

Incus PORP vs Titanium Angular Clip Prosthesis in Patients with incudostapedial Joint Erosion Caused by Chronic Otitis Media

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Background: Chronic otitis media (COM) is a common disease that can cause damage to the middle ear ossicles and thus lead to conductive hearing loss. The purpose of this study was to compare two methods of incus partial ossicular reconstruction prosthesis (PORP) and reconstruction with titanium angular clip prosthesis in patients with incudostapedial joint erosion.

Methods: In this interventional randomized clinical trial carried out in a tertiary referral hospital, patients with chronic otitis media and incudostapedial joint erosion who were candidates for surgery, were randomly allocated into two groups of incus PORP surgery and reconstruction with a titanium angular clip prosthesis. Audiometry was performed for the patients prior to and six months after surgery. Pre- and post-operative air-bone gap (ABG) and bone conduction (BC) thresholds were calculated and means were compared by analysis of variances (ANOVA). A p value of <0.05 was considered statistically significant.

Results: The study consisted of 24 and 14 subjects in the incus PORP and angular clip groups, respectively. There was no statistically significant difference between the mean pre- and post-operative ABG, BC thresholds and ABG reduction in the compared groups.

Conclusion: Considering issues such as high cost and inaccessibility of titanium angular clips in all centers, incus PORP may be a more acceptable method.

Comparing Audiometric Parameters between Crushed and Intact Cartilage Tympanoplasty: A Double-Blinded, Randomized, Controlled Trial Study

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Background: Tympanoplasty is the procedure of the tympanic membrane closure to protect the middle ear. Cartilage is the most popular type of grafts used in tympanoplasty. However, the stiffness and bulk of cartilage graft may affect sound transmission through the ear and affect hearing. On the other hand, reduction in living cells after crushing may reduce graft rigidity and volume. In order to investigate hearing and the take rate of crushed cartilage graft in tympanoplasty we performed this clinical trial study.

Methods: In this double-blinded, randomized, controlled trial forty-six patients with tympanic membrane perforation, were enrolled. A Conchal cartilage graft was used for reconstruction in both groups (i.e. intervention and control). In the intervention group crushed cartilage was used. All cartilage grafts were placed in posterior superior position and were fixed under the perforation. The success rate and hearing were ascertained every four months over a one-year follow-up period.

Results: In total, thirty-six patients including- 20 in the intervention and 16 in the control group- fulfilled their one-year follow-up. Considering the comparison among the mean scores of ABG, bone conduction (BC) threshold, speech discrimination score (SDS), and speech reception threshold (SRT), there was no statistically significant difference between the two groups.

Conclusion: The reduction in living cells after crushed cartilage tympanoplasty may decrease the rigidity and the volume of the graft; however, it may not necessarily improve the hearing results.

Keywords: Cartilage, Tympanoplasty, Tympanic membrane

Development and Assessment of the Validity and Reliability of Selective Auditory Attention Test in 7-9 year-old normal children in Persian Language

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Background: Attention is one of the most important factors in education and learning and Selective Auditory Attention is among the most important cognitive procedures in children. The aim of the present study was development and assessment of the validity and reliability of Selective Auditory Attention Test (SAAT) in 7-9 year-old normal children in Persian Language.

Methods: The current cross-sectional Study consists of two sections. First, development of the test was performed and then the Validity and Reliability of test were evaluated. The study was performed on 150 Persian speaking children aged 7 to 9 years with normal hearing. After confirming normal hearing in all the participants using pure-tone and immittance audiometry, word Intelligibility by Picture Identification (WIPI) test performed with four monosyllabic word lists. Next, SAAT was performed with the same four monosyllabic word lists with competing message. The result was analyzed using SPSS (v. 23).

Results: The results indicated no significant differences between mean scores of all lists in each age group and per list in all cases ($p>0.05$). There was no significant difference between the scores of the two genders, either ($P=0/107$) ($P=0/054$).

Conclusion: According to the results, all the lists' score were within normal ranges. Since there were no significant differences between lists' scores in all the age groups and no significant differences were seen in all the participants either, it could be concluded that all the lists were of the same difficulty.

Keywords: Selective Auditory Attention, Child Attention, Attention, Auditory Signal

Auditory brain response changes in children following meningitis and seizure disorders

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Background: In this study we aim to document the probable sequelae of meningitis and convulsion disorders on auditory brain response in pediatric group.

Methods: In this study, 72 samples out of 400 cases were studied. The samples were divided in 3 groups (30 Convulsionary patients, 12 patients with history of Meningitis and a control group which included children between 3 months to 5 years old with no history of above-mentioned conditions) were subjected to check-up tests.

Results: There was a significant difference in domain of wave 5 between convulsionary patients and normal people in both left and right ears. In presence and absence of wave 1 and 3 there is also significant difference between these two groups in right and left ears. However, in comparison between patients with Meningitis and normal people there was no significant difference.

Conclusion: We found a significant difference in hearing levels according to ABR levels between patients with history of convulsion disorders and normal children. We suggest close follow-up in this patients for early detection of hearing loss and proper use of hearing aids to prevent future disabilities

Fixed Length versus Measured Length of Stapes Prosthesis in Stapedotomy

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Background: To assess the relationship between the prosthesis length and the outcome of the primary stapes surgery in patients with otosclerosis.

Methods: We retrospectively reviewed medical records of patients who had surgery in two different hospitals with two different methods (fixed length and measured length prostheses).

Results: Mean age, preoperative bone conduction, postoperative bone conduction and postoperative gap were similar in both groups. Vertigo frequency was not significantly different between the two groups. There was no significant difference regarding the number favorable postoperative outcomes between the two groups (70 (97.2%) vs. 142 (97.3%))($p=0.601$). Considering the postoperative gap as the dependent variable and sex, age, side of the affected ear, and preoperative audiologic characteristics as independent variables, logistic regression analysis showed sex and age as independent predictors.

Conclusion: This study found no significant difference regarding the hearing outcome between two groups regarding different length of the prostheses.

Keywords: prosthesis length; surgery; otosclerosis

Full-thickness Cartilage Graft versus Partial-thickness Cartilage Graft in Tympanoplasty

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Background: Cartilage is used as the grafting material for tympanoplasty. The rigidity of the cartilage is the main concern. There are debates regarding slicing the cartilage when it is used as a graft. So, the aim of this systematic review and meta-analysis is to compare the hearing results of full vs. partial-thickness cartilages in patients undergoing tympanoplasty.

Methods: We systematically searched google scholar, PubMed, Cochrane, Ovid, Scopus, and gray literature including the references of the selected studies, and conference abstracts which were published up to October 2020. The search syntax for identifying studies was: ((Cartilage) AND (tympanoplasty) AND (type I)).

Results: The literature search found 1047 articles. After eliminating duplicates, 908 studies remained; from these, we excluded observational studies, reviews, case reports, and non-randomized trials, and 12 studies remained. Finally, only 5 articles were included for analysis. The pooled SMD for postoperative gap was -0.87 95%CI: (-1.66, -0.08) (I²=87.1%, P<0.001). The pooled SMD of the reduction in gain in the full-thickness group was 2.84, 95%CI (1.39-4.3), I²=93.2%, I²=93.2%, p<0.001). The pooled SMD of the reduction in gain in the partial thickness group was 4.02, 95%CI (1.97-6.02), I²=95.3%, p<0.001).

Conclusion: The pooled results of this systematic review showed that partial-thickness cartilage graft has a better outcome than full thickness.

Keywords: Tympanoplasty; Cartilage; Graft

CYP1A1 and GSTs Common Gene Variations And Presbycusis Risk: A Genetic Association Analysis And A Bioinformatics Approach

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Background: Antioxidant enzymes such as glutathione S-transferases (GSTs) and cytochromes P450 (CYPs) are involved in the metabolism and detoxification of cytotoxic compounds, as well as the elimination of reactive oxygen species (ROS). Therefore, alterations in the structure of these enzymes could result in prolonged production of ROS with subsequent risk of development of disorders such as presbycusis. This study aimed to investigate the association between CYP1A1 (rs4646903, rs1048943) and GSTs(GSTM1-deletion, GSTT1-deletion, GSTP1-rs1695) with presbycusis risk in an Iranian population which was followed by an in silico approach.

Methods: In a case-control study, 280 subjects including 140 cases with presbycusis and 140 healthy controls were enrolled. Genotypes of single-nucleotide polymorphisms (SNPs) were detected by PCR-RFLP method and the genotype of the above mentioned deletions was determined by touchdown PCR. Some bioinformatics tools were employed to evaluate the impact of SNPs on the gene function.

Results: SNP analysis revealed that there are significant associations between rs1048943 (AG vs. AA: OR = 2.46, 95%CI = 1.30–4.65, $p = 0.006$; GG + AG vs. AA: OR = 2.53, 95%CI = 1.36–4.69, $p = 0.003$; G vs. A: OR = 2.36, 95%CI = 1.33–4.17, $p = 0.003$) and rs4646903 (C vs. T: OR = 1.45, 95%CI = 1.02–2.06, $p = 0.040$) variations and increased risk of presbycusis. However, there was no significant association between rs1695 and presbycusis risk. Also, significant associations were observed between GSTM1 (OR = 4.28, 95%CI = 1.18–15.52, $p = 0.027$) and GSTT1 (OR = 1.64, 95%CI = 1.02–2.65, $p = 0.041$) deletions and elevated risk of presbycusis. Moreover, the combination analysis revealed a significant association between GSTM1+/GSTT1– genotype and presbycusis susceptibility (OR = 1.63, 95%CI = 1.00–2.67, $p = 0.049$). In silico analysis revealed that the rs1048943 SNP could influence significantly on the RNA structure of CYP1A1 (distance: 0.1454; p value: 0.1799).

Conclusion: Based on our findings, the rs4646903, rs1048943 SNPs as well as GSTM1 and GSTT1 deletions could be considered as genetic risk factors for the development and progression of presbycusis.

Cone-beam Computed Tomography Guidance in Functional Endoscopic Sinus Surgery: A Retrospective Cohort Study

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Background: Using image-guided intra-operative navigation systems in surgeries like functional endoscopic sinus surgery (FESS) has become widely accepted as an effective tool for improvement of surgical outcomes and reduction of complication. Cone-beam CT (CBCT) is a variant of computed tomography imaging that has developed as a cross-sectional and potentially low-dose technique to visualize bony structures in the head and neck. In current study, it was tried to evaluate surgeons' satisfaction with CBCT intra-operative navigation imaging as well as image quality prior to FESS and post-operative complications.

Methods: In this prospective study, the included patients who were candidates for FESS underwent CBCT from January to June 2019. The data regarding demographic information, CBCT findings and diagnosis were extracted. The surgeons' satisfaction with intra-operative navigation imaging and image quality was quantified using Visual Analogue Scale (VAS) (ranging 0 – 10). Furthermore, patients were contacted 3 months later to ask for their satisfaction with the operation using VAS and post-operative complications evaluated.

Results: Totally, 39 patients were included. The mean age was 40.74 ± 5.75 and 20 patients (51.28 percent) were male. Two surgeons performed this operation separately; one of the surgeons performed 20 (51.28 percent) FESS and the other performed 19 (48.71 percent). The mean satisfaction of the surgeons of CBCT guided FFESS was 8.69 ± 0.92 . After the 3-month follow up, patients' satisfaction score was 8.21 ± 1.89 . No postoperative complications were reported.

Conclusion: Based on the surgeons' point of view, CBCT was shown to be reliable for image-guided FFESS. Furthermore, the outcome and complications of performed surgeries were similar to those performed with computed tomography intra-operative navigation imaging

Evaluation Of The Effect Of Azelastine Spray On Rhinorrhea And Nasal Congestion After Septorhinoplasty

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Background: Septorhinoplasty is one of the most popular surgeries which is usually performed for aesthetic purposes, correcting nasal airway or in post traumatic noses. As the surgery is an invasive operation on the mucosa, the tissue reaction can lead to congestion or a runny nose (rhinitis). In this study, the effects of azelastine nasal spray on the post operative congestion and the rhinitis following a septorhinoplasty were studied.

Methods: In this double-blind placebo-controlled randomized clinical trial, 50 patients whom undergone septorhinoplasty surgery, were included. The patients were assigned to azelastine or placebo groups. The SNOT20 questionnaire was filled before the intervention and after 4 weeks of using azelastine or placebo nasal spray.

Results: Among the patients, 42.6% were men and 57.4% were women with a mean age of 29.4 ± 8.7 years old. The mean rhinorrhea-score changes among the placebo and the azelastine groups were 0.1667 and -3.1304, respectively. The mean congestion-score change were also -0.1667 and -3.7826 among the placebo and the azelastine groups, respectively (*p-values* < .001).

Conclusion: The azelastine nasal spray, a 2nd generation anti-histamine with anti-inflammatory effects besides blocking the H1 receptors, seems to be useful in alleviating the congestion and the rhinorrhea followed by a septorhinoplasty surgery.

Keywords: septorhinoplasty; azalestine; congestion; rhinorrhea

Comparison of blood and tissue eosinophil count and blood IgE in patients with chronic sinusitis and nasal polyps

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Background: The inflammatory mucosa of the sinus cavities is called sinusitis and is divided into various types based on its appearance and sign. Chronic rhinosinusitis is an inflammatory-infectious disease that involves the frontal, sphenoid, ethmoid, and maxillary sinuses. Chronic sinusitis is a multifactorial disease and the range of causes varies from environmental factors to genetic factors. The purpose of this study was to compare blood and tissue eosinophils and serum IgE levels in patients with chronic sinusitis with nasal polyp in Vali-e-Asr hospital in 1397.

Methods: In this descriptive-analytical study, the population under study included those with chronic sinusitis referred to Birjand Valiasr Hospital in 1397. 3 cc of Blood samples were taken 1 day before surgery to evaluate eosinophil counts and serum IgE levels. Also, samples taken from patients during surgery were counted and then 100 cells were counted and eosinophil counts and percentages were calculated. The data were entered into SPSS software after data collection.

Results: This study was performed on 70 patients with chronic rhinosinusitis which included 43 men (61.4%) and 27 women (38.6%) with mean age of 39.11 ± 13.72 years. There was no significant difference between sex of patients and mean serum IgE level ($P < 0.05$). The mean percentage of eosinophils in blood samples and tissues of patients with chronic sinusitis was significantly increased with the increase in CT Scan ($P < 0.05$).

Conclusion: Tissue or blood eosinophilia was not observed in patients with chronic rhinosinusitis. Also, the mean eosinophil percentage of blood and tissue increased significantly in patients with increased scanning computed tomography ($P < 0.05$).

Investigating Human Papilloma Virus Types In Sinonasal Papilloma Using Polymerase Chain Reaction: Is It Really A Prerequisite For Nasal Papilloma Formation?

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Background: Sinonasal papilloma is a relatively rare disease. However, it is prevalent enough for every otorhinolaryngologist to encounter it several times throughout one's medical practice. The aim of this study was to identify the presence of Human Papilloma Virus in sinonasal specimens of patients with sinonasal papilloma.

Methods: A cross sectional analytical study was performed on fresh tissue samples from 36 patients with sinonasal papilloma. Samples were studied by polymerase chain reaction for of Human Papilloma Virus detection.

Results: The majority of patients were of Human Papilloma Virus negative and there was no statistically significant difference in presence of squamous cell carcinoma in of Human Papilloma Virus positive and negative patients.

Conclusion: It seems that there is no correlation between HPV and SNP.further studies are needed to assess other potential factors that may influence the development of sinonasal papilloma.

Keywords: sinonasal papilloma, Human Papilloma Virus, polymerase chain reaction

Anterior Endoscopic Sublabial Transmaxillary Access to Infratemporal Fossa Lesions

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Background: Infratemporal fossa (ITF) is a deep seated area behind the maxillary sinus which is connected to middle cranial base superiorly and parapharyngeal space posteroinferiorly. Endonasal endoscopic transpterygoid approach has been described to deal with ITF lesions. The aim of this study is to assess the role of anterior endoscopic sublabial transmaxillary approach in the lesions of ITF with presence or absence of the nearby structure involvement.

Methods: Ten patients (age $8-58 \pm 14.8$ years) who underwent pure anterior endoscopic sublabial transmaxillary approach from 2011 to 2018 were included in the study. Patients demographic, lesions data, surgical technique and results were collected from 2010 to 2018 at a single institute. The data was analyzed using SPSS.

Results: Anterior endoscopic approach to the infratemporal fossa and parapharyngeal space was performed on 52 patients, out of which, 10 patients were treated by pure sublabial transmaxillary approach. The underlying conditions for these patients were as follow: trigeminal schwannomas (n= 3), meningiomas (n= 2) and arachnoid cyst, encephalocele, Ewing sarcoma, rbdomyosarcoma and osteochondroma (n= 1 each). Gross total resection was achieved in 9 cases (90%). The most common complication was numbness in the territory of maxillary and mandibular nerves (n=4). There average follow-up time was 15.1 months, and only 1 patient had asymptomatic residual tumor after 15.1 months of follow-up.

Conclusion: Endoscopic sublabial transmaxillary approach provides a direct access to the infratemporal fossa and middle cranial base, enhances working space and spares sinonasal cavity. It could be used either solely or in combination with other endoscopic corridors. this procedure is safe, less invasive and an efficient corridor for resection of selected infratemporal fossa lesions with or without extension to the middle cranial base and parapharyngeal space.

Keywords: Infratemporal fossa, Endoscopic, Sublabial, Transmaxillary, Transpterygoid, Middle cranial base

Anterior endoscopic approaches to Infratemporal fossa and Upper parapharyngeal space lesions

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Background: Infratemporal fossa(ITF)and upper parapharyngeal space(UPS) are challenging areas which not only contains vital neural and vascular structures ,but also have deep-seated locations and are hard to access. Treatment of most ITF and UPS lesions is surgery.In this study we describe our anterior endoscopic approaches(endonasal,transoral or combination)to reach these areas,our surgical technique, recommended corridors and our patients results.

Methods: This study is a retrospective case series of patients with benign and malignant lesions originating from or with extension to ITF and/or UPS space treated at tertiary-care referral center of IKCH-Tehran from 2010 to 2017 .

Results: Fifty two patients were reviewed with 42 cases having benign lesions(27 juvenile nasopharyngeal angiofibroma,4 schwannomas,6 meningiomas,2 encephaloceles,1 fibroma,1 gliosis,1 osteoma)and 10 malignant lesions(4 adenoid cystic carcinomas,1 recurrence of undifferentiated carcinoma,1 nasopharyngeal adenocarcinoma,1 metastatic thyroid carcinoma,2 sarcoma,1 mucoepidermoid carcinoma)treated with anterior endoscopic approaches for cure. Follow-up period was 2-60 months.We achieved gross total resection in 48 out of 52 patients.There was no major complications.The most longterm complication was nasolabial crease numbness in 23% of patients.In 39 patients there was no evidence of disease in extracranial area .2 cases had recurrence,4 had asymptomatic residue and 2 died of disease.5 patients lost to follow-up.

Conclusion: Anterior endoscopic approaches are safe and less invasive approaches to access and totally resect lesions of ITF and UPS areas.The best corridor can be choosed based on degree of laterality of tumor extension and nasal cavity involvement.

Keywords: Infratemporal fossa,endoscopic endonasal approach,pterygopalatine fossa,schwannoma,skull base tumors

Olfactory Dysfunction is Associated with More Severe Inpatient Clinical Course in COVID-19

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Background: Hyposmia is a known symptom of COVID19 infection, but its significance in determining the course of disease is unclear.

To perform a quantitative olfactory function testing in admitted patients and asymptomatic individuals, both with RT-PCR-confirmed COVID-19 to evaluate the association between hyposmia and severity of the disease.

Methods: Ninety-one patients (68 inpatients and 23 asymptomatic healthcare workers) with positive COVID-19 RT-PCRs were enrolled in this study. Their demographics and clinical characteristics were collected. An objective smell identification test was used to evaluate the reliability of self-reported hyposmia and determine the correlation of the measured olfactory dysfunction with severity of the disease.

Results: Twenty-two of 91 patients (24%) with confirmed COVID-19 reported hyposmia, while 41/91 (45%) patients had measurable olfactory dysfunction (IR-SIT score 1-4, $p < 0.05$). Mean age of the 68 inpatients and 23 asymptomatic individuals were 52.18 ± 17.54 years; M: F 43: 25, and 36.69 ± 9.57 years; M: F 8:15, respectively. 22/68 inpatients were graded as severe, 13/68 were graded as moderate and 33/68 had mild course of disease. Objective olfactory test detected hyposmia in 86% of inpatients with severe disease, 53% and 42% with moderate and mild disease, respectively. There was no significant difference between odds of objective olfactory dysfunction in patients with moderate disease and milder disease course (OR 1.58, 95% CI: 0.43-5.7, $p = 0.485$). However, the risk of disease severity was significantly increased for patients with olfactory dysfunction and was detected 8.6 times higher when compared to patients with mild disease (OR 8.6, 95% CI: 2.12-34.7, $p = 0.003$).

Conclusion: Olfactory Dysfunction was present in 86% of patients with severe course of COVID-19. The risk of disease severity is significantly increased when there is olfactory dysfunction in admitted patients.

Keywords: COVID-19; SARS-CoV-2; Hyposmia; Olfactory Dysfunction; Olfactory Test

New concept about division of proportion in the nose and face

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Background: What are the characteristics of beautiful nose? Small, long, projected, convex or concave nose? How much can the surgeon change the nose? Proportion and relationship are important in rhinoplasty. Many surgeons and patients are interested in a small and head up nose, short and over-rotate without considering the proportion of nose and face. I am trying to point out a number of good and bad proportions in this regard. The desirable relationship of lip project is that the upper lip arch must be approximately 2mm more than the lower lip. In women, chin lies slightly posterior to the lower lip.

Method: I study pictures of cases before and after surgery and study about longitudinal and transvers line in face and proportion with nose. I study about measure of forehead, nose, upper lip, lower lip and chin in these cases.

Results: Narrowing the tip and alar base and projection and rotation are very important in patient's beauty. Actually after surgery it could be more beautiful because patient achieves good proportion. But if patient have bad proportion, surgeon may not able to repair it. Lateral view: some patient like concave profile but it may not have proportion with their entire face in frontal view. Because with additional concavity, patient's face may look like empty in frontal view. Natural nose is with straight dorsal line, less projection and rotation but if surgeon can decrease this width with tip projection, rotation definition patient would be more beautiful.

Conclusion: Patients and many surgeons are interested in creating the small hyper project, hyper rotate with concave dorsum and create the standard nose. In many patients with small face and prominent malar and good proportion of nose with face, these changes is acceptable and patient satisfaction will be achieved. But in long and wide face this approach may cause that the patient's face become ugly. we should know that all component of face division. In books they consider the natural face with characteristics of for example alar base width should be approximately that of the intercanthal distance.

The evaluation association of demographic characteristics, associated symptoms and severity in patients with olfactory disorder in COVID-19 patients

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Background: COVID-19 is an emerging disease caused by the SARS-CoV-2, which typically presents with respiratory symptoms and fever, but there are studies that point to neurological damage and symptoms such as olfactory dysfunction. Therefore, this study was designed to further investigate olfactory disorder in COVID-19 patients.

Methods: The study was designed as a case-control study. All patients with COVID-19 referred to Shahid beheshti hospital in Kashan who had a positive PCR test and met the inclusion criteria were divided into case and control groups based on the presence or absence of olfactory disorder and were compared in terms of symptoms, outcome and demographic indicators.

Results: Finally, 78 patients in each case and control group were evaluated for the mentioned indicators. Finally, it was observed that in the case group, age ($P = 0.047$) and patients' recovery rate ($P = 0.042$) were significantly lower and nausea ($P = 0.047$) was significantly higher than the control group.

Conclusion: The presence of olfactory dysfunction is higher in patients with COVID-19 at a younger age and these patients have a lower recovery rate and nausea is a common symptom associated with olfactory disorder in COVID-19.

Keywords: COVID-19; Olfactory disorder

Middle turbinate resection in endoscopic pituitary surgery, is it advisable or not?

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Background: The objectives of this study are to evaluate the postoperative sinonasal outcome and quality of life and time of operation and degree of satisfaction of surgeons in endoscopic transsphenoidal pituitary adenoma surgery in two groups of patients with different approaches adopted regarding intraoperative management of the middle turbinate (preservation or resection)

Methods: We performed a single blind randomized clinical trial of 60 patients with pituitary adenoma , undergoing endoscopic endonasal pituitary surgery from December 2019 to June 2020 in two groups. group A in which middle turbinate resected and group B in which middle turbinate preserved. SNOT22 used for quality of life evaluation for six months postoperatively.time of operation in two group compared and surgeon satisfaction scored between 1- 4

Results: There was no statistically significant difference in SNOT 22 score between two groups. Time of operation and surgeons satisfaction was significantly better in middle turbinate resected group without any complication.

Conclusion: Middle turbinate resection during endoscopic transsphenoid pituitary adenoma surgery is safe and shortens time of operation and gives better accesses to skull base without significant sinonasal complication

Keywords: endoscopic, pituitary, adenoma, middle turbinate