaheed Hospital and Karachi Medical and Dental College from 3rd February 2015 to 30th September 2020. During this period, patients came with history of foreign body in pharyngo-esophagus were evaluated and 152 cases were included in the study because they had definite history of foreign body ingestion with more than one symptoms but on X-ray there was no evidence of foreign body. A detail proforma was designed about sex, age, symptoms and duration of symptoms, X-ray neck findings and clinical findings. History regarding ingestion of foreign body, type of foreign body and duration (which was within first 48 hours) since ingestion of foreign body. Complete ENT examination was carried out and findings were noted. Radiological investigation like X-ray neck AP and lateral view and X-ray chest PA view and lateral view were advised and evaluated by radiologist. Radiologist rule out the direct or indirect evidence of foreign body on X-ray. Direct signs include the radio-opaque shadow of foreign body in pharynx or esophagus while indirect signs include swelling of prevertebral soft tissue, air trap in esophageal lumen, shift of trachea or loss of normal lordosis.¹⁸ Those patients who had any evidence of foreign body in x-ray were excluded.

Patients with no evidence of foreign body on X-ray but had positive symptoms like history of initial choking and gagging immediately after ingestion of foreign, pain in neck, sub sternal pain, dysphagia/odynophagia, and or persistence cough were included. These patients kept on tablet paracetamol, two tablets thrice daily as pain killer and advised to report after 48 hours. This pain killer did not mask the symptom of pain because of foreign body pain is refractory to routine analgesic. In case of increase in severity of symptoms, patients were advised to report ENT OPD or Abbasi Shaheed hospital emergency department. Those patients who reported with increased in intensity of symptoms or persistence of symptoms after 48 hours were prepared for rigid esophagoscopy under general anesthesia to examine and removal of foreign body.

RESULTS: During the 5 years of study, 152 cases (13.6%) were found no evidence foreign body on x-ray but had definite history of foreign body ingestion and symptoms were present. Out of 152

patients, male were 95(62.5%) and female were 57 (37.5%). Male female ratio was 1.6:1. Highest number of foreign body impacted in pharyngo-esophagus with no findings on x-ray was found in 11-20 years age group and 21-30 years age group, was 39 (25.6%) and 38(25%) respectively. Followed by 0-11 years age group with 27 patients (17.7%). Dysphagia and odynophagia were the most common symptom noted in 123 (80.9%) patients and 92 (60.5%) patients respectively. Third common symptom was drooling of saliva in 79 (51.9%) cases. Fever was noted in only 2 patients. 134 patients (88%) were settled on conservative treatment while only 18 patients (11.8%) required rigid esophagoscopy in which in 13 (8.5%) patients foreign body was found in pharynx or esophagus while 5 (3.2%) patients had no foreign body in pharyngo-esophagus.

Symptoms	Yes	No	Total no.	%
Dysphagia	123	29	152	80.9
Odynophagia	92	60	152	60.5
Neck pain	65	87	152	74.7
Vomiting	30	122	152	19.7
Respiratory distress	8	144	152	5.2
Cough	17	135	152	11
Drooling	79	73	152	51.9
Fever	2	150	152	1.3
Choking	45	107	152	29.6

Table: Frequency of symptoms

DISCUSSION: Foreign body ingestion is one of the common problem in ENT practice. Type of foreign body depends upon the age. In children mostly swallowed coins or toys while in adults mostly due to impaction of meat bolus.¹⁶ After ear and nose, esophagus is the most common site for foreign body impaction.¹⁷ Plain x-ray neck and chest is readily available and mostly used investigation for the assessment of location of foreign body. X-ray shows radiopaque foreign body or raise suspicion by presence of other abnormal finding like swelling of prevertebral soft tissue, air trap in esophageal lumen, shift of trachea or loss of normal lordosis.¹⁸ The common clinical presentation of foreign body include dysphagia, odynophagia, drooling, gagging and vomiting. Respiratory symptoms usually develops when present late like fever, chest pain, and coughing, wheezing, and upper respiratory tract infection. In current study, 152 patients came in emergency room or in outpatient department with foreign body ingestion with no evidence of foreign body in x-rays but definitive history of foreign body

ingestion with more than one symptoms. In 152 patients male were 62.5%. Male female ratio was 1.6:1. In Abdulrazak Ajiya study, 62.7% were males and female were 37.3%, with sex ratio (M:F) of 1.6:1⁹ which is very close to the current study. Another study also showed male female ratio of foreign body ingestion 1.15:1.¹⁹ The incidence of foreign body ingestion in children is much higher. Study showed the highest number of patients came with foreign body impaction was between the 0-20 years 59.2%.²⁰ According to Sajid et.al study, commonest age group affected between 0-10 years of age is 66%.²¹ But current study showed the highest incidence of foreign body was between the 11-20 years and 21-30 years 39 (25.6%) and 38 (25%) respectively which is contradict to other studies because coin is the most common foreign body in children.²⁰ Coins are radio-opaque and detected in x-rays in all cases.²¹

X-ray is the radiological investigation of choice to detect foreign body but some time plain x-ray fails to detect foreign body. A negative x-ray does not mean that no foreign body in pharyngoesophagus.^{17,22} Current study excluded positive radiological findings in x-rays.

Dysphagia was the dominating presenting symptoms in current study followed by odynophagia. Dysphagia was noted in 123 patients (80.9%) and odynophagia on 92 (60.5%) cases respectively and fever was noted only in 2 (1.3%). Abdul Razak Ajiya study shows dysphagia in 83% cases, odynophagia 62%, drooling 34% and fever noted in 0.7%.⁹ In Fazal I. wahid study dysphagia was in 72.8% and fever was in 1.3% cases.²⁰ Both studies support the current study results.

In current study, 134 (88%) patients were settled and required no intervention while only 18 patients (11.8%) required rigid esophagoscopy, among those patients, in 13 (8.5%) foreign body was found and removed while in 5 patients (3.2%) no foreign body was found.

CONCLUSION: From the above study we concluded that patients with foreign body in pharyngo-esophagus in negative X-ray can be managed on conservative basis following the protocol in current study. Most of the patients can be prevented from undue endoscopic procedure under general anesthesia and also their related complications by following this protocol.

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Sinonasal Malignancies: A Five Year Experience of a Tertiary Care Health Institution

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ABSTRACT: OBJECTIVE: To see the clinical presentation, management and outcome in terms of recurrence and survival of patients diagnosed with sinonasal malignancy at tertiary care hospital. **METHODS:** It is a retrospective case series to elucidate the prevalence and clinic-pathological features of sinonasal tumors and prognosis of sinonasal malignancies. **RESULTS:** Total number of patients were 15. Out of which, 33.3% (5/15) were females and 66.6% (10/15) were males. The main presenting complaints were nasal blockage with epistaxis. Out of 15 patients, 46.6% (7/15) patients presented with T3 disease while 53.3% (8/15) patients presented with T4 disease. Twenty percent patients (3/15) died of disease. Among died patients two had T4 while one had T3 lesion. Most commonly tumors arise from maxillary sinus and are predominantly squamous cell carcinoma. Overall survival calculated was 80% and disease-free survival of 66% with mean follow-up of 21.4 months. **CONCLUSION:** Patients remain asymptomatic usually in early stage of disease and due to this reason, they present late with advance disease. Sinonasal tumors have a poor prognosis, despite of radical surgical resection, concurrent chemoradiation and strict follow-up.

Key words: sinonasal carcinoma, squamous cell carcinoma, paranasal sinuses, maxillary sinus tumor, nasal tumor

INTRODUCTION: A rare but aggressive tumors involving nose and paranasal sinuses was first described in 1986 by Frierson.^{1,2} Sinonasal malignancies accounts for only 0.2-0.5% of all cancers and 3-5% of head and neck malignancies.^{3,4} Most commonly tumors arises from maxillary sinus and are predominantly squamous cell carcinoma.⁵ Patients remains asymptomatic usually in early stage of disease and due to this reason, patient presents late with an advance disease.⁶

It is a heterogeneous group of malignancies and being classified by The World Health Organization^{4,7} as listed in table 1. Among all tumors, Squamous cell carcinoma is the most frequently reported type.^{4,8}

There are several associated risk factors contributing for the development of sinonasal tumor.⁵ The most distinguished association found is wood dust exposure leads to development of adenocarcinoma.^{5,9} The large-particle dust form certain hardwoods (ebony, oak, and beech) that increases risk for developing adenocarcinoma by 900 folds.^{5,9,10} Risk factors that has been connected to development of squamous cell carcinoma includes, smoking, metal industry products (chromate and nickel), leather & boot products,

1. Malignant epithelial a. SCC b. Adenoid cystic carcinoma c. Adenocarcinoma
2. Neuroendocrine a. Carcinoid
3. Malignant soft tissue a. Sarcomas
4. Borderline and low malignant potential tumors of soft tissue a. Hemangiopericytoma
5. Malignant tumors of bone and cartilage a. Chondrosarcoma
6. Hematolymphoid a. Lymphoma
7. Neuroectodermal a. Olfactory neuroblastoma b. Mucosal melanoma
8. Germ cell
9. Secondary a. Renal b. Lung c. Breast

Table 1: The World Health Organization classification system for sinonasal malignancies

textile industry (chrome pigments), thorium dioxide, and imaging agents.^{5,8,11} The symptoms depend on the site and extent of tumor involvement. As this region is closely related to brain, optic nerves and internal carotid arteries, hence the surgery may cause significant morbidity to patients.¹² Patient may need radiation therapy or chemoradiation therapy after surgery.¹² Sinonasal malignancies had poor prognosis with 5 year survival rate for squamous cell carcinoma is 25-50%.¹³

So, the study was aimed to report the 5-year experience of the presentation, management and

outcome in terms of recurrence and survival of patients diagnosed with sinonasal malignancy at tertiary care hospital.

STUDY METHOD: Patients who were admitted at our institution and diagnosed with sinonasal malignancy were retrospectively evaluated. The study was conducted at department of otorhinolaryngology, head and neck surgery Liaquat National Hospital, Karachi. Only those patients included in the study who had resectable tumor. Patient identity kept concealed as per ethical guidelines. The data collected via using institute's electronic medical record (EMR). Proforma was designed in to three sections. First section headed the demographic data that includes patient's age, gender, contact number, comorbid, clinical presentation, and exposure to occupational related risk factors, addiction, and any family history. Second section includes tumor location, presence of cervical nodal metastasis, T classification of primary tumor, radiology and tumor histology. Staging was performed according to the National Comprehensive Cancer Network (NCCN), TNM Staging for sinonasal cancer. Third sections includes type of surgery performed, intra-operative findings, type of adjuvant therapy received post surgically, duration between surgery and adjuvant therapy, follow up duration and any recurrence. The primary follow-up for the study was carried out via telephonic communication system. Patients were called for complete examination, which was done by primary surgeon. Informed verbal consent taken after the purpose of study was explained. We followed all the patients till March 2022.

Data was entered and analyzed on SPSS version 22. Overall survival (OS) and disease-free survival was calculated by Cox proportional hazard analysis in propensity score-matched cohorts. Factors associated with END were evaluated with logistic regression.

RESULTS: Out of 400 head and neck cancer patients a total of 15 patients (3.75%) included in the study. The mean age was 53.3 years with range from 38-75 years. Out of 15 patients 66.6% (10/15) were males and 33.3% (5/15) were females that is ratio of male: female is 2:1. Nine out of 15 (60%) patients had positive addiction history for smoking. More than half of the patients (60%) were exposed to welding fumes, leather or chemical.

The main presenting complaints were posterior nasal drip in 80% (12/15) patients, followed by unilateral nasal blockage in 73% (11/15), rhinorrhea in 66% (10/15), while epistaxis in 46% (7/15), anosmia and facial swelling in 33% (5/15), and vision loss, proptosis, and soft palate bulge present in 13% (2/15) of patients. (Figure 1). Only six of 15 patients (40%) had cervical lymphadenopathy at presentation (figure 1).

Treatment depended on the site and extent of the disease, histological type, age, medical status of the patient and patient consent. Per-operatively it was observed that nasal cavity was involved in all cases, followed by maxillary sinus (73%) involvement and 20% of ethmoidal sinus involvement. However, 13% had orbital involvement. At the time of presentation, 46.6%

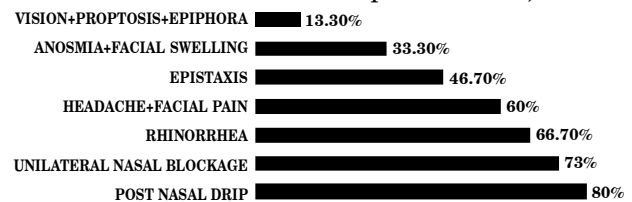


Figure 1: Clinical Presentation

(7/15) patients had T3 disease while 53.3% (8/15) patients presented with T4 disease. No patient presented with T1/T2 lesions. The most common histology found in this study is squamous cell carcinoma in 80% followed by, neuroendocrine in 13% and poorly differentiated carcinoma in 6%. The most common procedure done was total maxillectomy (80%), in addition 6 patients needed neck dissection (40%) and 2 had orbital extension so proceed with orbital exentration (13%). Post-operatively adjuvant therapy was advised in all cases, but two refused and 3 patients received delayed adjuvant therapy.

Patients were treated with surgery with adjuvant radiation, or surgery with adjuvant chemoradiation depending upon the disease. The treatment summary of all patients is outlined in Table II.

Mean follow up time was 21.4 months. Among 15 patients, five patients (33%) had recurrence. Out of those five patients, three patients expired due to recurrence. Two patients were refused for radiation, one with T3 lesion and other T4 lesion three patients get radiation after 6 weeks. Two patients who refused adjuvant therapy had developed early recurrence and expired. Overall survival was 80% in this study, and disease-free survival was 66% with mean follow-up of 21.4

S.No.	T Stage	N stage	Stage	Surgical Procedure	Adjuvant Treatment	Recurrence
1	T3	Negative	III	Sub-total maxillectomy	Radiation	No recurrence
2	T3	Negative	III	Sub-total maxillectomy	Radiation	No recurrence
3	T3	Negative	III	Sub-total maxillectomy	Refused	Recurrence + expired
4	T3	Negative	III	Total maxillectomy	Radiation	Recurrence
5	T3	Negative	III	Total maxillectomy	Radiation	No recurrence
6	T3	Negative	III	Total maxillectomy	Radiation	No recurrence
7	T3	Negative	III	Total maxillectomy	Radiation	No recurrence
8	T4	Negative	IVA	Total maxillectomy	CCRT	No recurrence
9	T4	Negative	IVA	Total maxillectomy	CCRT	No recurrence
10	T4	N2a	IVA	Total maxillectomy +neck dissection	CCRT	No recurrence
11	T4	N2a	IVA	Total maxillectomy + neck dissection	CCRT	No recurrence
12	T4	N1	IVA	Total maxillectomy + neck dissection	CCRT	No recurrence
13	T4	N2b	IVA	Total maxillectomy + neck dissection	CCRT (delayed, at 17 week)	Recurrence
14	T4	N3b	IVB	Total maxillectomy + orbital exentration + neck dissection	Refused	Recurrence + expired
15	T4	N2b	IV	Total maxillectomy +neck dissection + orbital exentration	CCRT (delayed, at 20 weeks)	Recurrence+ expired

Table II: Treatment summary and follow-up.

months as shown in figure 2 and 3 respectively.

DISCUSSION: From audit, of a period of five years from 2015-2020 the number of patients identified with sinonasal cancer as representing 3.75 per cent of all new head and neck cancer patients(400). This is comparable to other reports in the literature, with a range of 3-5 per cent of head and neck cancers.¹⁴ The predominance of male seen in this study with M: F ratio 2:1 is also similar to other reports in literature.^{14, 15}

The histological type of sinonasal malignancy varies in different series. The dominance of squamous cell carcinomas of 80% in this study is similar to that of most published series.¹⁴⁻¹⁶

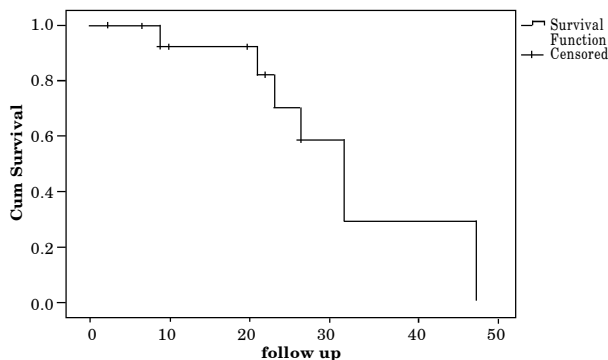


Figure 2: Kaplan Meier cure showing Over-all survival

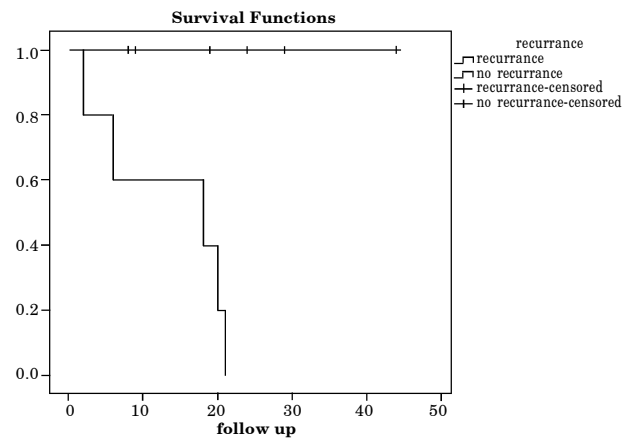


Figure 3: Kaplan Meier curve showing Disease free survival

Early detection and aggressive treatment of sinonasal malignancy is vital in order to improve the outcome.¹⁵ 57% of our patients presented with stage IV disease, while 43% had stage III disease, with no stage I or II disease. This is in concordance with series by Mahalingappa in which 50% patients presented at stage IV disease.¹⁴

T1 Sinonasal tumors may be treated by surgery alone, may achieve an excellent survival rate without adjuvant treatment.¹⁵ Combined treatment of surgery with adjuvant radiation or surgery with adjuvant chemoradiation is required for advanced stage disease.¹⁷

There was a 33 percent recurrence rate in current study with a mean follow up of 21.4 months. SW Hone et al. reported recurrence rate of 45%.¹⁵ Another study by Mahalinga et al. published in 2014 reported the recurrence rate of 30%.¹⁴ Devaraja et al. in 2015 reported recurrence rate of 44%.³ Local recurrence is the major cause of death in patients with malignant sinonasal tumors.¹⁸

CONCLUSION: Patients remains asymptomatic usually in early stage of disease or had symptoms mimicking benign disease that is being managed by general practitioner, due to this reason, patient presents late with advance disease. Adjuvant therapy after radical surgery shows significant reduction in disease recurrence.

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Nasopharyngeal Tuberculosis: A Diagnostic Challenge

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ABSTRACT: Tuberculosis can affect any tissue; however, pulmonary tuberculosis is the most common type of tuberculosis. Tuberculosis of the ENT region is not uncommon but isolated nasopharynx involvement is rare.

In this report we will describe a new case of primary nasopharyngeal tuberculosis focusing on the histopathological and radiological findings that will help in better diagnosis and treatment of this specific disease.

Key words: Nasopharyngeal TB, Nasopharynx, Tuberculosis, Biopsy, computed tomography.

INTRODUCTION: As per the WHO 2014 report, 6.1 million cases of tuberculosis have been reported with 5.7 million being newly diagnosed.¹ Upper respiratory tract tuberculosis is found to be an unusual site for tuberculosis infection.¹ 10% to 35% cases of 15% newly diagnosed tuberculosis manifest in the head and neck region such as lymph nodes, larynx, middle ear, oral cavity and pharynx.^{2,3} Tuberculosis in head and neck (HNTB), including cervical lymphadenopathy, is one of the most common extra pulmonary manifestation of TB.²

From 1947 to 2015 a total of 60 case reports of nasopharyngeal tuberculosis have been published mostly reported in females.² Published case reports include patients aged from 6 years to 78.³⁻⁶

The diagnosis of TB is mainly based on a mycobacterial smear and culture reports or the histopathological evidence of a chronic or a caseating granuloma. There are a number of differential diagnoses to one clinical presentation of tuberculosis of the otorhinolaryngeal region, we report this case with clinical, radiological, and laboratory experience along with the clinical presentation, diagnosis, and treatment of tuberculosis of the nasopharyngeal region that will help in better understanding and diagnosis of this rare disease entity.

CASE REPORT: A healthy 19 years old female, had no known comorbid came with the complain of right sided intermittent nasal blockage for one and a half year. It was gradual in onset and progressive in nature. It had no aggravating or relieving factors. It was associated with undocumented weight loss. There was no

association of nasal discharge, epistaxis, anosmia, hyposmia, facial pain, decreased hearing, tinnitus, night sweats or fever. She reported no other ENT related complain or any other medical history.

On physical examination of the nose bilateral nostrils showed hyperemia and normal patency with mild crusting on the left. The nasal mucosa was pale with no discharge or signs of bleeding. Bilateral tympanic membranes were normal. The neck showed a 1cm level 2 node palpable bilaterally.

Nasal endoscopy showed a mulberry shaped

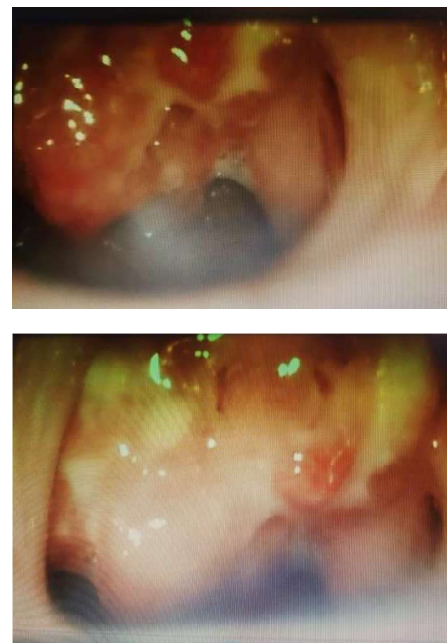


Figure 1: Preoperative nasoendoscopy

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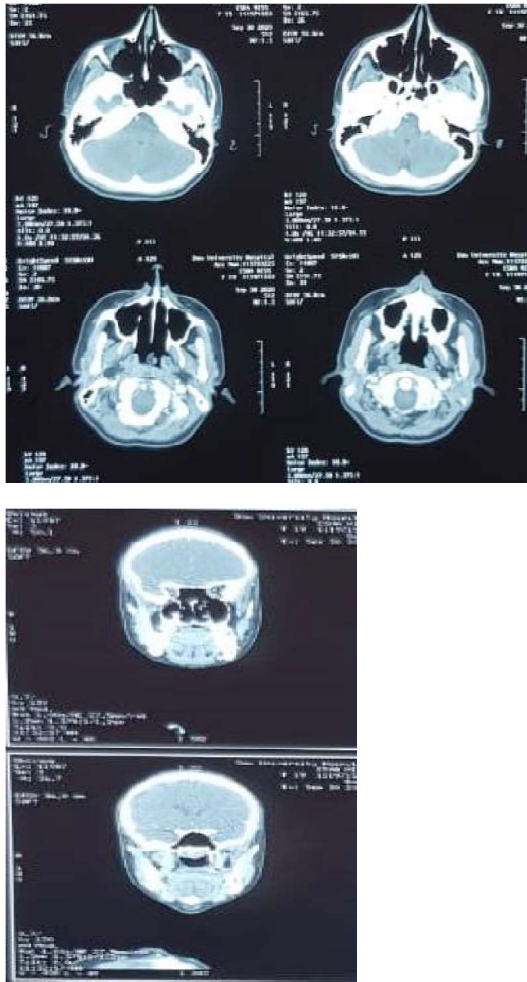


Figure 2: CT Scan neck with contrast.

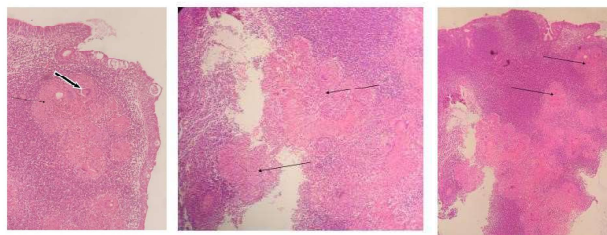


Figure 3: Thick arrows pointing Langerhans' type giant cells
Thin arrows are Epithelioid granulomas

growth obliterating the right Nasopharynx originating from the roof of the Nasopharynx (figure 1).

CT neck with contrast showed a lobulated heterogenous soft tissue thickening in the posterior nasopharynx resulting in luminal attenuation associated with cervical necrotic lymph nodes on level II bilaterally.

Patient underwent a biopsy of the nasopharyngeal

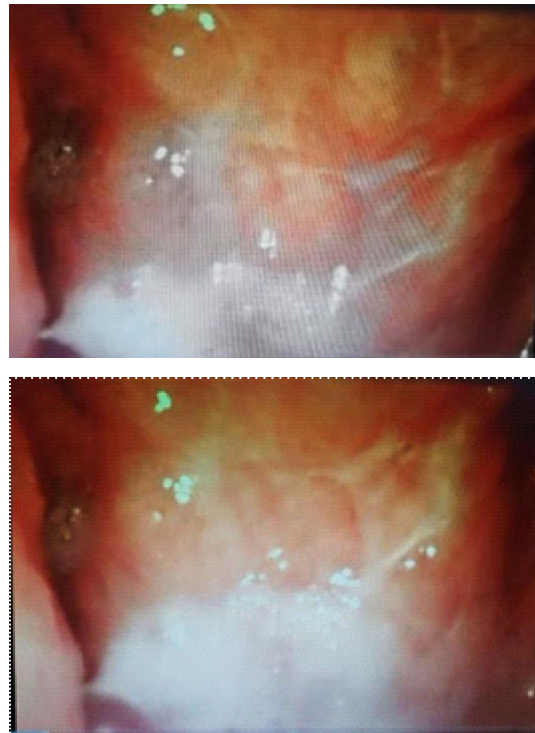


Figure 4: Postoperative nasoendoscopy

mass under general anesthesia. Histopathology report showed a subepithelial dense acute and chronic inflammatory infiltrates along with collection of epithelia's forming granulomas. Ziehl-Neelsen stain was applied, which came positive for TB. Areas of necrosis also noted overall features suggested tuberculosis (figure 3).

Patient was referred to infectious disease specialist and started on anti Tuberculous therapy with regular follow up in the ENT clinic.

On the follow up visit after 3 months her symptoms had significantly improved. A fiber optic nasal endoscopy was repeated which showed that the mass had visibly decreased in size (figure 4).

DISCUSSION: Primary nasopharyngeal tuberculosis is a rare disease of the nasopharynx and is challenging to diagnose at an early stage. There are two routes by which the nasopharynx can get infected with *Mycobacterium tuberculosis* - directly through the nasal ventilation or secondary route of infection mostly through blood vessels, lymphatics or airways⁴ Previously reported cases of primary nasopharyngeal tuberculosis were healthy people with minimal constitutional symptoms with a slight predominance in young females.⁵

Diagnosing primary nasopharyngeal tuberculosis at a very early stage is challenging due to

overlapping symptoms with other nasopharyngeal diseases.⁶ It can present very commonly with cervical lymphadenopathy, decreased hearing, heaviness in ear, otitis media and with symptoms of nasal obstruction like nasal blockage, nasal discharge, and epistaxis and sometimes with postnasal dripping.^{7,8}

The findings of nasal endoscopy can show a very normal appearance sometimes, mostly a polypoidal mass in the Nasopharynx commonly arising from the midline of the roof and upper posterior wall. It can also appear as mucosal thickening, Irregular textured mucosa or an ulcerative lesion, a bulging mass and sometimes as white patches in the nasopharyngeal region.^{6,9} Purulent discharge filled in the fossa of rosenmuller,⁵ polyp uprising from the superior and posterior nasopharyngeal walls sometimes the roof could be the findings.⁴

The diagnosis of nasopharyngeal tuberculosis is mostly by histopathological and microbiologic findings with the help of a biopsy specimen.⁹ Computed tomography (CT) and magnetic resonance imaging (MRI) are usually nonspecific for tuberculosis but findings in primary nasopharyngeal tuberculosis are mostly a polypoidal mass or buldge and also mucosal thickening in the nasopharyngeal region. Thus they are not enough for the diagnosis of primary nasopharyngeal tuberculosis.¹⁰

A nasopharyngeal lesion with necrosis observed on the scans can be helpful in diagnosing the case of nasopharyngeal tuberculosis but this necrosis which is most likely to be caseous necrosis has to be checked by histopathologist for confirmation.⁶ Case reports published about nasopharyngeal tuberculosis includes patients aged from 6 years to 78 years of age with a predominance of females presenting with aural fullness in right ear,⁵ bilateral cervical lymphadenopathy and nasal obstruction,¹¹ with postnasal drip and cough,¹² chronic snoring, complains of headache, asthenia, weight loss,¹¹ and cervical neck swelling.¹³

Histopathological examination showed central caseous necrosis surrounded by granulomatous inflammation and multinucleated giant cells in the granuloma although acid-fast bacilli stain was negative.⁵ Thickening of the nasopharyngeal mucosa revealed granuloma formation with caseous necrosis¹² and some showed caseating granulomatous inflammation. Cytology of the lymph node also revealed granulomatous lymphadenitis.¹³

In current case, CT revealed a lobulated

heterogeneous soft tissue thickening in the posterior Nasopharynx which resulted in luminal attenuation. Biopsy showed sub epithelial tissue revealing dense acute and chronic inflammatory infiltrates along with collection of epithelioids forming granulomas. Some areas of necrosis were also noted. These features were suggestive of tuberculosis in the nasopharyngeal mass emphasizing on the fact that imaging studies alone are not effective and efficient for the diagnosis of primary nasopharyngeal tuberculosis.

On follow, the patient has improved symptoms and on repeated endoscopic examination as shown in figure 4 the size of the mass had significantly decreased.

She was asked to complete the course for a total of 9 months with regular follow up on every 3 months. No side effects such as night sweats, weight loss, and decrease in appetite or sleep were mentioned by the patient.

CONCLUSION: Nasopharyngeal tuberculosis is a rare disease that usually is confirmed on the histopathological reporting. If treated early the outcomes are good and the treatments are usually well tolerated.

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