

The relationship between the ABO blood group and tumor diameters in patients with carotid body tumors

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ABSTRACT

Several studies have assessed the association between blood group of ABO and many cancer types. Nevertheless, there was no data regarding the connection between blood group of ABO and tumor diameters in carotid body tumors (CBTs) patients. The purpose of our study was to analyse possible association between tumor diameters and gender, ABO blood group in CBTs patients compared to healthy controls.

The demographic and laboratory data of 65 CBTs patients (57 females and 8 males) who underwent surgical intervention and 65 healthy controls (52 females and 13 males) were retrospectively analyzed.

The mean age of CBTs patients was 51.81 ± 9.82 years, and the mean age of the healthy subjects was 52.72 ± 8.50 years. There were no statistically significant difference between two groups with regard to age and gender. The mean of tumor diameters was 3.72 ± 1.50 cm (range=1-8 cm). There was no statistically significant difference between study groups according to ABO blood group ($p=0.87$). The females/males ratio of patients was 57/8. The mean tumor diameters of females was 3.57 ± 1.34 cm and the mean tumor diameters of males was 4.77 ± 2.16 cm; the difference was statistically significant ($p=0.03$). There was a positive correlation between male gender and the tumor diameters ($r=0.23$, $p=0.03$).

This is the first report investigating association between the tumor diameters and ABO blood group in CBTs. Although CBTs were shown higher in females, tumor diameters were found significantly higher in males than females. However, we did not determine any association between ABO blood group and tumor diameters.

Key Words: Carotid body tumors, ABO blood group, gender, tumor diameters

Introduction

Carotid body tumors (CBTs), known as neuroendocrine tumors, are generally localized near carotid bifurcation that primarily originating from paraganglionic corpuscles. CBTs are rare tumors with an incidence ranging between 0.06-3.3:100000 (1). Although they are commonly benign and grow slowly, they may cause symptoms such as local pulse-like vibratory sense on the mass site, headache, vertigo or alterations in voice as result of compression effect or cranial nerve dysfunction (2-4).

The exact etiological factors of CBTs are unknown. Carotid body is a chemoreceptor detecting the oxygen tension of systemic arterial blood. These tumors were associated with the conditions of chronic hypoxia such as high altitude (5,6).

The first information about relationship between gastric cancer and blood group A was mentioned

by Aird et al. (7). Many studies were performed for detecting association between blood group of ABO and mechanism of different cancers but its role in CBTs is unknown (8,9). Therefore, the purpose of our study was to review the gender, tumor diameters and ABO blood group of patients with CBTs by comparing these findings with healthy controls.

Material and Methods

The demographic and laboratory data of 65 CBTs patients (57 females and 8 males) who underwent surgical intervention from January 2007 to June 2017 and 65 age-matched healthy controls were obtained from information system of the hospital.

Age, gender, complete blood count parameters and ABO blood groups of all study participants were evaluated. The tumor diameters were also measured in the patient group. Patients with the missing records were not included in this study.

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Table 1. Comparison of the complete blood count in study participants

Parameters	CBTs (n=65)	Control (n=65)	p
White blood cell count (x10 ⁶)	7.76 ± 2.03	7.24 ± 1.61	0.07
Hemoglobin (g/dL)	13.72 ± 1.69	13.87 ± 1.22	0.57
Platelet	272.90 ± 71.04	257.08 ± 64.28	0.23

CBTs: Carotid body tumors

Statistical Analysis: The findings of the study are defined as the mean±standard deviation. The continuous variables of study groups were analyzed using a Student's *t* test. Correlation analyses were assessed using Pearson's test. The categorical variables were assessed using a chi-squared test. The results were considered to be statistically significant if the *p* results were less than 0.05. The data were analyzed using SPSS® for Windows (Version 21.0).

Table 2. The distribution of AB0 blood groups among study participants

Blood groups	CBTs (n=65)	Control (n=65)	p
A Rh (+)	27	27	0.87
A Rh (-)	4	4	
B Rh (+)	7	9	
B Rh (-)	1	2	
0 Rh (+)	19	13	
0 Rh (-)	2	4	
AB Rh (+)	5	6	

CBTs: Carotid body tumors

Results

The mean age of CBTs patients was 51.81±9.82 years, and the mean age of the healthy subjects was 52.72±8.50 years. Of the 65 patients, 57 (87.7%) were females and 8 (12.3%) were males. Of the 65 healthy subjects, 52 (80%) were females and 13 (20.7%) were males. There were no statistically significant between the two groups with regard to age and gender.

The results of complete blood count are summarized in table 1. There was no significant difference between two groups with respect to hemoglobin levels, white blood cell and platelet counts.

The distribution of AB0 blood group among study participants is summarized in table 2. There was no statistically significant between groups with respect to AB0 blood group (*p*=0.87). The most common blood group in study groups was A Rh (+)

The mean tumor diameter in patients group was 3.72±1.50 cm (range=1-8 cm). In patients with CBTs, correlation analysis results between the tumor diameters; gender, complete blood count and AB0 blood group are summarized in table 3. The females/males ratio was higher (57/8) in patients groups. The mean tumor diameters of females were 3.57±1.34 cm and the mean tumor diameter of males was 4.77±2.16 cm; the difference was statistically significant (*p*=0.03). In 4 (6.1%) of the 65 patients, the tumors were bilateral. There was a positive correlation between male gender and the tumor diameters (*r*=0.23, *p*=0.03).

Table 3. Correlation analysis between the tumor diameters; and age, gender, complete blood count and AB0 blood group

	p	r
Age	0.46	0.09
Gender	0.03	0.23
White blood cell count	0.21	0.16
Hemoglobin	0.74	0.04
Platelet	0.58	0.07
AB0 blood groups	0.99	0.01

Bold values indicate statistical significance

Discussion

In this study, we analyzed the general characteristics of patients with CBTs and compared the results with healthy controls. In the current study, we have determined that there was no significant difference between study groups regarding the AB0 blood group. However, the most common blood group in CBTs patients was A Rh (+). Moreover, we did not determine any association between AB0 blood group and tumor diameters. This is the first report investigating association between the tumor diameters and AB0 blood group in CBTs.

Interestingly, in patients with CBTs, the tumor diameters were positively correlated with male gender. To the best of our knowledge, this is the first study reporting a significant difference in tumor diameters of CBTs between genders.

Carotid body tumors were reported more commonly in females compared to males (3,10). Similarly, in our study, the female/male ratio was 57/8. Previously, Ma et al. (10) reported their experience on 18 patients with CBTs. They observed female/male ratio as 8/10. Gad et al. (11) also reported the female/male ratio as 17/39 in their study.

Carotid body tumors may be determined at any age group but they are most frequently reported at 4th or 5th decades of life (1,12). Similarly, in our study, the mean age of the patients was 51.81±9.82 years. In the present study, we did not determine any correlation between age and tumor diameters of CBTs patients.

There are some studies which mentioned association between ABO blood group and tumors. Nevertheless, there are two noteworthy points. Some authors hypothesized growing and spreading of tumors could be related to ABO glycosyltransferases dysfunction (8,9). Another possible mechanism was alterations of inflammatory process related to ABO blood group which may lead to tumorigenesis (13,14).

The treatment of CBTs should be in a multidisciplinary manner. Primary surgery, preoperative embolization and radiotherapy are the main options in management depending on the size, location and biologic activity of the tumor (15,16).

In literature, there is no study defining the data about blood groups in paragangliomas. In a recently study, A blood group was defined to be associated with increased risk of cancer, while O blood group was associated with decreased risk (17).

In conclusion, this is the first report investigating association between the tumor diameters and ABO blood group in CBT. Although CBTs were shown higher in females, tumor diameters were found significantly higher in males than in females. However, we did not determine any association between ABO blood group and tumor diameters. Larger studies with follow-up are warranted to determine the effects of demographic factors and laboratory findings on tumor size in patients with CBTs.

Conflict of interest statement

The authors declare that there are no conflicts of interest with regard to this research study.

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