Original Article/Özgün Makale

HEALTH SCIENCES
MEDICINE

DOI: 10.32322/jhsm.785087
J Health Sci Med 2020; 3(4): 432-435

Is there a relationship between chondroid neoplasia and AB0 blood groups?

Kondroid neoplazi ile AB0 kan grupları arasında bir ilişki var mı?

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Cite this article as/Bu makaleye atıf için: Sökmen FC, Ulucaköy C. Is there a relationship between chondroid neoplasia and AB0 blood groups?. J Health Sci Med 2020; 3(4): 432-435.

ABSTRACT

Aim: AB0 and Rh blood groups have been associated with various malignancies. This study aims to investigate the relationship between AB0/Rh blood groups and chondroid neoplasia.

Material and Method: We evaluated 276 patients with chondroid neoplasia retrospectively. The blood groups and tumor localization of the patients who were operated between 2014-2019 were recorded. 129 patients who donated blood to our hospital in 2019 constituted the control group. We compared the demographic characteristics and blood groups of the patients with the control group using the chi-square test.

Results: The mean age was 52±14.6, 49±15.9, and 37±10.3 years, respectively, for enchondroma, chondrosarcoma and the control group. The tumor was mostly localized to the distal femur in both enchondroma and chondrosarcoma patients. Although the 0 Rh (+) blood group rate was higher and the B Rh (+) blood group rate was lower in patients with enchondroma and chondrosarcoma compared to the control group, this difference was not statistically significant. The A and AB blood group rates of the case and control groups were similar.

Conclusion: There was no relationship between AB0 blood groups and chondroid neoplasia. Studies investigating the relationship of different benign and malignant bone tumors with AB0 and Rh blood groups in large patient series are needed.

Keywords: Enchondroma, chondrosarcoma, AB0 blood groups, malignancy

ÖZ

Amaç: AB0 ve Rh kan grupları, çeşitli malignitelerle ilişkilendirilmiştir. Bu çalışmada AB0 kan grupları ile kondroid neoplazi arasındaki ilişkinin araştırılması amaçlanmıştır. 276 kondroid neoplazili hastayı retrospektif olarak değerlendirdik.

Gereç ve Yöntem: 2014-2019 yılları arasında ameliyat edilen hastaların kan grupları ve tümör lokalizasyonu kaydedildi. Kontrol grubunu 2019 yılında hastanemize kan bağışı yapan 129 hasta oluşturdu. Ki-kare testi ile hastaların demografik özelliklerini ve kan gruplarını kontrol grubu ile karşılaştırdık.

Bulgular: Enkondrom, kondrosarkom ve kontrol grubu için ortalama yaş sırasıyla 52±14,6, 49±15,9 ve 37±10,3 yıldı. Tümör hem enkondrom hem de kondrosarkom hastalarında çoğunlukla distalfemurda lokalizeydi. Enkondroma ve kondrosarkomlu hastalarda 0 Rh (+) kan grubu oranı daha yüksek ve B Rh (+) kan grubu oranı kontrol grubuna göre daha düşük olmasına rağmen, bu fark istatistiksel olarak anlamlı değildi.

Sonuç: Kondroid neoplaziler ile AB0 kan grupları arasında ilişki yoktu. Geniş hasta serilerinde farklı benign ve malign kemik tümörlerinin AB0 ve Rh kan grupları ile ilişkisini araştıran çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Enkondrom, kondrosarkom, AB0 kan grupları, malignite

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Received/Geliş: 25.08.2019 **Accepted/Kabul:** 02.10.2020

INTRODUCTION

Enchondroma is usually found incidentally in the appendicular skeleton in young adults (1). Solitary enchondroma is a benign chondroid lesion representing 3 to 13% of all primary bone tumors in large biopsy series (1). Enchondroma is most common in the small bones in hand (40-65%) (2) Most hand lesions are found in proximal phalanges (40-50%) followed by metacarpals (15-30%), middle phalanges (20-30%) and distal phalanx (5-15%) (1,2). Carpal bone involvement is very rare (1). The next most common place for enchondroma is tubular bones, which make up 25% of cases. It is located most frequently in the femur, humerus and tibia from the tubular bones (1,2).

Chondrosarcoma is associated with pain and tends to occur in the axial skeleton of middle-aged adults (3). Chondrosarcoma is the second most common primary osseous neoplasm and constitutes 8 to 17% of the primary bone tumors that are biopsied (3). The most common involvement sites are pelvis, femur, humerus, ribs, tibia, scapula and spine (4). Hand and foot involvement of the chondrosarcoma is rare (1-4%), frequently seen in metacarpals and proximal phalanx (5,6). Chondrosarcoma has a different clinical course than enchondroma. Patients are on average ten years older than patients with enchondroma. Pain is almost always present and is generally insidious, progressive, worse (7).

Matrix mineralization types of bone neoplasms are divided into two main groups as chondroid and osseous. In chondroid matrix mineralization, punctate, linear, crescent shaped or annular calcifications are seen. Chondroid neoplasms are enchondoma, osteochondroma, chondroblastoma, chondromyxoid fibroma and chondrosarcoma (5-7). Numerous studies investigating the relationship between blood group and malignancies have been reported to increase the risk of malignancy with some blood groups (8-15). However, blood group was found to be unrelated to skin cancer, salivary gland cancer and malignant mesothelioma in other studies (16-18). There is only one study investigating the relationship between blood group and bone tumors (2). Of the 449 patients included in that study, only 38 had chondroid neoplasia (192). To the best of our knowledge, there is no study that investigate the relationship between blood group and chondroid neoplasms. Due to the contradictory results between the blood group and malignancy, we aimed to investigate the relationship between blood type and chondroid neoplasms.

MATERIAL AND METHOD

Patients and study design

This study is a case-control study. We retrospectively evaluated 129 (31.8%) patients with enchondroma and 147 (36.3%) with chondrosarcoma who were operated between the years 2014-2019. Blood groups, tumor localization, age, and gender of the patients were recorded from archive files. A control group was formed from 129 (31.8%) healthy volunteers who applied to the blood donation center of our hospital in 2019 and had similar characteristics with the case group in terms of age and gender. Patients whose records or pathology results could not be achieved, and those conservatively followed for enchondroma were excluded from the study. The study protocol was signed on August 18, 2020 at HSU Dr. Abdurrahman Yurtaslan Oncology Hospital was approved by the institutional review board. A written informed consent was obtained from each patient. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Statistical Analysis

SPSS 22.0 (Chicago) was used for statistical analysis of research data. In the descriptive statistics section, categorical variables are presented as numbers, percentages, and continuous variables are presented with mean±standard deviation and median (range). The consistency of continuous variables to normal distribution was evaluated via Kolmogorov-Smirnov and Shapiro-Wilk tests. Mann-Whitney U test was used for comparison of continuous variables of two groups. Chi-square tests were used in comparison analysis for categorical variables between independent groups. In this study, the level of statistical significance was set at $p< 0.05$.

RESULTS

The mean age was 52±14.6, 49±15.9, and 37±10.3, respectively, for enchondroma, chondrosarcoma, and the control group. There was no statistically significant difference between age, gender, and tumor site of enchondroma and chondrosarcoma patients (**Table 1**). Distal femur was the most common location of both enchondroma and chondrosarcoma (**Table 2**).

Table 1. The characteristics of patient groups

	Enchondroma (n=129)	Chondrosarcoma (n=147)	p value
Mean age±sd	52.1±14.6	48.7±15.9	0.088
Gender	-	-	-
Male, n (%)	68 (52.7)	78 (53.1)	0.953
Female, n (%)	61 (47.3)	69 (46.9)	
Tumor site of the extremity	-	-	-
Right, n (%)	70 (54.3)	81 (55.1)	0.888
Left, n (%)	59 (45.7)	66 (44.9)	

Table 2. Tumor localization of the patients

Localization	Enchondroma (n=129)	Chondrosarcoma (n=147)	p value
Distal femur, n (%)	62 (48)	42 (28)	p<0.001
Proximal humerus, n (%)	36 (28)	28 (20)	p<0.001
Phalanges, n (%)	18 (14)	11 (7)	p<0.001
Proximal tibia, n (%)	10 (7)	2 (1)	p<0.001
Pelvic, n (%)	-	31 (22)	p<0.001
Proximal femur, n (%)	-	22 (15)	p<0.001
Proximal fibula, n (%)	1 (1)	9 (6)	p<0.001
Foot, n (%)	2 (2)	2 (1)	p<0.001

The blood group distribution of the patients and the control group were shown in **Table 3.** The blood type A Rh (+) was the highest among both patients and the control group. The AB Rh (-) was the least blood group among both patients and the control group. Although the 0 Rh (+) blood group rate was higher and the B Rh (+) blood group rate was lower in patients with enchondroma and chondrosarcoma compared to the control group, this difference was not statistically significant. The A and AB blood group rates of the case and control groups were similar.

Table 3. Distribution of the ABO blood groups

Blood Groups	Enchondroma(%)	Chondrosarcoma(%)	Control group(%)	p value
A Rh (+)	38.0	34.0	37.2	0.646
B Rh (+)	10.1	10.9	16.3	0.646
AB Rh (+)	8.5	7.5	8.5	0.646
0 Rh (+)	32.6	31.3	24.8	0.646
A Rh (-)	4.7	6.8	5.4	0.646
B Rh (-)	1.6	3.4	3.1	0.646
AB Rh (-)	0.0	2.7	0.0	0.646
0 Rh (-)	4.7	3.4	4.7	0.646

DISCUSSION

Hereditary AB0 and Rh blood group antigens have been associated with various malignancies (9-11). However, as far as we know, there is no study in the literature investigating the relationship between chondroid neoplasm and blood group. So, this study is the first to investigate the relationship between blood group and chondroid neoplasm. As a result of the presented study, there was no relationship between the blood group and the chondroid neoplasms.

Human blood group antigens are glycoproteins expressed on the surface of red blood cells and in addition to their expression on the surface of red blood cells, ABO antigens are highly expressed on the surface of epithelial cells of the gastrointestinal, bronchopulmonary and urogenital systems (20). Sugar residues of these glycoproteins are added to a protein backbone, H antigen, by a glycosyltransferase encoded by the ABO gene on the 9q34 chromosome (21). Changes in surface glucoconjugates can lead to intercellular adhesion and membrane signals, which may have important effects on tumor development and spread (22). The association of the AB0 blood group system with cancer is unclear and difficult to understand (20). There are several hypotheses to explain its relationship with cancer. A and B antigens can somehow help cancers grow more aggressively (23). The presence of antigens A and B has been shown to increase cellular motility and facilitate interactions between tumor cells (23). In addition, it has been observed that AB0 antigens may contribute to apoptosis (23). For this reason, there are many publications in the literature investigating the relationship between AB0 and Rh groups and cancers, but this study is important because it is the first study to investigate the relationship between AB0 and Rh blood groups and bone tumors.

Several studies demonstrated that AB0 and Rh blood groups are protective against certain malignancies (12-19). Iodice et al. (8) showed a 47% risk reduction for exocrine pancreatic cancer in patients with 0 blood group. Huang et al. (9) showed that the B and AB blood groups could be protective against gastrointestinal, colorectal, gastric, and bladder cancers in their cohort study in 2017. Wolpin et al. (10) demonstrated that 0 blood groups were protective in pancreatic cancer in their cohort study in 2009. There are many studies investigating the relationship between blood groups and cancer risk (11). Marinaciio et al. (11) interpreted blood groupA as a risk factor for endometrial and ovarian cancer. Previous studies showed that blood group A increases the risk of gastric cancer (12,13). A similar relationship was demonstrated in colorectal cancers and studies showed that blood group A also increases the risk of colorectal cancer (14,15). Huang et al. (9) showed that the AB0 blood group increased the risk of liver cancer by 45%.

Some studies investigating the relationship between blood group and malignancy have yielded negative results (16-18). Pinkston et al. (16) showed no relationship between salivary gland tumors and AB0 and Rh blood groups. Tursen et al. (17) showed no relationship between skin cancer and AB0 and Rh blood groups. Similarly, Utkan et al. (18) could not find a relationship between the blood group and the risk of malignant mesothelioma.

This study has its strengths and some limitations. One of its strengths is the first original study in the literature to investigate the relationship between bone tumors and the AB0 and Rh blood group. Another strong thing is that blood groups are obtained from blood center data, not verbal expression. Limitation is that it requires more patients. Because the number of patients in rare blood groups is very low. Another limitation is that enchondroma patients who were conservatively followed up in the outpatient clinic without surgery were excluded because the blood groups were unknown.

CONCLUSION

As a result, enchondroma and chondrosarcoma are chondroid lesions with unique clinical, radiological and pathological findings. There is no relationship between AB0 and Rh blood group and enchondroma and chondrosarcoma. In addition, studies investigating the relationship between different benign and malignant bone tumors with AB0 and Rh blood groups in large patient series are needed.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Dr. Abdurrahman Yurtaslan Oncology Hospital Ethics Committee (Permission granted: 18.08.2020, Decision no: 100).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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