Oral Presentation 5

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OP-49

Asthma-COPD Overlap Shows Favorable Clinical Outcomes Compared to Pure COPD in Korean COPD Cohort

Hye Jung Park[1], Hyung Jung Kim[2], Chul Min Ahn[2], Jin Hwa Lee[3], Kyeong-Cheol Shin[4], Soo-Taek Uh[5], Seung Won Ra[6], Kwang-Ha Yoo[7], Ki Suck Jung[8], Min Kwang Byun[2]*

[1]Department of Internal Medicine, Yong-in Severance Hospital, Yonsei University College of Medicine, Gyeonggido, Korea, [2]Department of Internal Medicine, Gangnam Severance Hospital, Yonsei University College of Medicine, Seoul, Korea, [3]Division of Pulmonary and Critical Care Medicine, Department of Internal Medicine, School of Medicine, Ewha Womans niversity, Seoul, Korea, [4]Regional Center for Respiratory Disease, Yeungnam University Medicial Center, Yeungnam University College of Medicine, Daegu, Korea, [5]Division of Respiratory and Allergy Medicine, Soonchunhyang University, Seoul Hospital, Korea, [6]Department of Internal Medicine, Ulsan University Hospital, University of Ulsan College of Medicine, Korea, [7]Department of Internal Medicine, Konkuk University School of Medicine, Seoul, Korea, [8]Division of Pulmonary Medicine, Department of Internal Medicine, Hallym University Sacred Heart Hospital, Hallym University Medical School, Anyang, Korea

Purpose: Comparisons of the characteristics of chronic obstructive pulmonary disease (COPD) and asthma-COPD overlap syndrome (ACOS) have been the focus of several studies since the diseases were defined by the Global Initiative for Asthma and Global Initiative for Chronic Obstructive Lung Disease guidelines. However, no consensus is available yet. In this study, we aimed to compare the characteristics of asthma-COPD overlap (ACO) and COPD.
Methods: We retrospectively reviewed 1,504 patients with COPD in the Korean COPD Subtype Study cohort. The occurrence of ACO was defined as a positive response to a bronchodilator (an increase in forced expiratory volume in 1 second [FEV1] of 12% and 200 mL).
Results: Among 1,504 patients with COPD, 223 (14.8%) were diagnosed with ACO. Men (95.5%) and current smokers (32.9%) were more prevalent in the ACO group compared with the pure COPD group (90.5% and 25.3%, respectively) ($P = 0.015$ and $P = 0.026$, respectively). Patients with ACO had a better quality of life (St. George's Respiratory Questionnaire for COPD score = 31.0 ± 18.0 [mean ± SD]) than those with pure COPD (35.3 ± 19.1) ($P = 0.002$). Although the prevalence of acute exacerbation was not different between the two groups, patients with severe exacerbation required hospital admission significantly more frequently in the pure COPD group than in the ACO group. Patients with ACO showed a higher likelihood of FEV1 recovery than patients with pure COPD ($P < 0.001$).
Conclusions: We suggest ACO is characterized by less severe symptoms, and therefore it might lead to rare severe exacerbation, and the possibility of lung function recovery.

Key Words: Asthma, COPD, outcomes

OP-50

Characteristics of asthma-COPD overlap syndrome diagnosed by the specialist: observations from the Korean Academy of Asthma, Allergy and Clinical Immunology, Severe Asthma Work Group Registry

Sang-Heon Kim[1], Min-Hye Kim[2], Hye-Ryun Kang[9], Jong-Sook Park[10], Tae-Bum Kim[6], Heung-Woo Park[9], Kwang-Ha Yoo[11], Yeon-Mok Oh[6], Young-Il Koh[12], An-Soo Jang[10], Byung-Jae Lee[13], Young-Joo Cho[2], Ga-Young Ban[3], Sang-Heon Cho[9], Hae-sim Park[3], Choon-Sik Park[10], You Sook Cho[6], Joo-Hee Kim[4], Jae-Woo Jung[5], Ji Yong Moon[1], So-Young Park[6], Hyouk-Soo Kwon[6], Jae-Woo Kwon[7], Jae Hyun Lee[8], Ho Joo Yoon[1]*

[1]Department of Internal Medicine, Hanyang University College of Medicine, Seoul, [2]Department of Internal Medicine, Soonchunhyang University College of Medicine, Bucheon, [3]Department of Internal Medicine, Konkuk University College of Medicine, Seoul, [4]Department of Internal Medicine, Chonnam National University Medical School, Gwangju, [5]Department of Medicine, Sungkyunkwan University School of Medicine, Seoul, Korea, [6]Department of Internal Medicine, Ewha Womans University School of Medicine, Seoul, [7]Department of Allergy and Clinical Immunology, Ajou University School of Medicine, Suwon, [8]Department of Internal Medicine, Hallym University College of Medicine, Anyang, [9]Department of Internal Medicine, Chung-Ang University College of Medicine, Seoul, [10]Department of Internal Medicine, University of Ulsan College of Medicine, Seoul, [11]Department of Internal Medicine, Kangwon National University Hospital, Chuncheon, [12]Department of Internal Medicine, Yonsei University College of Medicine, Seoul, [13]Department of Internal Medicine, Seoul National University College of Medicine, Seoul

Background: Asthma-COPD overlap syndrome shares the features both of asthma and COPD. While the clinical characteristics and outcomes of ACOS have been frequently compared with COPD, little is known about the features of ACOS in comparison with asthma. This study aimed to compare the clinical features and asthma control between the patients with ACOS and severe asthma in the Korean Academy of Asthma, Allergy and Clinical Immunology (KAACI), Severe Asthma Work Group (SAWG) Registry.
Methods: At the time of registration, the patients with severe asthma were determined to be ACOS or not by the specialists who are caring the patients. Demographic and clinical characteristics and asthma control status were compared between ACOS and severe asthma (non-ACOS).
Results: Of a total of 481 enrolled patients with severe asthma, 114 patents (23.7%) were determined as ACOS. Most patients with ACOS were male (83.3%) and older than severe asthma ($P < 0.001$). Lung function was lower in ACOS than severe asthma ($P < 0.001$). While the total score of Asthma Control Test was similar between ACOS and asthma, emergency department visit due to exacerbation was more frequent in ACOS than severe asthma ($P < 0.001$).
Conclusions: The patients with ACOS determined by the specialists was found to be male dominant, older than severe asthma (non-ACOS). In addition, ACOS showed more frequent exacerbations.

Key Words: asthma-COPD overlap, severe asthma, registry

OP-51

Cough persistence and its predictors: a retrospective cohort study of chronic cough patients

Sung-Yoon Kang[1], Young-Chan Kim[1], Sae-Hoon Kim[5], Heung-Woo Park[1], Yoon-Seok Chang[5], Byung-Jae Lee[6], Sang-Heon Cho[1], Alyn H. Morice[7], Hee-Sun Park[1], Kyung-Min Ahn[1], Ji-Su Shim[1], Soo- Jie Chung[1], Ha-Kyeong Won[1], Eun-Jung Jo[2], Ju-Young Kim[3], Min-Suk Yang[4], Woo-Jung Song[1]*

[1]Division of Allergy and Clinical Immunology, Department of Internal Medicine, Seoul National University College of Medicine, Seoul, Korea, [2]Department of Internal Medicine, Pusan National University School of Medicine, Busan, Korea, [3]Department of internal medicine, Gyeongsang National University Changwon Hospital, Changwon, Korea, [4]Department of Internal Medicine, SMG-SNU Boramae Medical Center, Seoul, Korea, [5]Department of Internal Medicine, Seoul National University Bundang Hospital, Seongnam, Korea, [6]Department of Internal Medicine, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea, [7]Centre for Cardiovascular and Metabolic Research, Hull York Medical School, Castle Hill Hospital, University of Hull, Cottingham, United Kingdom

Background: Chronic cough is a significant medical condition with a high prevalence. There are only few long-term studies on the clinical outcome of chronic cough. We aimed to examine the frequency of cough persistence after initial treatment, and investigate the baseline predictors for cough persistence.
Methods: This study employed a retrospective cohort of all chronic cough patients who had visited a cough clinic at a tertiary hospital between March 2012 and December 2013. They had undergone baseline investigation for comorbid conditions and cough hypersensitivity, including the Hull Airway Reflux Questionnaire (HARQ), and received treatment. Current survey was conducted between October 2016 and March 2017 to assess persistence and healthcare utilization associated with cough using structured questionnaires.
Results: Among 418 patients, 310 patients (74.2%), with an average follow-up of 3.6 years, were successfully contacted in this survey. Cough was persistent among 27.4% of respondents. About 90% responded that they still need any kind of treatment for cough, and 65% continued uninterrupted cough treatment. Compared to patients without persistent cough (n=225), those with persistent cough (n=85) reported significantly longer duration of cough before initial visits (34.4 vs. 63.4 months, p=0.012), and had higher frequency of cold air sensitive cough (86.4 vs. 72.7%, p=0.036), and lower maximum tolerable concentration of capsaicin inhalation (4.7 vs. 6.8 x10-5M, p=0.032) at baseline. Several items in the HARQ showed significant difference; cough with eating, cough with certain foods, and cough brought on by singing or speaking.
Conclusion: More than one-quarter of patients with chronic cough still suffered from persistent cough despite receiving continuous treatment for about 4 years. Several baseline predictors for cough persistence identified here warrant further longitudinal validation, but indicate a potential role of cough hypersensitivity in refractory cough.

Key Words: chronic cough, retrospective cohort study, cough hypersensitivity

OP-52

NH_4Cl decreases O_3-induced up-regulation of SLC26A4 gene level and function in mice lung

Hyeon Ju Lee[2], Da-Jeong Bae1, Jong-Uk Lee[2], Dong Kyu Baek[1], Jong-Sook Park[2], Hun-Soo Chang[1,3]* and, Choon-Sik Park[2]*

[1]Department of Interdisciplinary Program in Biomedical Science Major, Soonchunhyang University Graduate School, [2]Division of Allergy and Respiratory Diseases, Soonchunhyang University Bucheon Hospital, [3]Soonchunhyang Medical Research Institute, College of Medicine, Soonchunhyang University, Korea.

Background: Recently, an increase in SLC26A4 was observed in the transcriptome data of O_3-exposed mice, and the O_3 concentration is directly related to airway resistance and inflammatory response. Since SLC26A4 gene induces mucin genes and intraluminal acidification in the airways, SLC26A4 is supposed to be a key molecule in the O_3 - induced AHR and neutrophilic inflammation. Thus, we evaluated the role of SLC26A4 gene in a chronic O_3 exposure of murine model.
Methods: 6 weeks old BALB/C female mice were exposed to filtered air or O_3 (2ppm for daily exposure 3hr time, 21days). Ammonium chloride (NH_4Cl; 0, 0.1, 1, 10mM) was administered into the O_3-exposed animals via intra-trachea route to block the effect of SLC26a4. Airway resistance was measured using Flexivent and Bronchoalveolar lavage fluid (BALF) cells were differentially counted. SLC26A4 and Muc5ac proteins and genes were assessed by western blotting, immunohistochemistry, and real-time PCR. The cytokines TNF-α, IFN-γ, IL-1beta, IL-17 and Caspase-1 were analyzed as markers of inflammation by using a western blot analysis.
Result: SLC26A4 was detectable in the bronchial epithelium of normal mice lung exposed to O_3 and significantly increased with time-dependent manner. Airway resistance and the number of neutrophils in BALF fluids were increased significantly in the O_3- exposed mice. SLC26A4 and Muc5ac RNA and protein levels were increased in the O_3 exposed mice lungs. Th1 cytokines and inflammasomes were increased in the O_3 exposed mice lungs and decreased when treated with NH_4Cl. NH_4Cl treatment reduced the elevation toward those of sham-treated mice on filtered-air and significantly suppressed the O_3-induced increase of AHR and inflammatory cells, particularly neutrophils (p-value$<$0.05).
Conclusion: SLC26A4 may be a target to alleviate O_3-induced AHR and neutrophilic inflammation, and NH_4Cl seems to be a good candidate.

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Key Words: SLC26A4, neutrophilic inflammation, NH_4Cl

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Outdoor pollutants and meteorological conditions on Exacerbation of Asthma: A Time-Trend Controlled Case-Crossover Study

Da-Jeong Bae[1], Sung Wook Shin[2], Hun Soo Chang[1,2], Sung-Ryul Kim[1], Jong Sook Park[2], Choon-Sik Park[2]*

[1]Department of Medical Bioscience, Graduate School, Soonchunhyang University, Asan, Republic of Korea,
[2]Division of Allergy and Respiratory Medicine, Soonchunhyang University Bucheon Hospital, Bucheon, Republic of Korea

Air pollution is the main cause for aggravation of asthma symptoms in a certain number of asthmatics. However, there have been few studies evaluating the effect of air pollution on exacerbation between the severity of exacerbation. Thus, we compared the association of air pollution with exacerbation between mild cases and moderate to severe cases.
We recruited 143 asthmatics, experienced at least one exacerbation between 2005 and 2013 in Seoul and Kyunggi. A total of 535 exacerbations was evaluated in association with air pollutants and meteorological conditions using a time-trend controlled case-crossover study design, certain on the day of exacerbation (Lag 0) and up to 3 days before (Lag 1 - Lag 3). We stratified the data into four seasons with respect to the median temperature of each month and further stratified them according to the severity of asthma.
For the mild cases (290), the levels of O_3 on Lag1 in spring (P= 0.004, OR: 1.675) and, lag1 (P=0.017, OR: 1.457) and lag3 (P=0.015, OR: 1.471) in summer had associations with the exacerbation. The level of NO2 on lag2 (P= 0.03, OR: 2.152) also has the positive association in winter. In the severe cases (245), the levels of the SO2 on lag1 (P= 0.04, OR: 1.257) and lag2 (p=0.046, OR:1.259) in summer, CO on lag2 (P=0.036, OR: 1.241) in Autumn, O_3 on Lag1 (P=0.002, OR: 1.785) and lag2 (P=0.038, OR: 1.472) in summer and lag1 (P=0.01, OR: 3.141) in winter, PM10 on Lag3(P= 0.025, OR: 1.008) in spring, NO2 on Lag1 (P=0.016, OR: 2.025) in winter had the significant associations with the exacerbation. For both mild cases and severe cases, the level of O_3 had the association with the exacerbation in summer. The level of NO had the association with the exacerbation of both groups in summer. In addition, the ORs were significantly higher in moderate to severe cases than in mild cases. This data indicate that ambient air pollutants affect the exacerbation of moderate to severe exacerbation rather than mild exacerbation. The biospecimens and data used for this study were provided by the Biobank of Soonchunhyang University Bucheon Hospital, a member of the korea Biobank Network This study was funded by the Korea Ministry of Environment (MOE) as "the Environmental Health Action Program (2016001360002).

Key Words: Exacerbation, Air pollution, Asthma

OP-54

Weather type influences the harmful effect of air pollution on asthma symptom

Joongbum Cho[1], Young-Min Kim[2], JeongYun Hwang[1], JIhyun Kim[1], Minyoung Jung[1], WooHyeok Choi[1], Ji Young Lee[1], Jeong-Ok Lee[2], Byung-Jae Lee[3], Dong-Chull Choi[3], Kangmo Ahn[1]*

[1]Department of Pediatrics, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea
[2]Environmental Health Center for Atopic Diseases, Samsung Medical Center, Seoul Korea
[3]Division of Allergy, Department of Medicine, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea

Background: Synoptic weather-typing is a useful tool for the research on the environment. The purpose of the present study was to investigate whether asthma symptoms are affected by weather type and air pollution.
Method: Forty nine asthmatic adults living in Seoul, Korea, were followed between August 2013 and December 2014. Asthma symptoms were recorded on a daily basis and daily weather was classified into 6 categories according to Spatial Synoptic Classification: dry moderate (DM), dry polar (DP), dry tropical (DP), moist moderate (MM), moist polar (MP), and moist tropical (MT). Exposure to particulate matter with a diameter less than 10 micrometer (PM10) and nitrogen dioxide (NO2) in each individual was estimated with time-weighted average of concentrations considering outdoor and indoor level of air pollutants and time activity of each individual. A generalized linear mixed model was used for the analysis after controlling for cigarette smoke, age, and sex.
Results: A total of 10,575 person-days of records were analyzed. Among 6 weather types, the presence of any asthma symptom was more frequently found on DP days (16.3%, $P < 0.05$) and lower on MM (12.0%, $P < 0.05$) and MT days (10.3%, $P < 0.05$). The risk of developing asthma symptoms was increased by the exposure to PM10 on DM days [adjusted odds ratio (aOR) = 1.12; 95% confidence interval (CI), 1.03-1.22] and on MM days (aOR = 1.35; 95%, 1.17-1.55) and by NO2 on DM days (aOR = 1.14; 95% CI, 1.03-1.25) and on MM days (aOR = 1.38; 95% CI, 1.11-1.73). With an increase in 10 μg/m3 of PM10, asthma symptom increased by 9.3% (95% CI, 4.9-13.8) on dry days and 9.0% (95% CI, 1.5-17.1) on moist days, whereas 10 ppb of NO2 increased asthma symptom by10.9% (95% CI, 2.8-19.7 per 10 ppb) only on dry days.
Conclusion: Asthma symptoms in adults are aggravated on days with dry polar weather. The effect of PM10 and NO2 on asthma symptoms was different depending on weather type.

Key Words: Whether, pollution, asthma

OP-55

Serum periostin level correlate with smoking exposure during pregnancy in children

Myongsoon Sung[1]*, Hey-Sung Baek[2], Kyung Suk Lee[3], Young Ho Jung[3], Eun Gyo Ha[3], Hye Mi Jee[3], Youn Ho Shin[4], Man Yong Han[3], K.izuhara[5]

[1]Department of Pediatrics, CHA Gumi Medical Center, CHA University School of Medicine, Gumi, Korea, [2]Department of Pediatrics, Hallym University Kandong Sacred Heart Hospital, Seoul, Korea, [3]Department of Pediatrics, CHA Bundang Medical Center, CHA University School of Medicine, Seongnam, Korea, [4]Department of Pediatrics, CHA Gangnam Medical Center, CHA University School of Medicine, Seoul, Korea, [5]Department of Biomolecular Sciences, Saga Medical School, Saga, Japan

Background: Periostin is associated with airway remodeling that induced by interleukin (IL)-4 and IL-13 in recent studies. Smoking exposure during pregnancy is associated with chronicity of allergic disease. However, the serum periostin level is limited by lack of smoking exposure during pregnancy. We explore the relationship between periostin and smoking exposure during pregnancy in children.
Method: This population-based study examined 7 years old children who were enrolled in the 2016 Seongnam Atopy Project in Korea between June 2016 and July 2016. The allergy group was defined having symptom of current asthma, allergic rhinitis or atopic dermatitis within12 months via questionnaire, meanwhile health group having no symptom. Of the 1,265 children, 249 were included randomly for the analysis. Based on smoking exposure period, subjects divided into three subtypes- pregnancy period, within one year, and over one year after birth period.
Result: Mean age of total subjects was 7.1±0.3 years (boy=55.4%) and serum periostin level was 106.0 ng/ml (IQR 92.0-124.0). There is no difference between allergy (n=173, median, 106.0 ng/ml, IQR 92.0-123.0) and healthy groups (n=76, median 106.5 ng/ml, IQR 91.3-125.5) in serum periostin levels (P = 0.920). Serum periostin level was a significant difference between children with smoking exposure (median, 110.0 ng/ml, IQR 97.0-131.0) and without smoking exposure during pregnancy (n=131, median, 103.0 ng/ml, IQR 91.0-120.0) (P = 0.031). There was no difference between within one year and over one year after birth period in smoking exposure (P = 0.161). After univariate linear regression, serum periostin level had association with smoking exposure of pregnancy period (B=45.3, SE=11.0, P < 0.001).
Conclusion: Serum periostin level significantly correlated with smoking exposure during pregnancy in children.

Key Words: periostin,smoking, children

OP-56

Serum progranulin/clusterin as a potential biomarker for toluene diisocyanate induced occupational asthma(TDI-OA)

Gil-Soon Choi[1], EunMi Yang[2], Hoang Kim Tu Trinh[2], Young-Mi Ye[2], Yoo Seob Shin[2], Seung-Hyun Kim[2], Hae-Sim Park[2]*

[1]Department of Internal medicine, Kosin University College of Medicine
[2]Department of Allergy and Clinical immunology, Ajou University School of Medicine

Backgrounds: It is critical to develop serologic markers to identify susceptible subjects among TDI-exposed workers, considering poor prognosis of TDI-OA. Oxidative stress is thought to play a role in the pathogenesis of TDI-OA. Recent studies suggested a possible role of progranulin/clusterin in oxidative stress-mediated inflammatory mechanisms in asthmatic airway.
Objectives: We compared serum levels of progranulin/clusterin in three study groups, TDI-OA patients, asymptomatic exposed controls(AEC) and unexposed helthy normal controls(NC) in order to evaluate clinical significance.
Methods: Sixty-eight patients with TDI-OA, 100AEC and 122 NC were enrolled. Serum levels of progranulin/clusterin were measured using commercial ELISA kits(R&D Systems, Minneapolis, Minn., USA). The diagnostic values were determined using the receiver operating characteristic(ROC) curves.
Results: Significantly lower serum levels of progranulin/Clusterin were noted in TDI-OA groups compared to AEC and NC groups(P<0.05). Using the optimal cutoff value of progranulin(<68.4 ng/m) and clusterin (<131 ug/mL), sensitivity and specificity were 62.3% and 73.1% for progranulin , 63.1% and 64.4% for clusterin. When these 2 parameters were combined, there were 39.3% sensitivity and 89.3% specificity(P<0.001).Serum progranulin and clusterin levels were not significantly associated with clinical parameters such as age, sex, atopy, disease duration, FEV1%, PC20 methacholine levels.
Conclusion: We suggest that the serum levels of progranulin/clusterin may be used as a potential serologic marker for identifying TDI-OA among TDI-exposed workers, although the exact mechanisms of progranulin and clusterin remains not understood. Further mechanism studies should be followed to clarify their roles.

Key Words: progranulin, clusterin, TDI-induced occupational asthma

OP-57

Th2 cytokines may be involved in evolution of non-eosinophilic chronic rhinosinusitis with nasal polyp

Dong-Kyu Kim[1], Sohee Oh[2], Kyoung Mi Eun[3], Il Gyu Kong[4], Seong-Ho Cho[5], Dae Woo Kim[3]*

[1]Department of Otorhinolaryngology-Head and Neck Surgery, Chuncheon Sacred Heart Hospital and Nano-Bio Regenerative Medical Institute, Hallym University College of Medicine, Chuncheon, Korea, [2]Department of Biostatistics, Boramae Medical Center, Seoul National University College of Medicine, [3]Department of Otorhinolaryngology-Head and Neck Surgery, Boramae Medical Center, Seoul National University College of Medicine, Seoul, Korea, [4]Department of Otorhinolaryngology-Head and Neck Surgery, Pyongchon Sacred Heart Hospital, Hallym University College of Medicine, Chuncheon, Korea, [5]Division of Allergy-Immunology, Department of Internal Medicine, University of South Florida Morsani College of Medicine, Tampa, Florida

Background: Endotype in chronic rhinosinusitis (CRS) has been established in the last decade by case-control studies. However, the inflammatory profiles of allergic disease evolve over time within subjects. Time-dependent changes in endotype should be investigated to strengthen its therapeutic utility.
Objective: To investigate endotype within each CRS, its changes from non-polyp mucosa, uncinate process mucosa (UP) to nasal polyp tissues (NP) within subjects, and its duration-dependent changes in NP.
Methods: UP were harvested from 9 controls, 20 CRS without NP, and 27 CRS with NP. NP were obtained from 36 CRS with NP (CRSwNP).
Results: Signature inflammatory mediators are IL-5, CCL-24, MCP-4 and VCAM-1 in eosinophilic NP, whereas IL-17A, IL-1β, MMP-9 was detected as signature inflammatory markers in non-eosinophilic NP. Despite a difference in inflammatory cytokine profiles between both eosinophilic and non-eosinophilic NPs, the common upregulation of IL-5, CCL-11, IL-23, IL-2Rα, VCAM-1, MMP-1, MMP-3, and MMP-9 were shown from UP to NP in both subtypes. Furthermore, CCL-24, MCP-4, IL-1α and IL-6 upregulated but IFN-γ expression declined from UP to NP in eosinophilic CRSwNP, whereas upregulation of CXCL-1 and downregulation of TIMP-1 were observed in NP versus UP in non-eosinophilic CRSwNP. IL-5 and IL-13 demonstrated a positive correlation with symptom duration in non-eosinophilic CRSwNP, whereas eosinophilic CRSwNP with shorter symptom duration showed higher Th2 endotype than longer symptom duration.
Conclusion: Increase in Th2 cytokines from non-polyp tissue, UP to NP were shown irrespective of subtypes of CRSwNP. There was also a symptom duration-dependent increase in Th2 cytokines in non-eosinophilic NP. Th2 cytokines may be involved in evolution of non-eosinophilic NP.

Key Words: chronic rhinosinusitis, nasal polyp, evolution

OP-58

Nasal patency in nonallergic rhinitis associated with resistance at 5 Hz in impulse oscillometry system

Joo Young Song[1], Eun Kyo Ha[1], Hye Mi Jee[1], Yoon Ho Sheen[2], Mi Ae Kim[3], Seung Won Lee[4], Jung Won Yoon[5], Seung Jin Lee[1], Young-Ho Jung[1], Kyung Suk Lee[1], Jae-Cheul Ahn[6], Man Yong Han[1]*

[1]Department of Pediatrics, CHA Bundang Medical Center, CHA University, Seongnam, [2]Department of Pediatrics, CHA Gangnam Medical Center, CHA University, Seoul, [3]Department of Medicine, CHA Bundang Medical Center, CHA University School of Medicine, Seongnam, [4]CHA University School of Medicine, Seongnam, [5]Department of Pediatrics, Myongji Hospital, Gyeonggi-do, [6]Department of Otorhinolaryngology-Head & Neck Surgery, CHA Bundang Medical Center, CHA University, Seongnam

Background: Allergic rhinitis is immunologically and morphologically connected to lower airway. We investigated the link between anatomical change of intranasal cavity in nonallergic rhinitis and small airway resistance.
Methods: We enrolled the 226 of 7 year aged children who participated in the Seongnam Atopy project 2016, and performed the skin prick test for 18 aero allergens and examined total eosinophil counts (TEC). For nasal patency, acoustic rhinometry measured the area of nasal cavity at 0-5 cm. The resistance of low airway was assessed with IOS and the volume and flow of airway was assessed with spirometry. We measured the score for rhinitis symptoms during 1 month with Visual Analog Scale (VAS, 0-10).
Results: In a total 226 children, allergic rhinitis was 71 (31.7%), and nonallergic rhinitis was 62 (27.7%). Nasal patency in allergic rhinitis (median, 8.28 mm3, IQR 7.07-9.83) decreased than that of the healthy children (median, 9.3 mm3, IQR 7.69-10.64, P = 0.011). Nasal patency showed a significant correlation with TEC (spearman rho = -0.145, P = 0.049) and VAS score (rho = -0.145, P = 0.029). Nasal patency was related with resistance at 5 Hz under multivariate regression of adjusting confounding variables (beta= -0.005, SE = 0.0032, P = 0.041). In non allergic rhinitis, the proportion of children with small airway resistance more than 4 quartile, increased (6.3% to 35.7%) as the nasal patency was narrowed from less than 1 quartile to more than 4 quartile (linear trend, P = 0.020).
Conclusion: Nasal symptom and eosinophil count were correlated with nasal patency. In nonallergic rhinitis, the children with narrow nasal patency showed high lung resistance, like in allergic rhinitis.

Key Words: nasal patency, nonallergic rhinitis, small airway resistance

OP-59

Pet Allergy in Korean Pet Owners

Sang Min Lee[1], Min-Suk Yang[2], Sang Pyo Lee[1]*

[1]Gachon Univsersity Gil Medical Center
[2]SMG-SNU Boramae Medical Center

Introduction: Pet allergy was not sufficiently investigated, especially in Korea.
Methods: We enrolled 480 subjects who owned pet and participated in one Korean pet exhibition celebrated in Seoul 2016. They were asked to respond to questionnaires regarding pet ownership, pet allergy, medical service for allergy, and agreement to "Allergy can occur during exposure to pet" and "I try to prevent or reduce allergic symptoms or diseases" using visual analogue scale (0~100%). They also underwent skin prick test for indoor inhalant allergens.
Results: A total of 179 subjects experienced allergic symptoms during exposure to dog (n=109), cat (n=60), rabbit (n=6), guinea pig (n=1), rat (n=1), hedgehog (n=1), or any haired pet (n=1). In skin prick test, they were more frequently sensitized to animal allergens and other inhalant allergens compared to subjects without pet allergy. They also more frequently received medical service (29.1% vs. 2.3%, P <0.001) and got prescription (14.0% vs. 1.0%, P <0.001) for their allergy, however there was no difference in performing allergen-specific immunotherapy (AIT) between two groups (2.2% vs. 1.0%, P =0.433). They strongly agreed to "Allergy can occur during exposure to pet" (65.5 ± 25.0% vs. 41.7 ± 30.8%, P <0.001) and "I try to prevent or reduce allergic symptoms or diseases" (41.0 ± 31.0% vs. 32.1 ± 32.2%, P <0.003). However, they spent more time in sharing space and contacting directly with their pets, and there were more subjects who slept with their pets in their bedrooms and let their pets defecate anywhere in their houses.
Conclusions: Pet allergy seems to be prevalent in Korean community. Subjects with pet allergy think that exposure to pet can provoke allergy, and that they try to prevent or reduce their allergy. However, they are more frequently exposed to their pets in real life.
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Key Words: Pet, Allergy, Exposure

OP-60

Long term efficacy of Turbinoplasty in patients with allergic rhinitis compared with medical treatment

Ji-Hun Mo[1]*, Young-Jun Chung[1], Sang Hyup Kim[1]

[1]Department of otorhinolaryngology Dankook University College of Medicine

Background: The long term efficacy of turbinoplasty in patients with allergic rhinitis has been controversial.
Objective: The aim of this study was to compare long-term efficacy of turbinoplasty in patients with allergic rhinitis (AR) compared with medical management.
Methods: 205 patients with AR who were diagnosed with allergic symptoms and positive skin test were included in this study. Turbinoplasty group were 137 subjects and medical treatment group were 68. The symptom questionnaire were performed before treatment and telephone survey was performed at 2 and 5 years postoperatively. Allergic symptoms such as rhinorrhea, itching, sneezing and nasal obstruction, drug use frequency and subjective satisfaction were evaluated using visual analogue scale and were compared between two groups.
Results: Turbinoplasty group showed significant improvement over medical treatment group in allergic symptoms such as nasal obstruction, rhinorrhea , itching and sneezing at 2 and 5 years postoperatively. However, In nasal obstruction, the degree of improvements decreased at 5 years compared with that of 2 years postoperatively in turbinoplasty group although it was still better than that of medical treatment group ($p<0.05$). Turbinoplasty group also showed significantly less drug use frequency than medical treatment group ($p<0.01$).. In terms of subjective satisfaction score, turbinoplasty group had more satisfaction score than medical treatment group at 2 and 5 years postoperatively(all $p<0.001$).
Conclusion: Turbinoplasty improved not only allergic symptoms but also drug usage even at 5 years postoperatively, compared with medical treatment. Therefore, turbinoplasty could be used in refractory cases of AR patients with good outcome.

Key Words: allergic rhinitis, treatment