Correlations Between Serum Apolipoprotein A-I and Formation of Vocal Cord Polyp

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Summary: Objective. This study aims to investigate the correlations between serum apolipoprotein A-I (ApoA-I) and the formation of vocal cord polyps (VCPs).

Study Design. This study used the nonmatched case–control study method.

Methods. The serum total cholesterol (TC), triglyceride, high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol, ApoA-I, apolipoprotein B (ApoB), and ApoA-I/ApoB levels of 89 VCP patients and 87 normal volunteers were compared. Additionally, such VCP-related factors as excessive vocal use, vocal abuse, smoking, drinking, and the size of VCPs were analyzed.

Results. The two groups did not significantly differ with regard to triglyceride, low-density lipoprotein cholesterol, ApoB, and ApoA-I/ApoB levels ($P > 0.05$), whereas they did significantly differ with regard to TC, HDL-C, and ApoA-I levels ($P < 0.05$) according to independent t tests. Logistic regression analysis showed that excessive vocal use and vocal abuse were risk factors for VCPs ($P < 0.05$), with odds ratio values of 5.675 and 12.781, respectively. The ApoA-I level was negatively associated with VCPs ($P < 0.05$), with an odds ratio of 0.511; however, TC and HDL-C were not associated with the formation of VCPs ($P > 0.05$). The size of VCPs in females was negatively correlated with the serum ApoA-I level ($r = –0.349$, $P = 0.032$), whereas that in males was not ($P > 0.05$).

Conclusions. As the serum ApoA-I level was negatively correlated with the formation of VCPs, ApoA-I may reduce the risk of VCPs. These findings may facilitate the prevention and treatment of VCPs.

Key Words: Apolipoprotein A-I–Vocal cord polyps–Risk factors–Size of vocal cord polyps–Blood lipids.

INTRODUCTION

Vocal cord polyp (VCP) is a benign lesion of the vocal cord and a common disease. Clinical studies showed that vocal abuse, excessive vocal use, inflammations in the upper respiratory tract, and smoking were the major risk factors toward the formation of VCP.[1]

Serum total cholesterol (TC) consists of high-density lipoprotein cholesterol (HDL-C) and low-density lipoprotein cholesterol (LDL-C), among which high-density lipoprotein (HDL) is composed of lipid and apolipoproteins, and apolipoprotein A (ApoA) is one of the main components of HDL, accounting for about 90%. Apolipoprotein A-I (ApoA-I) accounts for 70% of ApoA, and the rest of the 20% is the ApoA subtypes.[2] Early studies had found that ApoA-I could not only regulate the cholesterol efflux, and exhibit antiatherosclerotic effect but also suppress the inflammations in atherosclerosis. More and more evidence had proved ApoA-I's anti-inflammatory effects.[3,4] It was reported that ApoA-I mimetic peptides had characteristics in animal models and humans such as anti-inflammation, antioxidation, antiplatelet aggregation, antirejection, and antivirus, as well as inhibition of the angiogenesis of tumors,[5] and prevent atherosclerosis, cardiac transplant rejection, and are beneficial in obesity-related therapeutic areas. Future studies must reveal the roles of these peptides in treatment of non-cardiac inflammations and tumors. Because of ApoA-I's great clinical effects, the clinical applications of ApoA-I has become the hotspot in current studies.

In previous studies, it was reported that decreasing serum ApoA-I would increase the risk of gallbladder polyps lesions; the reduction of serum HDL/ApoA-I was an independent risk factor of gallbladder polyps lesions, which was even larger than the risks caused by hepatitis B surface antigen (HBsAg) and gender.[6,7] It was found that the serum ApoA-I levels in patients with schizophrenia,[8] nasopharyngeal carcinoma,[9] or colon cancer[10] were significantly lower than those in patients in the normal control group; these phenomena indicated that the serum ApoA-I level might be possibly related with certain lesions *in vivo*.

VCP is a chronic inflammatory disease characterized by exudative lesions pathologically. However, the relations between the anti-inflammatory roles of serum ApoA-I and the formation of VCP remain unclear. The reported protective effects of serum ApoA-I against inflammations in the vocal cord and excessive vocal vibration must be further investigated. Therefore, we designed this preliminary clinical case–control study through questioning and comparing such risk factors as vocal abuse, excessive vocal use, smoking, and drinking between the VCP patients and the normal control people, as well as analyzing the correlations between the serum ApoA-I level and VCP size, to investigate whether the reduction of ApoA-I would be the risk factor for the formation of VCP, and to explore the roles of ApoA-I toward the formation of VCP.

MATERIALS AND METHODS

Subject selection

The VCP group

Using the nonmatched case–control study method, VCP patients admitted into the Department of Otolaryngology of our hospital and diagnosed as VCP by surgery from January 2013 to March 2014 were selected. All the patients underwent preoperative electronic laryngoscopy and surgical samples were confirmed by postoperative pathology. Exclusion criteria

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included uncontrolled hypertension, diabetes, hepatonephric dysfunction, thyroid dysfunction, cancer, autoimmune disease, any other acute or chronic inflammatory disease, body mass index (BMI) ≥24 kg/m^2, or administration with lipid-adjusting drugs or traditional Chinese medicines within nearly 6 weeks.

The control group

Selected normal people underwent physical examinations in the same period, with or without obvious pharyngolaryngeal discomfort, while diagnosed normal by laryngoscopy. Inclusion criteria were absence of history of coronary heart disease, hyperlipidemia, hypertension, diabetes, hepatonephric dysfunction, thyroid dysfunction, cancer, autoimmune disease, any other acute or chronic inflammatory disease, lipid dysmetabolism, and BMI in the normal range (18.6~23.9 kg/m^2). The comparisons of age, height, BMI, and so on, between the two groups had no statistically significant difference ($P > 0.05$).

Survey methods

All the patients underwent routine preoperative examinations after being admitted to the hospital, including liver function, kidney function, blood lipids, and electronic laryngoscopy, and the enrolled patients were surveyed by one uniform questionnaire. The normal healthy people also underwent laryngoscopy (to exclude throat tumor) and were administered the uniform questionnaire survey, and were formally enrolled into the control group when their medical reports met the inclusion criteria. To ensure consistency and accuracy, the investigation was completed by the same investigator.

Main aspects in the questionnaire survey

1 Personal information: gender and age
2 Drinking: drinking preference, average daily alcohol consumption, drinking duration (drinking referred to average daily alcohol consumption of ≥50 g and lasted for more than 1 year);
3 Smoking: smoking preference, average daily cigarette consumption, smoking duration (smoking referred to at least one cigarette every day and lasted for more than 1 year);
4 Vocal usage: referred to vocal usage time weekly (accumulated vocal usage time in work and daily life every week, hours); excessive vocal use referred to more than 20 hours of vocal usage weekly, and the average daily usage was more than 3 hours[11]
5 Vocal abuse: one of the following circumstances might be considered as vocal abuse: (1) loved to yell or used to yelling, (2) used voice much during upper respiratory tract infections, (3) long-term crying, or (4) singing after drinking.

Blood lipid determination

All the subjects were sampled the fasting venous blood in the morning and under resting state; the operations were performed strictly according to the instructions of the instrument and kit; ADVIA2400 automatic biochemical analyzer (SIEMENS Corp., Munich, Germany) was used to detect TG, HDL-C, LDL-C, ApoA-I, and apolipoprotein B (ApoB); and all the methods used were the international standard methods recommended by the Chinese Society of Laboratory Medicine.

VCP size determination

The images of VCP were obtained via laryngoscopy (PENTAX Electronic laryngoscope, HOYA Corp, Tokyo, Japan): pixel 390 × 392; the objective lens was placed horizontally above the false vocal folds and photographed the anterior vocal cord joint and full vocal cord. Each image was taken while keeping the distance between the lens to the vocal cord consistent. ImageJ software (NIH) was applied to measure the length (ab) and width (cd) along one side of the vocal cord as shown in Figure 1. Then, ab multiplied by cd was calculated as the vocal cord area; the VCP outline was hand-drawn and its area was measured; the ratio of the VCP area to the vocal cord area was set as the VCP size then measured three times for the average VCP size.[12]

Statistical processing

The quantitative data that met the normal distribution were expressed as $x \pm s$, and the comparison of intergroup averages used the two independent-sample t tests; the difference in the ratio or constituent ratio of two samples was compared using the chi-square test; the nonconditional logistic multiple regression

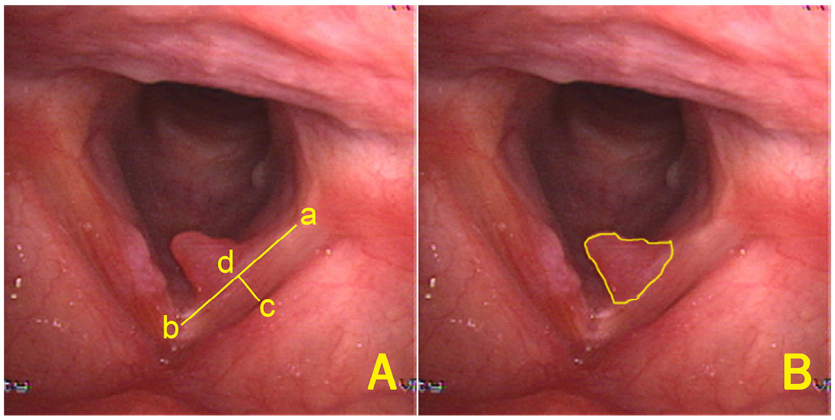

FIGURE 1. VCP electronic laryngoscopy picture. **(A)** vocal cord area measurement; ab: the length from anterior commissure to vocal process, cd: the width of vocal cord at the middle part of vocal cord. **(B)** VCP area measurement.