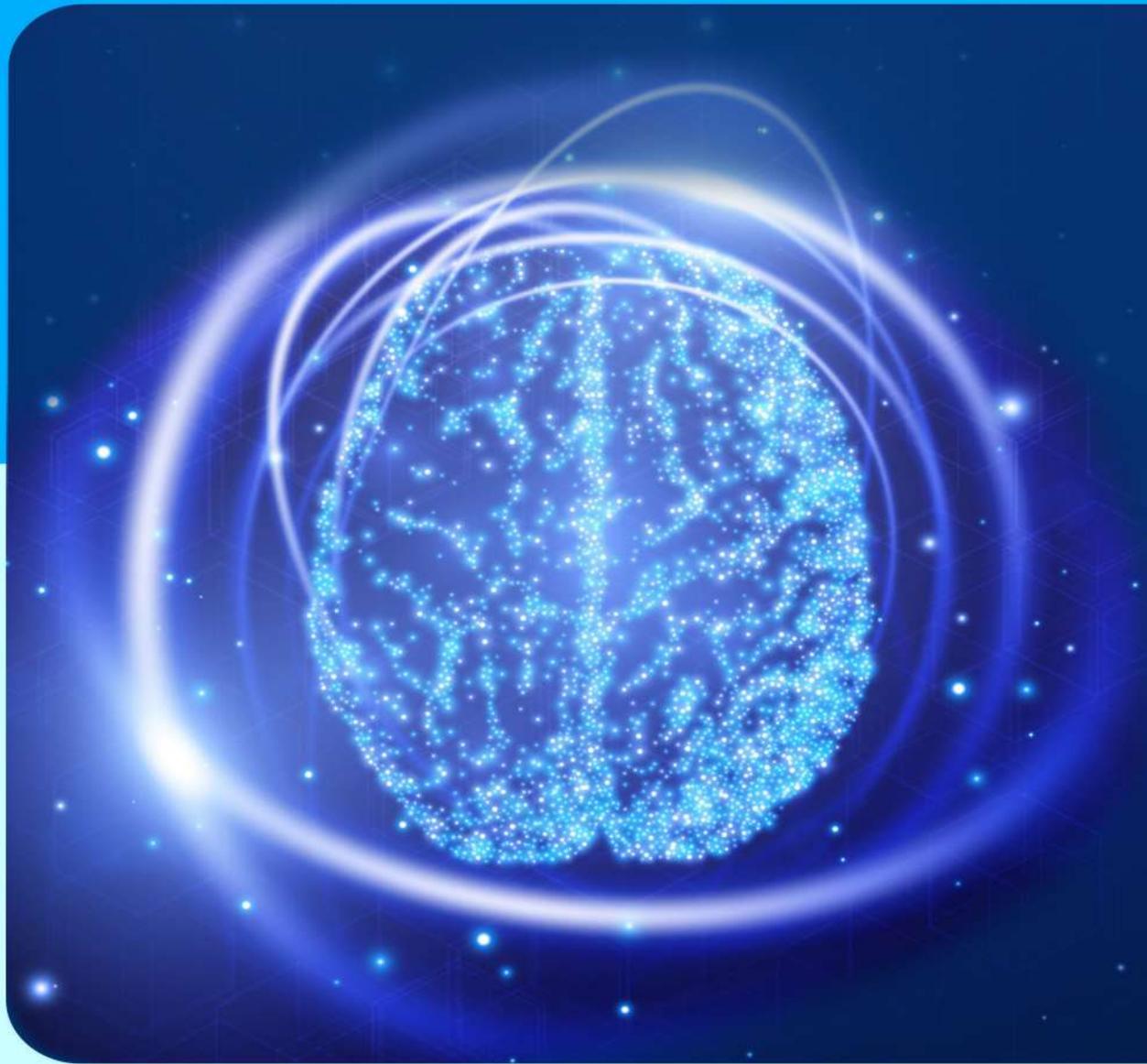


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Cancer-pain.org [homepage on the Internet]. New York: Association of Cancer Online Resources [updated 16 May 2002; cited 9 Jul 2002]. Available from: www.cancer-pain.org

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Kısa, kolay anlaşılır ve yazının içeriğini tanımlar özellikte olmalıdır.

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Türkçe (Öz) ve İngilizce (Abstract) olarak yazılmalı, Amaç, Gereç ve Yöntem, Bulgular ve Sonuç (Aim, Materials and Methods, Results, Conclusion) olmak üzere dört bölümden oluşmalı, en fazla 300 sözcük içermelidir. Araştırmanın amacı, yapılan işlemler, gözlemsel ve analitik yöntemler, temel bulgular ve ana sonuçlar belirtilmelidir. Özetle kaynak kullanılmamalıdır. Editöre mektup için özet gerekmemektedir.

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Kaynaklar, yazının alındığı dilde ve aşağıdaki örneklerde görüldüğü şekilde düzenlenmelidir.



Dergilerdeki yazılar

Teke Z, Kabay B, Aytakin FO et al. Pyrrolidine dithiocarbamate prevents 60 minutes of warm mesenteric ischemia/reperfusion injury in rats. *Am J Surg* 2007;194(6):255-62.

Ek sayı (Supplement)

Solca M. Acute pain management: Unmet needs and new advances in pain management. *Eur J Anaesthesiol* 2002;19(Suppl 25):3-10.

Henüz yayınlanmamış online makale

Butterly SJ, Pillans P, Horn B, Miles R, Sturtevant J. Off-label use of rituximab in a tertiary Queensland hospital. *Intern Med J* doi: 10.1111/j.1445-5994.2009.01988.x

Kitap

Örnek 1: Murray PR, Rosenthal KS, Kobayashi GS, Pfaller MA. *Medical microbiology*. 4th ed. St. Louis: Mosby; 2002.

Örnek 2: Sümbüloğlu K, Akdağ B. *Regresyon Yöntemleri ve Korelasyon Analizi*. Hatiboğlu Yayınevi: Ankara; 2007.

Kitap bölümü

Meltzer PS, Kallioniemi A, Trent JM. Chromosome alterations in human solid tumors. In: Vogelstein B, Kinzler KW, editors. *The genetic basis of human cancer*. New York: McGraw-Hill; 2002. p. 93113.

İnternet makalesi

Abood S. Quality improvement initiative in nursing homes: The ANA acts in an advisory role. *Am J Nurs* [serial on the Internet] 2002 [cited 12 Aug 2002]; 102. Available from: www.nursingworld.org/AJN/2002/june/wawatch.htm

Web Sitesi

Cancer-pain.org [homepage on the Internet]. New York: Association of Cancer Online Resources [updated 16 May 2002; cited 9 July 2002]. Available from: www.cancer-pain.org

Yazar olarak bir kuruluş

The Intensive Care Society of Australia and New Zealand. Mechanical ventilation strategy in ARDS: Guidelines. *Int Care J Aust* 1996;164:282-4.

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Investigation of the Presence of Discoid Meniscus and Its Effect on Anatomic Structures in the Knee Joint by Magnetic Resonance Images, A Retrospective Study

Diskoid Menisküs Varlığının ve Diz Eklemindeki Anatomik Yapılar Üzerindeki Etkisinin Manyetik Rezonans Görüntüleri ile Araştırılması, Retrospektif Bir Çalışma

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ABSTRACT

Aim: We aimed to investigate the effect of the presence of discoid meniscus (DM) on the anatomical structures of the knee joint.

Material and Method: The knee magnetic resonance (MR) images of 144 (97 female, 47 male) individuals with DM and 159 (94 female, 65 male) individuals with normal meniscus were evaluated.

Results: DM was mostly seen on the left side (n=64). This was followed in decreasing order by right side and bilateral. The incidence of DM was higher in individuals aged 36 years and older than in 18 years and younger (p=0.003). Incomplete type DM was seen most frequently in both genders. Meniscopathy was most common (n=21) in the medial meniscus of people with DM. And also in individuals with normal meniscus, meniscopathy was also most common (n=31) medially. When the effected ligaments were examined, tearing and degeneration were most common (n=21) in the anterior cruciate ligament (ACL) in individuals with DM. On the other hand in the presence of DM, chondropathy (n=42) on adjacent joint surfaces was reported. It was determined that ligament damage was mostly (n=43) in ACL in normal menisci. In addition, the presence of chondropathy was observed on the bone surfaces adjacent to the joint (n=64) in normal menisci.

Conclusion: All DM cases were in the lateral meniscus. This was mostly accompanied by meniscopathy and ACL injury.

Keywords: Knee joint, discoid meniscus, anterior cruciate ligament, magnetic resonance imaging

ÖZ

Amaç: Diskoid menisküs (DM) varlığının diz eklemine anatomik yapıları üzerindeki etkisini araştırmayı amaçladık.

Gereç ve Yöntem: DM'li 144 (97 kadın, 47 erkek) ve normal menisküslü 159 (94 kadın, 65 erkek) bireyin diz manyetik rezonans (MR) görüntüleri değerlendirildi.

Bulgular: DM en sık sol tarafta görüldü (n=64). Bunu azalan sırayla sağ taraf ve bilateral takip etmekteydi. DM insidansı 36 yaş ve üzeri bireylerde 18 yaş ve altı bireylere göre daha yüksekti (p=0.003). Her iki cinsiyette de en sık inkomplet tip DM görüldü. DM'li kişilerde en sık (n=21) medial meniskopati görüldü. Normal menisküsü olan bireylerde de meniskopati en sık (n=31) medialde görüldü. Etkilenen bağlar incelendiğinde, DM'li bireylerde yırtılma ve dejenerasyon en sık (n=21) ligamentum cruciatum anterior'da (LCA) görüldü. Diğer yandan DM varlığında komşu eklem yüzeylerinde kondropati (n=42) izlendi. Normal menisküslerde bağ hasarının en fazla (n=43) LCA'da olduğu tespit edildi. Ayrıca normal menisküslerde eklem komşu kemik yüzeylerinde kondropati varlığı (n=64) gözlemlendi.

Sonuç: Tüm DM olguları lateral menisküste idi. DM'ye çoğunlukla meniskopati ve LCA yaralanması eşlik etmekteydi.

Anahtar Kelimeler: Diz eklemi, diskoid menisküs, ligamentum cruciatum anterior, manyetik rezonans görüntüleme

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INTRODUCTION

The menisci are crescentic, intracapsular, fibrocartilaginous laminae. They serve to widen and deepen the tibial articular surfaces that receive the femoral condyles. Their peripheral attached borders are thick and convex, and free inner borders are thin and concave. Their peripheries are vascularised by capillary loops from the fibrous capsule and synovial membrane, while inner regions are avascular and fed by diffusion. The medial meniscus is almost a semicircle in shape. The lateral meniscus forms approximately four-fifths of a circle, and covers a larger area than the medial meniscus (1). Discoid meniscus (DM) was described by Young in 1889 firstly for the lateral meniscus in cadaver studies (2). Later, Jones described the presence of a very rare anomaly, the medial DM, in a young patient (3). The prevalence of DM varies between different populations (4,5). In 1948, Smillie suggested the embryological theory about the formation of DM (6). But anatomical studies did not support that theory. Kaplan (7) stated that the discoid shape is an acquired feature developed secondary to increased meniscal motion due to lack of posterior tibial attachment. Several studies have suggested that this variation may be familial (8, 9). However, the etiology of DM is still unclear. In this study, we aimed to investigate the presence of DM and its effect on the anatomical structures of the knee joint using magnetic resonance (MR) images.

MATERIAL AND METHOD

The study was carried out with the permission of Tokat Gaziosmanpaşa University Clinical Research Ethics Committee (Date: 09.06.2022, Decision No: 22-KAEK-130). The images of individuals who applied to our hospital and underwent knee MRI between January 2017 and April 2022 for any reason were examined. Evaluations were made by examining patient reports and patient files through the Enlil and picture archiving and communication system (PACS) systems of our hospital. We analyzed 6570 individuals who underwent knee MRI. It was checked whether there was DM in the images. Those who had undergone knee joint surgery before MRI were excluded from the study. The presence of additional joint pathologies in DM were examined and individuals were grouped according to their age and gender. Whether it was symptomatic or not, on which side DM was more common, and additional pathologies in the presence of DM were evaluated.

Statistical Analysis

Descriptive statistics were made to give information about the general characteristics of the study groups. Data of continuous variables Mean±Standard Deviation; Data belonging to categorical variables were given as n(%). Differences between groups were

analyzed with the Independent Sample T-Test or One-Way Analysis of Variance (Anova) for quantitative variables. Differences between groups for qualitative variables were evaluated with the Chi-Square Test. Ready-made statistical software was used in the calculations (IBM SPSS Statistics 19, SPSS inc., an IBM Co., Somers, NY). When p values were less than 0.05, they were considered statistically significant.

RESULTS

In the knee images of 6570 individuals analyzed in our study, the presence of DM was observed in a total of 144 individuals (2.19%), all in the lateral meniscus. Of the people with DM, 107 had unilateral and 37 had bilateral images. Images of 159 individuals with normal menisci were also evaluated to compare the accompanying pathologies. It was determined that 140 of the patients diagnosed with DM presented to the hospital with pain, 3 with swelling and 1 with locking. DM was found in the right knee of 59 patients, in the left knee of 64 patients, and in both knees of 21 patients. The mean ages of individuals with DM and normal meniscus are given in **Tables 1** and **2**, respectively. The presence of DM was detected in a higher number of individuals aged 36-65 years compared to the 18 and under age group ($p=0.003$).

Table 1. Distribution of female and male individuals with discoid meniscus by age groups

	Age groups [years, n (%)]					P
	18 and ↓	19-35	36-50	51-65	66 and ↑	
Gender						0,003*
Female	5 (5.2) ^a	18 (18.6) ^{ab}	42 (43.3) ^b	32 (33.0) ^b	-	
Male	10 (21.3) ^a	14 (29.8) ^{ab}	14 (29.8) ^b	8 (17.0) ^b	1 (2.1) ^{ab}	

Pearson Chi-Square Test. $p<0.05$ is statistically significant.

Table 2. Distribution of female and male individuals with normal meniscus by age groups

	Age [years, n (%)]					P
	18 and ↓	19-35	36-50	51-65	66 and ↑	
Gender						0,298
Female	10 (10.6)	17 (18.1)	35 (37.2)	23 (24.5)	9 (9.6)	
Male	11 (16.9)	9 (13.8)	16 (24.6)	19 (29.2)	10 (15.4)	

Pearson Chi-Square Test. $p<0.05$ is statistically significant.

It was seen that among our cases with normal meniscus, 140 individuals applied with pain, 12 with swelling, 4 with falling, 2 with redness and 1 with locking complaints. Of the 159 individuals with normal meniscus, 125 had unilateral and 34 had bilateral images.

The distribution of DM types according to gender is given in **Table 3**. The presence of unilateral incomplete type DM was observed most frequently in both genders.

Table 3. Type of Discoid Meniscus

	Gender		p
	Female n (%)	Male n (%)	
Unilateral Incomplet	52 (65.8)	27 (34.2)	0.855
Unilateral Complet	30 (68.2)	14 (31.8)	
Bilateral Incomplet	6 (75.0)	2 (25.0)	
Bilateral Complet	4 (57.1)	3 (42.9)	
Bilateral Complet-Incomplet	5 (83.3)	1 (16.7)	

Pearson Chi-Square Test. p<0.05 is statistically significant.

When the MR images were analyzed for the presence of meniscopthy, it was observed that medial meniscopthy was most common in individuals with DM and normal meniscus (n=21 and n=31, respectively), followed by lateral meniscopthy. Coexistence of medial and lateral meniscopthy was observed at the lowest rate. Out of 37 people who had MR images of both knees, 21 individuals had bilateral DM. Meniscopthy was observed in 16 of the individuals with bilateral DM. When evaluated in terms of ligament damage, ACL damage was most common in individuals with both DM and normal meniscus. ACL lesions were found to be more common in normal menisci (n=43) than those with DM (n=21). Distribution of additional ligament pathologies in individuals with DM and normal meniscus is given in **Table 4, Figure 1** and **2**. It was determined that the incidence of ACL damage increased in parallel with the increase in age.

Table 4: The distribution of additional knee joint ligament pathologies seen in individuals with discoid meniscus and normal meniscus

	DM (n)	NM (n)	p
Tear of the ACL	5	7	0.773
Degeneration of the ACL	9	20	
Mucoid degeneration of the ACL	7	16	
Degeneration of the PCL	1	5	
Degeneration of the MCL	1	5	

Pearson Chi-Square Test, DM: discoid meniscus, NM: normal meniscus, ACL: anterior cruciat ligament, PCL: posterior cruciat ligament, MCL: medial collateral ligament. p<0.05 is statistically significant.

It was observed that 64 of the individuals with normal meniscus and 42 of the individuals with DM had chondropthy (cartilage degeneration)(**Table 5**).

Table 5: The distribution of accompanying cartilage surface pathologies

	DM (n)	NM (n)	p
Degeneration of Medial Tibiofemoral Cartilage Surfaces	15	26	0.606
Degeneration of Lateral Tibiofemoral Cartilage Surfaces	11	12	
Degeneration of Retropatellar Cartilage Surfaces	10	20	
Degeneration of Patellofemoral Cartilage Surfaces	6	6	

Pearson Chi-Square Test, DM: discoid meniscus, NM: normal meniscus. p<0.05 is statistically significant.

DISCUSSION

The menisci contribute to the nourishment of the articular cartilage by enhancing synovial fluid distribution. At the same time, and perhaps the most important and clinically relevant role, they share the load on the knee joint with the articular cartilage. The presence and circumferential arrangement of collagen fibers are very important in these functions (10). DM is one of the most common variations of the knee joint (11,12). Its frequency varies according to races. The incidence rates have been reported in Greek 1.8%, Indians 5.8%, Koreans 9.5%, and Japanese 16.6% (5,11). The real incidence of discoid meniscus is difficult to estimate due to asymptomatic individuals. The rate we found in our study was 2.19%, which is very close to the rate in the Greeks. It is reported in the literature that DM is more likely to be seen bilaterally.(13,14) Kale et al. (15) examined 22 knee joints of 11 neonatal cadavers and reported a 77% incidence of lateral DM. In our study, we did not encounter any discoid appearance in the medial meniscus. However, in our study, most of the patients had radiologic imaging of only one knee. On the other hand, in accordance with the literature, we observed that DM was high in individuals who had imaging of both knees.

The reported incidence ranges from 0.4% to 17% for lateral DM and 0.06% to 0.3% for medial DM (11,14,16,17). Bilateral lateral DM has been described in 15% to 25% of cases (11-13,18). In our study, the rate of bilateral DM was 57%. The limitation of our study is that most individuals with lateral DM had MRI of only one knee. It is also difficult to estimate the true incidence of discoid meniscus because of asymptomatic individuals.

Watanabe et al., classified the discoid menisci as complete, incomplete, and Wrisberg types, depending on the presence or absence of a normal posterior attachment and the degree of tibial plateau coverage (19). Complete discoid shape, with full coverage of the tibial plate, mechanically stable, with normal posterior coronal insertions. Incomplete coverage of no more than 80% of the tibial surface, stable to palpation, with normal posterior coronal insertions. Wrisberg variant, normal or slightly discoid shape, with instability due to absence of posterior coronal fixation, only Wrisberg's ligament maintained (20). In contrast to studies reporting a higher incidence of complete type DM (5,13), our results showed a higher incidence of incomplete type DM, similar to the study of Kato et al (12).

In a study knee MR images of 675 children were evaluated, and all children with DM were male (21). In the literature, similar to our study, it was determined that DM was more common in women (5,12).

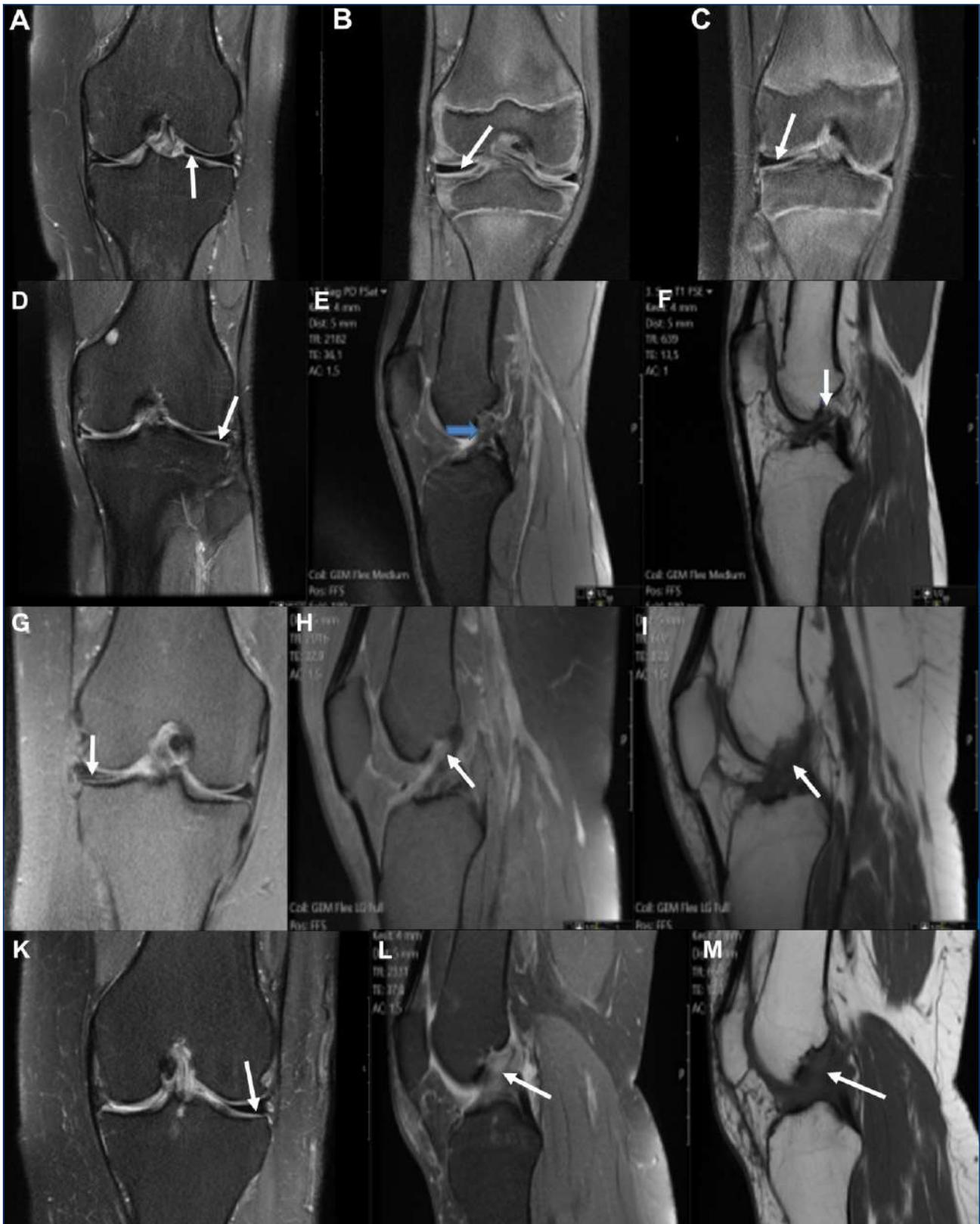


Figure 1. **A and B:** Complete lateral discoid meniscus (white arrow) **C:** Incomplete lateral discoid meniscus (white arrow). **D, E and F:** Total rupture of ACL. Incomplete discoid meniscus (white arrow) in the lateral meniscus in coronal pdT2A (proton density) image. **E and F:** ACL is not visible on sagittal pdT2A and sagittal T1A images (blue and white arrow). **G, H and I:** ACL degeneration: Incomplete discoid meniscus (white arrow) in the lateral meniscus in coronal pdT2A (proton density) image. Although ACL integrity is observed in sagittal pdT2A and sagittal T1A images, there is an increase in signal due to degeneration (white arrow). **K, L and M:** ACL mucoïd degeneration: Incomplete discoid meniscus (white arrow) in the lateral meniscus in coronal pdT2A (proton density) image. ACL integrity is observed in sagittal pdT2A and sagittal T1A images, but there is a significant increase in volume and signal due to mucoïd degeneration (white arrow).



Figure 2. A, B and C: PCL degeneration: Incomplete discoid meniscus (white arrow) in the lateral meniscus in coronal pdT2A (proton density) image. Although PCL integrity is observed in sagittal pdT2A and sagittal T1A images, there are focal signal increases due to degeneration (white arrow). **D:** MCL degeneration: Signal and volume increase due to degeneration in incomplete discoid meniscus and MCL in lateral meniscus in coronal pdT2A (proton density) image. **E and F:** Chondropathic degeneration: In coronal pdT2A (proton density) image, incomplete lateral discoid meniscus (white triangle) and chondropathic signal pulses (white arrow) on the cartilage surfaces and subchondral edema in the adjacent bone structure (white arrow).

Knee pain is a common cause of hospital admission in patients of all ages with various etiologies. MRI is a common imaging method used to diagnose internal injuries of the knee, especially meniscus lesions (22). For this reason, we used MRI in our study. On the other hand, clinical examination has been reported to have higher sensitivity and specificity than MRI in diagnosis. It has also been reported that MRI has a lower sensitivity and specificity in children under 12 years of age (23). DM can cause mechanical complaints such as pain, swelling and locking in patients. DM is prone to rupture due to increased thickness, poor tissue quality, and instability. It is also reported that it causes early osteoarthritis in the joint (4). We also found that the complaints of patients with DM presenting to the hospital were similar to the literature. The collagen fiber organization in DM is different from the normal meniscus. It has been reported that due to this difference, the weight distribution on the knee joint changes and increased damage to the structures in the knee joint is observed (24). In our study, contrary to the literature, additional joint pathologies were observed slightly more frequently in

normal meniscus than in DM. As long as a tear does not occur in the meniscus body, there are cases that remain asymptomatic for many years (4). But we found that all individuals with DM were symptomatic. MRI is mostly preferred to evaluate the meniscus and ligaments in the knee joint (4).

However it is reported that DM predisposes to meniscus damage. In a study, it was suggested that DM is prone to damage due to its structural feature. It has been reported that the collagen network is irregular and vascularization is poor in the presence of DM. Several studies have shown that the higher incidence of meniscal tears would also be associated with a larger meniscal size, thickness and weak posterior attachment to the joint capsule (7,21,25,26).

In patients with unilateral DM, even if there is no complaint in the opposite knee at first, the opposite knee also has a higher risk in terms of accompanying knee joint pathologies in the future (14). In our study, most of the patients with DM had unilateral knee imaging. This suggests that, similar to the literature, the



complaints were initially one-sided. On the other hand, very few patients with DM had bilateral MRI images. However, in most of those with bilateral images, DM and meniscopathy were detected in both knees. In the literature it has been reported an almost twice as high incidence of ruptures or degenerative changes in DM compared to normal meniscus (27). Inconsistent with the literature, we found that individuals with normal meniscus had more meniscal pathology than individuals with DM. Maffulli et al. (28) evaluated 89 pediatric patients in their prospective arthroscopic study. They reported many pathologies including the presence of DM and ligament degeneration. However, they did not mention the association of DM and ligament tears. Although ACL injury increases with age in our study, we think that an accurate comparison cannot be made because there was only 1 patient in the DM group in patients older than 65 years.

In 1948, Smillie proposed that in the normal course of embryological development, a disc-shaped structure forms in the knee joint, and then in some individuals the central part of the disc fails to resorb, leading to DM (6). Later studies, contrary to this theory, reported that the meniscus does not form a disc-shaped fibrocartilage structure at any stage of embryological development (29,30). Kaplan (7) stated that DM is related to increased meniscus movement secondary to posterior tibial attachment deficiency. In their study of more than 4.5 million individuals, Grimm et al. found that the prevalence of DM was 0.004 and that there was no significant association between gender, ethnicity, body mass index and DM. They also found that three quarters of individuals with DM were symptomatic (4). Kale et al. (15) reported that the primordial shape of the meniscus is discoid and that this form later transforms into other shapes and this transformation may begin in the early stages of intrauterine life. They explained the differences in meniscus shape with mesenchymal differentiation or vasculature development.

Limitations

Our study has several limitations. One of them is the number of individuals evaluated was not very large. Additionally, not all patients had bilateral images. Our other shortcomings are that we do not have information about patients' factors such as height, weight, body mass index, accompanying diseases, occupation, living conditions and familial predisposition.

CONCLUSION

We found a higher incidence of incomplete type DM. Contrary to our expectation, we saw more ligament and cartilage damage in the presence of normal meniscus. We think that our results will contribute to the literature.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Tokat Gaziosmanpaşa University Clinical Research Ethics Committee (Date: 09.06.2022, Decision No: 22-KAEK-130).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

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

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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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REFERENCES

1. Standring S, Ellis H, Healy J, Johnson D, Williams A. Gray's anatomy. Churchill Livingstone. Elsevier; 2008.
2. Young R. The external semilunar cartilage as a complete disc. *Memoirs and memoranda in anatomy*. 1889.
3. Jones RW. Specimen of internal semilunar cartilage as a complete disc. SAGE Publications; 1930.
4. Grimm NL, Pace JL, Levy BJ, et al. Demographics and epidemiology of discoid menisci of the knee: Analysis of a large regional insurance database. *Orthop J Sports Med* 2020;8(9):2325967120950669.
5. Papadopoulos A, Karathanasis A, Kirkos JM, Kapetanios GA. Epidemiologic, clinical and arthroscopic study of the discoid meniscus variant in Greek population. *Knee Surg Sports Traumatol Arthrosc* 2009;17:600-6.
6. Smillie I. The congenital discoid meniscus. *J Bone Joint Surg Br* 1948;30(4):671-82.
7. Kaplan EB. Discoid lateral meniscus of the knee joint. Nature, mechanism, and operative treatment. *J Bone Joint Surg A*. 1957;39:77-87.
8. Dashefsky JH. Discoid lateral meniscus in three members of a family. *JBJS*. 1971;53(6):1208-10.
9. Gebhardt M, Rosenthal R. Bilateral lateral discoid meniscus in identical twins. *JBJS*. 1979;61(7):1110-1.
10. Baratz ME, Fu FH, Mengato R. Meniscal tears: the effect of meniscectomy and of repair on intraarticular contact areas and stress in the human knee: a preliminary report. *Am J Sports Med* 1986;14(4):270-5.
11. Ikeuchi H. Arthroscopic Treatment of the Discoid Lateral Meniscus Technique and Long-term Results. *Clin Orthop Related Res* (1976-2007). 1982;167:19-28.
12. Kato Y, Oshida M, Aizawa S, Saito A, Ryu J. Discoid lateral menisci in Japanese cadaver knees. *Modern Rheumatol* 2004;14:154-9.
13. Bae J-H, Lim H-C, Hwang D-H, Song J-K, Byun J-S, Nha K-W. Incidence of bilateral discoid lateral meniscus in an Asian population: an arthroscopic assessment of contralateral knees. *Arthroscopy* 2012;28(7):936-41.
14. Chung JY, Roh J-H, Kim JH, Kim JJ, Min B-H. Bilateral occurrence and morphologic analysis of complete discoid lateral meniscus. *Yonsei Med J* 2015;56(3):753.
15. Kale A, Kopuz C, Edýzer M, Aydin ME, Demýr M, Ýnce Y. Anatomic variations of the shape of the menisci: a neonatal cadaver study. *Knee Surg Sports Traumatol Arthrosc* 2006;14:975-81.
16. Flouzat-Lachaniette C, Pujol N, Boisrenoult P, Beaufils P. Discoid medial meniscus: report of four cases and literature review. *Orthop Traumatol Surg Res* 2011;97(8):826-32.

17. Nathan PA, Cole SC. 12 Discoid Meniscus: A Clinical and Pathologic Study. *Clin Orthop Relat Res* 1969;64:107-13.
18. Dickason J, Del Pizzo W, Blazina ME, Fox JM, Friedman MJ, Snyder SJ. A series of ten discoid medial menisci. *Clin Orthop Relat Res* 1982;168:75-9.
19. Watanabe M, Takeda S, Ikeuchi H. *Atlas of Arthroscopy*: Igaku-Shoin; 1979.
20. Saavedra M, Sepúlveda M, Tuca MJ, Birrer E. Discoid meniscus: current concepts. *EFORT Open Rev* 2020;5(7):371-9.
21. Masquijo J, Bernocco F, Porta J. Menisco discoide en niños y adolescentes: correlación entre la morfología y la presencia de lesiones. *Revista Española de Cirugía Ortopédica y Traumatología*. 2019;63(1):24-8.
22. Tachibana Y, Yamazaki Y, Ninomiya S. Discoid medial meniscus. *Arthroscopy* 2003;19(7):e59-e65.
23. Kocher MS, DiCanzio J, Zurakowski D, Micheli LJ. Diagnostic performance of clinical examination and selective magnetic resonance imaging in the evaluation of intraarticular knee disorders in children and adolescents. *Am J Sports Med* 2001;29(3):292-6.
24. Rebello G, Grottkau B, Albright M, Patel D. Discoid lateral meniscus: Anatomy and treatment. *Techniq Knee Surg* 2006;5(1):64.
25. Tudisco C, Botti F, Bisicchia S. Histological study of discoid lateral meniscus in children and adolescents: morphogenetic considerations. *Joints*. 2019;7(04):155-8.
26. Ayala J, Abril J, Magán L, Epeldegui T. Discoid meniscus: prognostic significance of meniscal thickness. *Rev Esp Cir Ortopédica Traumatol*. 2004;48(3):195-200.
27. Rohren EM, Kosarek FJ, Helms CA. Discoid lateral meniscus and the frequency of meniscal tears. *Skelet Radiol* 2001;30:316-20.
28. Maffulli N, Chan KM, Bundoc RC, Cheng JC. Knee arthroscopy in Chinese children and adolescents: an eight-year prospective study. *Arthroscopy* 1997;13(1):18-23.
29. Clark C, Ogden J. Development of the menisci of the human knee joint. Morphological changes and their potential role in childhood meniscal injury. *JBSJ*. 1983;65(4):538-47.
30. Gardner E, O'Rahilly R. The early development of the knee joint in staged human embryos. *J Anatomy*. 1968;102(Pt 2):289.



Evaluation of the Health Workers' Proficiency in Advocating for Child Rights

Sağlık Çalışanlarının Çocuk Hakları Savunuculuğundaki Yeterliliklerinin Değerlendirilmesi

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ABSTRACT

Aims: Child rights are defined as the protection of children rights all over the world such as education, health, living, housing, protection against sexual or psychological abuse. It is necessary to increase awareness of children rights among healthcare professionals and to put them into practice. In this study, we aimed to evaluate the awareness of healthcare professionals employed in departments of child health and diseases regarding children's rights.

Material and Methods: The study comprised 319 people including physicians, health officers, nurses, and midwives working in the Department of Child Health and Diseases in training and research hospitals in Ankara, Turkey. All participants completed a questionnaire consisting of 19 questions. Results: Two hundred and twenty (69.0%) participants were aware of the United Nations Convention on the Rights of the Child, while 99 (31.0%) were not. There were 59 (18.5%) participants who could list 3 of the basic principles of the convention, but there were 236 (74%) participants who could not specify any articles. It was found that 111 (34.8%) people in the study population considered themselves sufficient in advocating for children's rights, but 208 (65.2%) did not.

Conclusions: This study found an insufficient level of awareness of children's rights among healthcare professionals. This suggests that there is a need to raise the level of knowledge and awareness of healthcare workers to know the principles, to fulfill the responsibilities determined in terms of rights and laws, and to be aware of the importance of this convention for children.

Keywords: basic rights and laws of children, right to education, healthcare professionals, right to life

ÖZ

Amaç: Çocuk hakları, tüm dünyada çocukların eğitim, sağlık, yaşam, barınma, cinsel veya psikolojik istismara karşı korunma gibi haklarının korunması olarak tanımlanmaktadır. Sağlık çalışanları arasında çocuk hakları konusunda farkındalığın artırılması ve uygulamaya geçirilmesi gerekmektedir. Bu çalışmada, çocuk sağlığı ve hastalıkları bölümlerinde çalışan sağlık çalışanlarının çocuk haklarına ilişkin farkındalıklarının değerlendirilmesi amaçlanmıştır.

Gereç ve Yöntem: Çalışmaya Ankara eğitim ve araştırma hastanelerinin çocuk sağlığı ve hastalıkları bölümlerinde çalışan hekim, sağlık memuru, hemşire ve ebelerden oluşan 319 kişi katılmıştır. Tüm katılımcılar 19 sorudan oluşan bir anket doldürmüştür. Sonuçlar: Katılımcıların 220'sinin (%69,0) Birleşmiş Milletler Çocuk Hakları Sözleşmesi'nden haberdar olduğu, 99'unun (%31,0) ise haberdar olmadığı tespit edilmiştir. Sözleşmenin temel ilkelerinden 3 tanesini sıralayabilen 59 (%18,5) katılımcı mevcutken, herhangi bir madde belirtemeyen 236 (%74) katılımcı saptanmıştır. Çalışma evrenindeki 111 (%34,8) kişinin çocuk hakları savunuculuğu konusunda kendini yeterli gördüğü, 208 (%65,2) kişinin ise yeterli görmediği tespit edilmiştir.

Sonuç: Bu çalışma, sağlık çalışanları arasında çocuk haklarına ilişkin farkındalık düzeyinin yetersiz olduğunu ortaya koymuştur. Bu durum, ilkelerin bilinmesi, haklar ve yasalar açısından belirlenen sorumlulukların yerine getirilmesi ve bu sözleşmenin çocuklar açısından öneminin farkında olunması için sağlık çalışanlarının bilgi ve farkındalık düzeyinin yükseltilmesine ihtiyaç olduğunu düşündürmektedir.

Anahtar Kelimeler: Çocukların temel hak ve hukuku, eğitim hakkı, sağlık çalışanları, yaşam hakkı

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INTRODUCTION

The first Convention on the Rights of the Child was adopted in the United Nations General Assembly on 20 November 1989 (1,2). The convention defines a child as any individual under the age of eighteen, unless the age of majority is attained earlier under national legislation, and sets out the civil, political, economic, social, health, and cultural rights of individuals in this age group (3). The convention defines the rights of all children without discrimination, regardless of their birthplace, identity, gender, religion, or social origin (2). All parties to the agreement accept that every child has a basic right to life. All participating states work to ensure the health and well-being of children. (4). The convention also stipulates that children have the right to express their opinions and that their opinions are to be taken into account when decisions are made concerning them (5, 6). It provides the necessary conditions for children to prepare for the future and gives young people freedom and respect (5, 7).

The medical community is widely recognized as playing a crucial role in protecting and advancing kids' rights. The importance of healthcare professionals' knowledge and comprehension of children's rights remains significant in terms of the practical application of these rights in their lives and their perspectives on advocacy. To effectively address the medical, physical, emotional, and developmental requirements of children, it is imperative for healthcare professionals to serve as strong advocates and actively work towards the endorsement and advancement of relevant protocols and guidelines. Therefore, the implementation of children's rights will ensure the full growth and well-being of children.

Establishing an encouraging environment for children to freely share their opinions, keeping parents informed about the child's disease progress or treatment, and ensuring easy access to healthcare facilities are achievable through a profound understanding of children's rights. Health professionals working in pediatrics can promote the protection of children from discrimination and inequality, as well as ensure that children's fundamental needs are met and their development is maximized, by fully understanding and implementing children's rights in their own practice for children. Children's hospitals should be improved as centres for children's rights, and there should be a concerted effort to enhance the level of knowledge among health professionals. In this study, we aimed to evaluate the awareness of healthcare professionals employed in departments of child health and diseases regarding children's rights.

MATERIAL AND METHOD

The study comprised 319 participants including physicians, health officers, nurses, and midwives working in training and research Hospital in Ankara

which had pediatric service. All participants were randomly selected. We excluded individuals who were not healthcare professionals and those who were not employed in a department of child health and diseases.

The questionnaire was prepared by the researchers and included questions about the gender of the participants, their profession, the hospital in which they worked, the history of children's rights, the main articles and their use in the clinic. A survey form with questions to determine the existence of awareness of children's rights was distributed to all participants. A brief information was given before the survey and the participants were asked to answer the questions themselves. The survey questions are listed in supplementary materials.

Statistical Analysis

IBM SPSS Statistics for Windows (version 21.0) was employed for data analysis. In accordance with the objectives of the study, frequency (f) and percentage (%) calculations were performed to describe the personal information and opinions of the healthcare professionals and physicians included in the study. For categorical variables, inter-group differences were determined by chi-square test. The level of significance was considered as $p < 0.05$.

RESULTS

Of the study population, 94 (29.5%) were male and 225 (70.5%) were female. It was determined that 150 (47%) were doctors, 100 (31.3%) of the healthcare workers were nurses, 38 (11.9%) were midwives, and 31 (9.7%) were health officials (**Table 1**).

Table 1- The Distribution of Participants' Responses to the Questions.

"Have you ever heard about the United Nations Convention on the Rights of the Child?"	
Yes (n, %)	222 (69.0%)
"What is the date of the convention?"	
Correct answer (n, %)	35 (11.0%)
"Has Turkey signed this convention?"	
Correct answer (n, %)	146 (45.8%)
"When did Turkey incorporate this convention into domestic law?"	
Correct answer (n, %)	39 (12,2%)
"Can you list 3 of the basic principles of the convention?"	
Three principles	59 (18,5%)
None	236 (74%)
"Do you think the implementation of the convention concerns healthcare professionals?"	
Yes (n, %)	301 (94,4%)
"Do you consider yourself sufficient in advocating for children's rights?"	
Yes	111 (34.8%)
No	208 (65.2%)

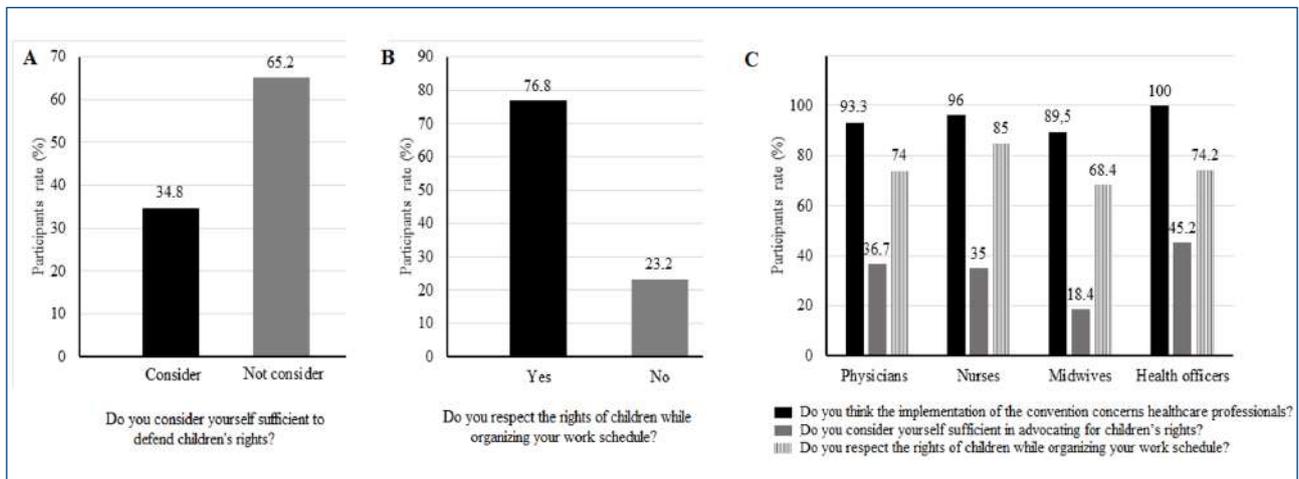


Figure 1. Participants' views on children's rights

Distribution of participants answer to the questions were shown in **Table 1**. Considering the professional groups, the rate of being aware of the convention was 72.0% among physicians, 81.0% among nurses, 34.2% among midwives, and 58% among health officers ($p < 0.001$).

"Can you list 3 of the basic principles of the convention?" Among all participants, the numbers of those who could list one, two, and three articles of the convention and those who could not list any of the articles were 6 (1.9%), 18 (5.6%), 59 (18.5%), and 236 (74%), respectively. "Which do you think is the most important right/law?" In answering this question, 207 (64.9%) of the participants replied with "no rights are more important than the others", 77 (24.1%) with "the right to survive", 25 (7.8%) with "the right to be protected from physical and sexual abuse", and 10 (3.1%) with "the right of non-discrimination". Replies of all participants to the question "Do you think the implementation of the convention concerns healthcare professionals?" were "Yes, it concerns them" for 94.4% participants and "No, it does not" for 5.6%.

The participants were asked whether they consider themselves sufficient in advocating for children's rights. Accordingly, 111 of the participants (34.8%) stated that they considered themselves sufficient in advocating for children's rights, whereas 208 (65.2%) stated that they did not consider themselves sufficient (**Figure 1A**).

Replies of all participants to the question "Do you respect the rights of children while organizing your work schedule?" were "Yes, I do" for 245 (76.8%) of participants and "No, I don't" for 74 (23.2%) (**Figure 1B**). According to professional groups, 93.3%, 36.7%, and 74.0% of the physicians replied positively to the questions "Do you think the implementation of the convention concerns healthcare professionals?", "Do you consider yourself sufficient in advocating for children's rights?" and "Do you respect the rights of children while organizing your

work schedule?", respectively. Among nurses, these rates were 96.0%, 35.0%, and 85.0%, respectively. Among midwives, these rates were 89.5%, 18.4%, and 68.4%, respectively. Among health officers, these rates were 100%, 45.2%, and 74.2%, respectively (**Figure 1C**). "Do you think there are violations of children's rights in daily life?" 282 (88,1%) people thought, while others did not. "Do you think there are violations of children's rights in clinical or outpatient practices?" To the question, 34.8% (111) of the participants answered "Yes", whereas 65.2% (208) answered "No".

"According to the UNCRC, for what ages is the definition of 'child' valid?" Of all participants, 218 (68.3%) answered this question with "0 to 18 years old", 26 (8.2%) with "0 to 17 years old", 38 (11.9%) with "0 to 16 years old", (2.8%) with "0 to 15 years old", and 28 (8.8%) with "0 to 14 years old". Among the physicians, 10 answered with "0 to 14 years old", 2 with "0 to 15 years old", 23 with "0 to 16 years old", 11 with "0 to 17 years old", and 104 with "0 to 18 years old". Among the nurses, 9 answered with "0 to 14 years old", 7 with "0 to 15 years old", 10 with "0 to 16 years old", 7 with "0 to 17 years old", and 67 with "0 to 18 years old". Among the midwives, 5 answered with "0 to 14 years old", 1 with "0 to 16 years old", 3 with "0 to 17 years old", and 29 with "0 to 18 years old". Among the health officers, 4 answered with "0 to 14 years old", 4 with "0 to 16 years old", 5 with "0 to 17 years old", and 18 with "0 to 18 years old" (**Figure 2**).

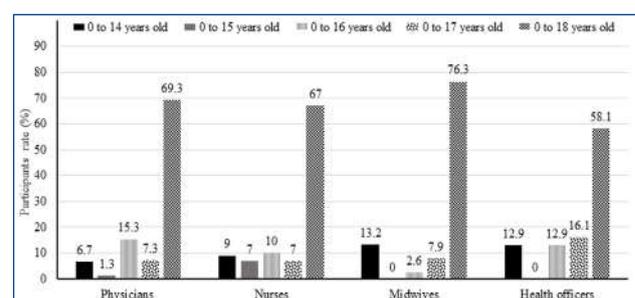


Figure 2. Definition of the Child by Occupation

“When conducting a patient examination in an outpatient clinic, do you have a separate meeting with an older child?” To this question, 52.4% (167) of the participants answered “Yes” and 47.6% (152) answered “No”. The participants were also asked whether it is necessary to obtain consent from an older child before an intervention, and 293 participants reported that consent was required from a child, whereas 26 participants reported that there was no need for a child to provide consent. The participants were further asked if they would inform an older child about his/her disease at the diagnostic and therapeutic stages of the disease. To this question, 293 answered “Yes”, whereas 25 answered “No”. According to the professional groups, this question was answered positively by 54.7% of the physicians, 47.0% of the nurses, 55.3% of the midwives, and 54.8% of the health officers ($p = 0.642$). The question regarding obtaining the consent of an older child before an intervention was answered “Yes” by 165 of the physicians, 90 of the nurses, 37 of the midwives, and 31 of the health officers. The question regarding the necessity of informing an older child about his/her disease was answered “Yes” by 141 (94%) of the physicians, 93 (93.0%) of the nurses, 28 (73.7%) of the midwives, and 31 (100%) of the health officers.

The question of “Would you be interested in the active educational status of a child patient?” was answered “Yes” by 294 (92.2%) of the participants and “No” by 25 (7.8%) of the participants. According to the professional groups, this question was answered “Yes” by 136 (46.3%) of the physicians, 97 (33%) of the nurses, 34 (11.6%) of the midwives, and 27 (8.2%) of the health officers. There was no significant difference between the occupations regarding the right to education. ($p = 0.117$) (Figure 3).

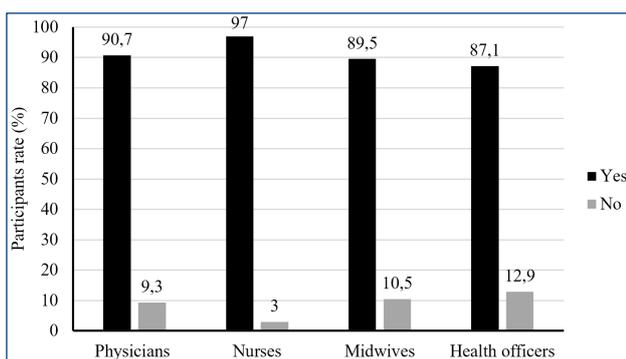


Figure 3. Opinions on the Right to Education by Occupations

DISCUSSION

Healthcare professionals should be considered a prominent occupational category within society, as they are commonly demanded by children due to their essential role in providing medical care. It is crucial for healthcare workers to have a deep understanding and knowledge of children's rights. This study aimed

to evaluate the level of understanding of child rights among medical professionals, who are employed in pediatric wards located in Ankara. The findings of this study show that approximately one-third of healthcare professionals are not aware of the UNCRC.

The UNCRC is the most widely accepted human rights document in history (8-11). It reveals a new vision of child and childhood, considering the child as a strong and competent individual and a family and community member with rights and responsibilities suitable for the developmental stage. This convention, which recognizes children's rights in this way, focuses firmly on the child as a whole (12-14). The basic values that guide this convention can be listed as non-discrimination, care for the benefit of the child, and the right of the child to life, development, and participation. Children's rights are innate rights that all children in the world have, legally and morally (15, 16). Children's rights do not only entail the right to have needs met, such as education, health, and housing. This universal concept also includes the protection of children from physical, psychological, and sexual exploitation (17-22).

In terms of professional groups, the rate of awareness of this convention was higher among nurses than physicians. There is a need to enhance the knowledge and awareness of healthcare professionals, enabling them to acquire a comprehensive understanding of the principles outlined in the UNCRC. This will enable them to effectively fulfill their obligations as mandated by legal frameworks and ensure that they recognize the significance of this convention in safeguarding the well-being and rights of children.

Turkey has signed this convention and thus came under the obligations contained within it as a state party. However, in our study a lower number of participants knew the details of the acceptance of this convention by Turkey. This suggests that the UNCRC is not sufficiently emphasized in the education of Turkish healthcare professionals.

In our study, participants who were previously aware of the UNCRC were asked to list 3 of the basic principles of the convention. Of the 220 participants who were aware of the convention, only 83 were able to list of basic principles. This is a very low rate. It is not enough to simply be aware of the convention to advocate for children's rights and to apply the principles of the convention; it is also imperative to know the content and basic principles of the convention.

To the question of which is the most important right or law, only 24.1% of participants responded with “the right to survive”. However, Article 6 of the UNCRC stresses that “States Parties recognize that every child has the inherent right to life and shall ensure to the maximum extent possible the survival and development of the child”. Therefore, the right to life forms the basis



of benefiting from all other rights and freedoms. In addition, we believe that the most important principle that should concern healthcare professionals is the right to life, because healthcare professionals have a vital role in maintaining the healthy life of the child.

Only 35% of the entire study population considered themselves sufficient in advocating child rights. This is a truly dire result, revealing that healthcare workers are not aware of the content of the UNCRC or the basic principles of children's rights. It is also important for healthcare professionals to specifically adhere to children's rights and laws in personal and clinical practice, in the regulation of healthcare services, and in children's access to healthcare services because children have different physical and psychological characteristics than adults. During periods of growth and development, they should be socially protected against the negative effects of the external environment.

Despite a low rate of awareness of children's rights among the study population, about 88% of respondents expressed the opinion that violations of children's rights do occur. In recent years, violations of human rights including violence, fear, and oppression in many countries of the world have reached daunting levels (23, 24). These terrible events have the greatest impact on children. According to data provided by Amnesty International, it is evident that nations categorized as undeveloped and developing exhibit a higher prevalence of children's rights violations. This may be attributed to the presence of significant detrimental factors, including but not limited to violence, labor exploitation, pornography, and various illicit activities 25-27. Children should be able to benefit from the necessary treatments and rehabilitation services. It is the responsibility of states to heal and support children who are neglected, abandoned on the streets, abused, or tortured. The responsibilities of healthcare professionals include defending children's rights, informing children and their families about their rights and ensuring their understanding, intervening in cases of violations, informing patients about their diagnosis and treatment, and protecting their privacy. Despite these important responsibilities, the rate of awareness was low among midwives and health officers.

Our population may not be fully representative. Due to the survey's expansive coverage area, demanding working conditions, and time-allocation constraints, it was impossible to recruit enough people to establish statistical significance. After a brief introduction, participants were given questionnaires, which were subsequently collected. The return rate for the questionnaires we sent out was disappointingly low. Open-ended question answer rates were low since they were not administered through in-person interviews.

CONCLUSION

Our study revealed an insufficient level of awareness of children's rights among healthcare professionals. To raise awareness of children's rights and the principles of the UNCRC, this convention should be highlighted at every stage of the training of healthcare professionals. Children's hospital should establish a supportive atmosphere to meet the fundamental needs and rights of children and give them a voice in situations where they lack those rights. Health professionals should be in charge of carrying out the supporting of child rights.

ETHICAL DECLARATIONS

Ethics Committee Approval: According to the 2013 Official Gazette Regulation Law on Clinical Trials, no medication or examination related to the volunteer or patient group was performed in the clinical trial and there was no need for an ethics committee due to the thesis design. The study was conducted with the permission of the department lecturer and hospitals.

Informed Consent: All patients signed the free and informed consent form.

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.

REFERENCES

1. Melton GB. Preserving the dignity of children around the world: the U.N. Convention on the Rights of the Child. *Child Abuse Negl.* 1991;15(4):343-50.
2. UNICEF. Convention on the Rights of the Child. 1989.
3. Staff U. The state of the world's children 2011-executive summary: Adolescence an age of opportunity: UNICEF; 2011.
4. UNICEF. The State of the World's Children-Special Edition: Celebrating 20 Years on the Convention on the Rights of the Child: Executive Summary: UNICEF; 2009.
5. Shier H. Pathways to participation: Openings, opportunities and obligations. *Child Society* 2001;15:107-17.
6. Lückner-Babel M-F. The right of the child to express views and to be heard: An attempt to interpret Article 12 of the UN Convention on the Rights of the Child. *Int J Child Rights* 1995;3:391-404.
7. Pemberton S, Gordon D, Nandy S, Pantazis C, Townsend P. Child rights and child poverty: can the International framework of children's rights be used to improve child survival rates? *PLoS Med* 2007;4.
8. Cohen CP, Naimark H. United Nations Convention on the Rights of the Child: Individual rights concepts and their significance for social scientists. *American Psychologist* 1991;46:60.
9. Verhellen E. Convention on the Rights of the Child 1997.
10. Grover S. On recognizing children's universal rights: what needs to change in the Convention on the Rights of the Child. *Int J Child Rts* 2004;12:259.

11. Lowden J. Children's rights: a decade of dispute. *Journal of Advanced Nursing* 2002;37:100-7.
12. Stasiulis D. The active child citizen: Lessons from Canadian policy and the children's movement. *Citizenship Studies* 2002;6:507-38.
13. Lindenmeyer K. A right to childhood: the US Children's Bureau and child welfare, 1912-46: University of Illinois Press; 1997.
14. Dolgin JL. The Fate of Childhood: Legal Models of Children and the Parent-Child Relationship. *Alb L Rev* 1997;61:345.
15. Archard D. *Children: Rights and childhood*: Routledge; 2014.
16. Eekelaar J. The emergence of children's rights. *Oxford J Legal Stud* 1986;6:161.
17. Kieling C, Baker-Henningham H, Belfer M, et al. Child and adolescent mental health worldwide: evidence for action. *Lancet* 2011;378:1515-25.
18. Goldman J. A coordinated response to child abuse and neglect: The foundation for practice: US Department of Health and Human Services, Administration for Children and ...; 2003.
19. Glaser D. Emotional abuse and neglect (psychological maltreatment): a conceptual framework. *Child Abuse Negl.* 2002;26(6-7):697-714.
20. Prinz RJ, Sanders MR, Shapiro CJ, Whitaker DJ, Lutzker JR. Population-based prevention of child maltreatment: The US Triple P system population trial. *Prevent Sci* 2009;10:1-12.
21. Woodhead M. Psychology and the cultural construction of children's needs. *Constructing and reconstructing childhood*: Routledge; 2015:54-73.
22. Boyden J. Childhood and the policy makers: A comparative perspective on the globalization of childhood. *Constructing and reconstructing childhood*: Routledge; 2015:167-201.
23. Taran PA. Human rights of migrants: challenges of the new decade. *International Migration* 2001;38:7-51.
24. Sikkink K. *The Justice Cascade: How Human Rights Prosecutions Are Changing World Politics* (The Norton Series in World Politics): WW Norton & Company; 2011.
25. Mapp SC. *Human rights and social justice in a global perspective: An introduction to international social work*: Oxford University Press, USA; 2014.
26. Tanielian AR. Illicit supply and demand: Child sex exploitation in South East Asia. *NTU L Rev* 2013;8:97.
27. Taylor L, Mulder M, Formoso B, et al. Dangerous trade-offs: The behavioral ecology of child labor and prostitution in rural northern Thailand. *Current Anthropology* 2005;46:411-31.



Assessment of Iliac Artery Stent Patency Using Computed Tomography Angiography and Comparison with Digital Subtraction Angiography

İliak Arter Stent Açıklığının Bilgisayarlı Tomografi Anjiyografi ile Değerlendirilmesi ve Dijital Subtraksiyon Anjiyografi ile Karşılaştırılması

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ABSTRACT

Aim: To evaluate the effectiveness of computed tomography angiography (CTA) methods in measuring intimal thickening and stenosis in iliac artery stents to digital subtraction angiography (DSA).

Material and Method: Twenty patients who underwent stent implantation for aorto-iliac artery stenosis in our radiology clinic were assessed using CTA and DSA. In addition to CTA axial images, multiplanar reformat, maximum intensity projection (MIP), shaded surface display (SSD), and virtual intravascular endoscopy (VIE) images were generated to evaluate the stents using the CTA data. Statistical analyses were conducted using the McNemar test with the IBM SPSS software program. This study adhered to the principles of the Helsinki Declaration.

Results: Multiplanar reformat images were more effective than other imaging (MIP, SSD, and VIE) in evaluating stent lumens and stenoses.

Conclusion: CTA image processing methods can be used as a non-invasive technique to evaluate iliac vascular stent patency.

Keywords: Atherosclerosis, computed tomography angiography, diagnostic imaging, stent

ÖZ

Amaç: İliak arter stentlerinde intimal kalınlaşma ve darlığın değerlendirilmesinde Bilgisayarlı Tomografi Anjiyografi (CTA) yöntemlerinin etkinliğini araştırmak ve bu yöntemleri Dijital Subtraksiyon Anjiyografi (DSA) ile karşılaştırmaktır.

Gereç ve Yöntem: Radyoloji Kliniğimizde aorto-iliak arter stenozu nedeniyle stent implantasyonu yapılan yirmi hasta CTA ve DSA ile analiz edildi. CTA incelemesinde elde edilen verilerden stentleri değerlendirmek için aksiyel görüntüleme ek olarak multiplanar reformat (MPR), maksimum yoğunluk projeksiyonu (MIP), gölgeli yüzey görüntüsü (SSD) ve sanal intravasküler endoskopi (VIE) görüntüleri oluşturuldu. İstatistiksel analizler SPSS yazılım paket programı (IBM) kullanılarak McNemar testi ile gerçekleştirilmiştir. Bu çalışma Helsinki Deklarasyonu Prensiplerine uygundur.

Bulgular: Stent lümeninin görüntülenmesi açısından, MPR görüntüleri stent lümeninin ve stenozların değerlendirilmesinde diğer görüntülerden (MIP, SSD, VIE) daha etkilidir.

Sonuç: CTA görüntü işleme yöntemleri, iliac vasküler stent açıklığını değerlendirmede non-invaziv bir yöntem olarak uygulanabilir.

Anahtar Kelimeler: Ateroskleroz, stent, bilgisayarlı tomografi anjiyografi, tanısal görüntüleme

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INTRODUCTION

Atherosclerotic peripheral arterial disease in the lower extremities is chronic and progressive. According to several epidemiologic studies, it produces vascular lesions that require treatment in approximately 10% of adults over the age of 65 year. The preferred mode of treatment is endovascular. The two most common types of endovascular treatment are balloon angioplasty and stenting (1).

Digital subtraction angiography (DSA) provides high temporal and spatial resolution in the radiologic evaluation of stent-treated patients. The disadvantages include invasiveness and high radiation exposure.

Computed tomography angiography (CTA), an alternative imaging method, is non-invasive. Compared with DSA, the radiation dose and amount of contrast material used during the test may now be chosen (2).

MATERIAL AND METHOD

In this study, 20 patients who underwent intravascular stenting and a control DSA test for iliac artery stenosis in our radiology clinic were included retrospectively.

Nineteen male and one female patients aged 46–80 year (mean, 63) were assessed with CTA at the one-month and 10-year follow-up visits following intravascular stenting. The CT angiography examination was carried out using the HiSpeed CT/i (GE Medical Systems, Milwaukee, Wisconsin).

To determine the localization of the aorta-iliac artery stents, an initial evaluation was conducted before administering intravenous contrast material. Patients were positioned supine in the gantry to acquire an anterior–posterior anterior image. After the stent was observed in the anterior image, 2–3 cm distal to the stent, beginning at the L4 vertebral level, was examined with 10-mm collimation, 30-mm/s table speed, “pitch” 3/1 with 120 kV, 50-mA X-ray settings to obtain the best image with a minimal number of slices. The examination time ranged from 2.9 to 5.9 s, with a mean of 4.4 s.

After localization was determined, 120 cc (1.5–2 cc/kg) of nonionic contrast medium (Iopamiro-Ultravist or Visipaque 300 mgI/mL) was injected at a rate of 4 cc/s using a 20-G intravenous cannula via an antecubital vein from an automated injector (MedRad OP 100, USA).

The delay time (the time between the initiation of the injection and the formation of maximum contrast intensity in the terminal aorta and iliac artery dissociation level) was 25 s in 19 cases and 15 s in one case (Case 20). In the examinations, 120 kV, 200 mA, 3-mm collimation, 6-mm/s table speed, and “pitch” 2/1 were used. At the end of the delay time, patients were asked to hold their breath before spiral scanning began. The examination was completed in 11.6–22.4 s, with an average time of 17 s.

Following the imaging technique, the 1800 linear interpolation algorithm was used to reconstruct all patients' volumetric data from spiral scanning with a slice thickness of 1 mm using. Reconstruction took roughly 8–10 min.

Nine of the stenting stenoses were detected in the left common iliac artery, seven in the right common iliac artery, three in the right external iliac artery, and one in the terminal aorta. In CTA, oblique reformat images were acquired in all patients from 1-mm reconstructed standard axial images with the stent referenced from the stent plane, allowing the stent to be examined thoroughly in the coronal plane.

The stents were evaluated using axial images, workstation-generated multiplanar reformat (MPR), maximum intensity projection (MIP), shaded surface display (SSD), and virtual intravascular endoscopy (VIE).

Statistical analyses were performed using the IBM SPSS software program. Data are expressed as mean \pm standard deviation. The McNemar test was used to assess the effectiveness of CTA and image processing procedures, and stenosis rates and intimal thickness growth were compared with those obtained with DSA.

RESULTS

Sixteen of the 20 patients had a single stent placed in one iliac artery, two patients had two stents implanted for lesions in the right and left iliac arteries, and two patients had an in-stent stent placed after stent stenosis.

Multiplanar reformats are coronal, sagittal, or oblique single-voxel thick planes formed by superimposing axial slices. This method distinguishes calcification and stent from intraluminal contrast. In our study, the stent was visualized separately from the intraluminal contrast in all cases; however, the stent, calcification, and bone structures had similar densities.

Multiplanar reformat images were obtained from standard axial images using the stent as a reference. Depending on the stent's angle with the aorta-iliac artery, the stent lumen was best assessed on sagittal oblique images between 50 and 500 in 18 patients and on axial oblique images in two patients (**Figure 1**).

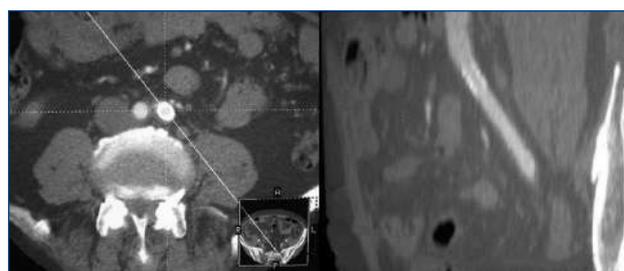


Figure 1. Axial image and the MPR imaging with the stent

Following contrast enhancement, vascular structures distal to the stent were typically visible on MIP images. MIP images with thicknesses ranging from 4.1 to 7 mm provided the best view of vascular structural continuity.

The iliac vascular structures and stents were observed by carefully removing the bones from the image to avoid superposition with MIP images derived from axial images and incorporating the entire scan volume (Figure 2).



Figure 2. Windowing to visualize vascular structures in MIP images

In 11 cases, the stent was broader than the aorta-iliac artery diameter at the localization site on SSD images. In the other cases, the stent and intraluminal contrast were indistinguishable because their density exceeded the specified threshold value.

SSD images were generated by taking a cutoff value of 160–200 HU on axial images (Figure 3).



Figure 3. SSD images viewed from the anterior side. The threshold value was taken as 160 HU

The threshold value in VIE images was set between 90 and 150. In all cases, the stent was seen from the proximal vascular lumen, and the stent lumen and stent distal were assessed. The stent was patent in all cases.

The iliac arteries were also endoluminally imaged using VIE software (Figure 4).

In the statistical analysis, it was found that CTA and image processing procedures were similarly effective as DSA in assessing iliac artery stent patency Tables 1,2.

Table 1. Comparison of Axial CT, DSA, MIP, SSD, and VIE imaging techniques with intimal thickness increase

Imaging techniques	Intimal thickness increase		p value
	Present (%)	Absent (%)	
Axial CT	10 (50)	10 (50)	>0.05
DSA	0	20 (100)	>0.05
MIP	0	20 (100)	
SSD	0	20 (100)	
VIE	0	20 (100)	

Note. CT, computed tomography; DSA, digital subtraction angiography; MIP, maximum intensity projection; SSD, shaded surface display; VIE, virtual intravascular endoscopy.

Table 2. Comparison of stenosis rates between DSA and MPR imaging techniques

Imaging techniques	Stenosis rates		p value*
	>10%	10%–30%	
MPR	17 (85)	3 (15)	>0.05
DSA	17 (85)	3 (15)	

Note. DSA, digital subtraction angiography; MPR, multiplanar reformation. *p value shows the results of the McNemar test.

DISCUSSION

DSA is the gold standard for diagnosis and treatment. Its main advantage is that a balloon or stent may be placed immediately following the diagnostic test; however, it is an invasive, costly method with a high risk of complications and radiation exposure (3).

CTA is now preferred as an alternative method to DSA because it allows for software-supported MPR and 3D volume images that enable a thorough evaluation of the entire vascular tree (3,4). In our study, MPR, MIP, SSD, and VIE images were generated in all cases.



Figure 4. The created VIE images. In these images, the left iliac artery and the stent are visualized from the aortic lumen by determining the path in the aortic lumen with a "curser"

Calcification and stent may be distinguished from intraluminal contrast in oblique MPR images obtained in relation to the stent. In this study, the stent was visualized separately from the intraluminal contrast. MPR images may be used to assess the relationship between the metallic stent and vascular structures as well as its patency and location.

Maximum intensity projection is highly sensitive in distinguishing calcification from intraluminal contrast (4). In this study, we used MIP to differentiate between stent and intraluminal contrast in all cases.

SSD images cannot be used to evaluate stenosis or patency of the stented segment (5). In our study, the stent appeared as contour overflow in the vessel on SSD images in 11 cases, with the stent, calcification, and intraluminal contrast all having a similar appearance.

Virtual intravascular endoscopy represents a three-dimensional perspective of virtual fiberoptic endoscopy. In aorta-iliac artery stenosis, the location of stents and their relationship with the vascular structure can be evaluated by VIE, ostial or luminal narrowing (6,7).

This study has some limitations. The study group consisted of patients who only had their iliac arteries stented.

Stenoses and stents in other arteries were excluded to avoid increasing the dose of contrast agent used.

The advantages of this study include the possibility of using alternative reconstruction approaches that increase diagnostic sensitivity after the CTA procedure (8,9).

In a study by Napoli et al. (3) on the efficacy of spiral and multidetector CT in the diagnosis, stenosis grading, and treatment of peripheral arterial disease, it was found that the diagnostic performance of CTA was equal to that of DSA (accuracy, >98%), and it is suggested that CTA can be used as a primary imaging method in place of DSA.

CONCLUSION

In conclusion, this study supports the literature data by showing that CTA, when combined with advanced image processing methods, can be as effective as DSA in assessing stent integrity, stent patency, and the stent–aorta-iliac artery relationship following intravascular stenting in aortic and iliac artery stenoses.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study used research data before 2020, and it is among the studies that do not require ethics committee permission as it is produced from my master's/doctoral thesis.

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.

Note: The research article was accepted as an oral presentation at the Eastern Mediterranean Family Physicians Association Congress in May 2024.

REFERENCES

1. Meissner O, Prettner R, Kellner WS, et al. Endoluminal repair of peripheral arterial aneurysms: 4-year experience with the Cragg Endopro System I. *J Vasc Interv Radiol* 2000;11(5):593-600.
2. Alanazi A, Nojiri C, Kido T, et al. Engineering analysis of diamond-like carbon coated polymeric materials for biomedical applications. *Artif Organs* 2000;24(8):624-7.
3. Napoli A, Anzidei M, Zaccagna F, et al. Peripheral arterial occlusive disease: Diagnostic performance and effect on therapeutic management of 64-section CT angiography. *Radiology* 2011;261(3):976-86.
4. Ofer A, Nitecki SS, Linn S, et al. Multidetector CT angiography of peripheral vascular disease: A prospective comparison with intraarterial DSA. *AJR Am J Roentgenol* 2003;180(3):719-24.
5. Hiatt MD, Fleischmann D, Hellinger JC, Rubin GD. Angiographic imaging of the lower extremities with multidetector CT. *Radiol Clin North Am* 2005;43(6):1119-27.
6. Rubin, GD. Multi-detector row CT angiography of lower extremity arterial inflow and runoff: initial experience. *Radiology* 2001;221(1):146-58.
7. Ota H, Takase K, Igarashi K et al. MDCT compared with digital subtraction angiography for assessment of lower extremity arterial occlusive disease: important of reviewing cross-sectional images. *AJR Am J Roentgenol* 2004;182(1):201-9.
8. Mahesh M. Search for isotropic resolution in CT from conventional through multiple-row detector. *Radiographics* 2002;22(4):949-62.
9. Martinez R, Ferral H: Endovascular treatment of athero-occlusive disease of iliac arteries. *La Revista de Investigacion Clinica* 2001;53(6):543-51.



Endometriozis Olgularının 10 Yıllık Analizi: Tek Merkez Sonuçları

Ten Year Analysis Of Endometriosis Cases: Single Center Results

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ÖZ

Amaç: Endometriozis, endometriyal bezlerin ve stromanın, sıklıkla uterus dışında varlığı ve büyümesi ile karakterize benign, kronik inflamatuvar bir hastalıktır. Endometriozis odakları abdominal boşlukta sıklıkla overler, tubalar ve ligaman yapılarında, uterus dış ve pelvis iç yüzeyinde görülür. En sık görülen semptomlar kronik pelvik ağrı, dismenore ve infertilitedir. Endometriozisin yaygın olarak görülmesi ve çok farklı bölgelerde tutulum yapmasından dolayı çalışmamızda endometriozisin lokalizasyonlarını, hastaların başvuru şikayetlerini ve eşlik eden lezyonları belirlemeyi amaçladık.

Gereç ve Yöntem: Patoloji Anabilim Dalında 2010-2020 yılları arasında endometriozis tanısı alan 330 vaka hastane bilgi sistemi üzerinden tarandı. Endometriozis tanısı alan hastaların yaşı, şikayeti, endometriozis yerleşim yeri, eşlik eden malign ve benign lezyonları ve frozen incelemesi açısından retrospektif olarak incelendi.

Bulgular: Endometriozis tanısı alan 330 hasta mevcuttu. Hastaların yaş ortalaması 45 (SS 11,23) olup en genç hastanın 11, en yaşlı hastanın ise 87 yaşında olduğu görüldü. Hastaların pelvik kitle (%79), anormal uterin kanama (%19) ve pelvik ağrı (%2) şikayeti ile kadın hastalıkları ve doğum kliniğine başvurdıkları görüldü. En sık tutulan bölgenin sağ over (%32,4) ve sol over (%33) olduğu izlendi. Ayrıca 46 (%13,9) hastada bilateral over tutulumu ve 29 (%8,8) hastada da karın cildinde tutulum izlendi (Tablo 1). 87 (%26,3) hastaya frozen incelemesi yapılmış olup 70 (%80) hastaya benign, 17 (%20) hastaya da malign tanısı verilmişti.

Sonuç: Endometriozis, toplumda yaygın olarak görülmesi, kişinin yaşam kalitesini önemli derecede azaltması ve kitle oluşturup malignite şüphesi uyandırmasından dolayı önemli bir hastalıktır. Endometriozisin patogenezi hala net olarak açıklanamamış olsa da günümüzde retrograd menstruasyon teorisi kabul görmektedir. Medikal veya cerrahi tedaviler ile kolaylıkla tedavi edilebilen bir hastalıktır. Over kanserli hastalarda özellikle endometrioid adenokarsinom ve berrak hücreli karsinomun endometriozis ile birlikteliğinin bulunduğu bildirilmektedir.

Anahtar Kelimeler: Endometriozis, over kanseri, frozen, karsinom

ABSTRACT

Aim: Endometriosis is a benign, chronic inflammatory disease that often involves the presence and enlargement of endometrial glands and stroma outside of the uterus. Endometriosis foci are often seen in the abdominal cavity, in the ovaries, Fallopian tubes, ligament structures, on the outer surface of the uterus and the inner surface of the pelvis. The most common symptoms are chronic pelvic pain, dysmenorrhea, and infertility. In our study, we aimed to determine the localization of endometriosis, accompanying symptoms and other accompanying lesions due to the prevalence of endometriosis and its involvement in many different regions.

Material and Method: 330 cases diagnosed with endometriosis in the Department of Pathology between 2010 and 2020 were scanned through the hospital information system. The patients diagnosed with endometriosis were analyzed retrospectively in terms of age, complaints, endometriosis location, accompanying malignant and benign lesions and frozen examination.

Results: There were 330 patients diagnosed with endometriosis. The average age of the patients was 45 (SS 11,23), and it was observed that the latest patient was 11 years old and the oldest patient was 87 years old. It was observed that the patients applied to the gynecology and obstetrics clinic with complaints of pelvic mass (79%), abnormal uterine bleeding (19%) and pelvic pain (2%). It was observed that the most frequently affected area was the right (32,4%) and the left ovary (33%). In addition, bilateral ovarian involvement was observed in 46(13,9%) patients and abdominal skin involvement in 29(8,8%) patients (Table 1). Frozen examination was performed on 87(26,3%) patients and 70(80%) patients were diagnosed as benign and 17(20%) patients were diagnosed as malignant.

Conclusion: Endometriosis is an important disease due to its widespread prevalence in the society, significantly decreasing the quality of life of the person and causing a suspicion of malignancy by forming a mass. Although the pathogenesis of endometriosis has not been clearly explained, retrograde menstruation theory is accepted today. It is a disease that can be easily treated with medical or surgical treatments. It has been reported that especially endometrioid adenocarcinoma and clear cell carcinoma are associated with endometriosis in patients with ovarian cancer.

Keywords: Endometriosis, ovarian cancer, frozen, carcinoma

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GİRİŞ

Endometriozis, endometriyal bezlerin ve stromanın, sıklıkla uterus dışında varlığı ve büyümesi ile karakterize yaygın, iyi huylu, kronik inflamatuvar bir hastalıktır (1-6). Endometriozis odakları abdominal boşlukta sıklıkla overler, tubalar ve ligaman yapılarında, uterus dış ve pelvis iç yüzeyinde görülür. Daha az olarak bağırsaklar, anal kanal, mesane, vajina, serviks ve geçirilmiş batin ameliyatlarının skarlarında da görülebilir (5, 6). Endometriozis beyin ve göz gibi diğer pelvis dışı organlarda da nadiren görülebilir (6). Premenarşyal ve postmenapozal dönemde de ortaya çıkabilen endometriozisin prevalansı % 6 ila 10 arasındadır (2, 3, 6). Tanı anında ortalama yaş yaklaşık 28'dir. En sık görülen semptom kronik pelvik ağrı, dismenore ve infertilitedir (3, 6). Endometriozisli hastalardaki bir diğer önemli sorun da epitelyal over kanserleri için bir risk faktörü olmasıdır. Genel olarak endometriozis, endometrioid ve berrak hücreli over kanserlerinin bir kısmında prekürsör lezyon olarak gösterilmiştir ve bu kanserlerin riskini azaltmak için endometriozise cerrahi yaklaşım önerilmiştir (7). En sağlam kanıtlarla desteklenen hipotez, retrograd menstrüasyon fenomenine dayanır. Endometriyal fragmanlar, muhtemelen dissinerjik uterus kasılmalarından dolayı fallop tüplerinden geçer ve periton boşluğuna ulaştıktan sonra pelvik yapılara yapışır, sonrasında östrojen uyarısıyla büyüyebilir (8). Ayrıca karın duvarında görülen skar endometriozis vakalarında ise endometrial hücrelerin operasyon esnasında dökülmesi ve östrojenik uyarıyla hücrelerin çoğalması sonucu oluştuğu en çok kabul gören teoridir (9).

Endometriozisli kadınlarda pelvik anatomi, oluşan yapışıklıklar nedeniyle ciddi derecede hasara uğrar. Bunun sonucunda doğurganlıkta bariz bir bozulma ortaya çıkmaktadır. Yapışıklıklar nedeniyle fimbriyaların salınan oositi yakalama ve fertilizasyon bölgesine taşıma şansı azalır ya da kaybolur. Bununla birlikte küçük lezyonların nasıl kısırılığa neden olduğu açık değildir (2, 10). Endometriozis tedavisinde geniş medikal tedavi seçenekleri olmasına rağmen bazı hastalarda medikal tedaviye dirençli endometriozis vakaları görülür. Bu durum hastalarda birden fazla cerrahi müdahale gerektirir ve hastaların yaşam kalitesinin düşmesine sebep olur (11). Ovaryan endometriomalarda medikal tedavi lezyon boyutlarında küçülmeyi sağlayabilmesine karşın tamamen bir rezolyona yol açamamaktadır. Bu nedenle semptomatik ve büyük boyutlarda olan endometriomalarda primer tedavi yaklaşımı cerrahi yönünde olmalıdır (12).

GEREÇLER VE YÖNTEM

Patoloji Anabilim Dalında 2010-2020 yılları arasında endometriozis tanısı alan 330 vaka hastane bilgi sistemi üzerinden tarandı. Endometriozis tanısı alan hastaların yaşı, şikayeti, endometriozis yerleşim yeri, eşlik eden malign ve benign lezyonları ve frozen incelemesi açısından

retrospektif olarak incelendi. Yerleşim yeri, hastanın şikayeti, eşlik eden lezyonlar ve frozen sonuçları patoloji raporlarından elde edildi. Endometriozis ve frozen sonuçları, endometriozis ve eşlik eden lezyonlar açısından olgular değerlendirildi. Çalışmamız, başvuru Yerele Etik Kurulun 2021/217 nolu kararı ile onaylanmıştır.

BULGULAR

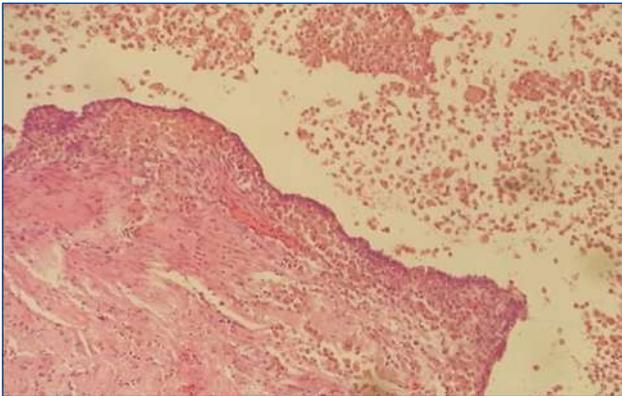
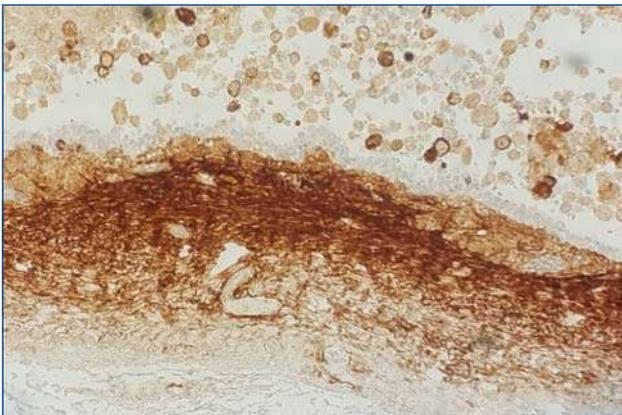
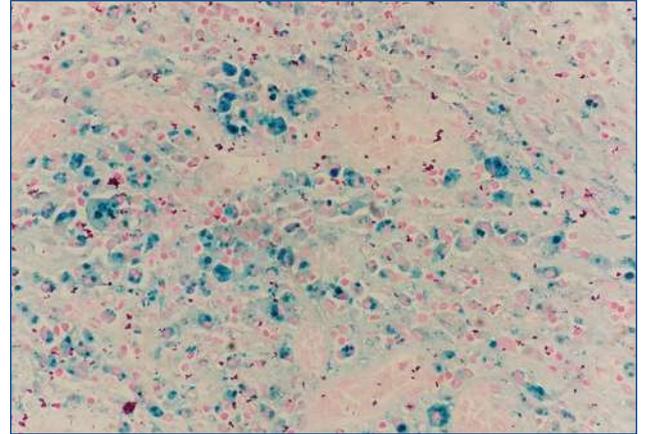
Endometriozis tanısı alan 330 hasta mevcuttu. Hastaların yaş ortalaması 45 (SS 11,23) olup en genç hastanın 11, en yaşlı hastanın ise 87 yaşında olduğu görüldü. Hastaların pelvik kitle (%79), anormal uterin kanama (%19) ve pelvik ağrı (%2) şikayeti ile kadın hastalıkları ve doğum kliniğine başvurdukları görüldü. En sık tutulan bölgenin sağ 107 (%32,4) ve sol over 109 (%33) olduğu izlendi. 46 (%13,9) hastada bilateral over tutulumu ve 29 (%8,8) hastada da karın cildinde tutulum izlendi. Ayrıca sağ tubada 8 (%2,4), sol tubada 7 (%2,1), bilateral tubalarda 5 (%1,5), peritonda 5 (%1,5), sol over ve tubada 2 (%0,6), serevikste 3 (%0,9), sağ over ve tubada 2 (%0,6), sol uterin ligamentte 3 (%0,9), bilateral uterin ligamentlerde 1 (%0,3), kolonda 1 (%0,6) ve apendikte de 1 (%0,3) hastada tutulum izlendi (**Tablo 1**). Hastalardan 87 (%26,3)'sine frozen incelemesi yapılmış olup 70 (%80) hastaya benign, 17 (%20) hastaya da malign tanısı verilmiş. Benign tanısı verilen 67 (%95,8) hastaya overdeki kitle sebebiyle, 1 (%1,4)'er hastaya da sağ tuba, sol uterin ligament ve karın cildindeki kitle sebebiyle frozen incelemesi yapılmış. Overdeki kitle sebebiyle frozen incelemesi yapılan hastaların 5 (%7)'inde seröz kistadenom, 2 (%3)'sinde müsinöz kistadenom ve 1 (%1,5)'er hastada da matür teratom, müsinöz karsinom ve berrak hücreli karsinom tanısı verilmiş. Diğer 57 (%85,5) hastaya ise endometriozis tanısı konmuş. Malign tanısı verilen hastaların 10 (%59)'una endometrium karsinomu, 4 (%23)'üne overin endometrioid karsinomu, 1 (%6)'ine overin seröz karsinomu, 1 (%6)'ine overin seröz borderline tümörü ve 1 (%6)'ine de overin atipik adenofibromu tanısı koyulmuş. Endometriozis tanısı konan hastaların 195 (%59)'inde eşlik eden bir patoloji olmadığı, 20 (%6)'sinde adenomyozis, 13 (%4)'ünde endometrium karsinomu, 68 (%21)'inde leiomyom, 27 (%8)'sinde over tümörü ve 7 (%2)'sinde de serviks karsinomu olduğu görüldü (**Tablo 2**). Endometriozise eşlik eden over tümörlerinin 6 (%27,5)'sinin seröz kistadenom, 5 (%18,5)'inin endometrioid karsinom, 3 (%11)'ünün seröz karsinom, 3 (%11)'ünün müsinöz borderline tümör, 2 (%7)'sinin müsinöz karsinom, 2 (%7)'sinin müsinöz kistadenom ve 1 (%3)'er olgunun da fibrotekoma, metastatik karsinom, adenofibrom, berrak hücreli karsinom, seröz borderline tümör ve teratom olduğu tespit edildi. Overlerdeki kistlerde endometrial tipte epitel ve stromanın bulunduğu (**Resim 1**) ve endometrial stromanın CD10 ile boyandığı görüldü (**Resim 2**). Ayrıca Prusya mavisini ile hemosiderinin (eski kanama bulgusu) boyandığı izlendi (**Resim 3**).

Tablo 1. Endometriozis olgularının tutulum yerleri ve olgu sayıları

Endometriozis Lokalizasyonu	Olgu sayısı	Olgu yüzdesi (%)
1 Sağ Over	107	32,4
2 Sol Over	109	33,0
3 Sağ ve Sol Over	46	13,9
4 Sağ Tuba	8	2,4
5 Sol Tuba	7	2,1
6 Sağ ve Sol Tuba	5	1,5
7 Periton	5	1,5
8 Sol Over ve Tuba	2	0,6
9 Karın Cildi	29	8,8
10 Serviks	3	0,9
11 Sağ Over ve Tuba	2	0,6
12 Sol Uterin Ligament	3	0,9
13 Sağ ve Sol Uterin Ligament	1	0,3
14 Kolon	2	0,6
15 Apendiks	1	0,3
Toplam	330	100,00

Tablo 2. Endometriozise eşlik eden patolojiler

Endometriozise eşlik eden patolojiler	Olgu sayısı	Olgu yüzdesi (%)
Adenomyozis	20	6
Endometriozis	195	59
Endometrium Karsinomu	13	4
Leiomyom	68	21
Over Tümörü	27	8
Serviks Karsinomu	7	2
Toplam	330	100

**Resim 1:** Yoğun eski kanama bulguları içeren endometriozis olgusu. Hematoxylin Eozin, X100**Resim 2:** İmmünohistokimyasal CD10 boyası ile endometrial stromanın boyandığı görülüyor. CD10, X200**Resim 3:** Eski kanama bulguları içeren endometriozis olgusundaki hemosiderin yüklü makrofajların Prusya Mavisi ile boyandığı görülüyor. Prusya Mavisi, X400

TARTIŞMA

Endometriozis pelvik ağrı, dismenore ve infertilite gibi ciddi sorunlara sebep olan ve kişinin yaşam kalitesini etkileyen, östrojene bağımlı, kronik inflamatuvar bir hastalıktır. Kronik inflamasyona bağlı oluşan sitokinler ve büyüme faktörleri pelvik ağrı oluşmasına aracılık etmektedirler (2). Endometriozis tipik olarak ağrı ve infertiliteye sebep olsa da %20-25 hastada asemptomattır (4). Bazı hastalarda endometriozise bağlı semptom olmadığı ve bu kişilerde endometriozisin başka hastalıklara eşlik ettiği görülmektedir. Pelvik kitle ve anormal uterus kanama gibi semptomlara sebep olan hastalıklarda da overde veya pelvik bölgede küçük endometriozis odakları görülebilmektedir. Bizim serimizde hastaların %21'inin leiomyom, %8'inin over tümörü, %6'sının adenomyozis, %4'ünün endometrium karsinomu %2'sinin de serviks karsinomu sebebiyle opere oldukları ve bu lezyonlara küçük endometriozis odaklarının eşlik ettiği görüldü. Yani endometriozis olgularının %41'inde pelvik kitle sebebiyle opere edilen hastalara endometriozisin eşlik ettiği söylenebilir. Endometriozisin patogenezi hala net olarak açıklanamamış olsa da günümüzde retrograd menstruasyon teorisi kabul görmektedir. Bizim serimizde de olguların büyük kısmının adneksler ve periton boşluğundaki organlarda olması bu yolla oluştuğunu destekler nitelikteydi. Karın duvarındaki sezeryan skar hattındaki endometriozislerin ekilme yöntemiyle oluştuğu düşünülmektedir. Bizim serimizde de endometriozis olgularının %8,8'inin skar hattında oluştuğu görüldü. Pelvis dışı organlarda görülen endometriozis olgularının ise endometrial kök hücrelerin hematogen veya lenfatik embolizasyon yoluyla implantasyonu sonucunda oluştuğu ileri sürülmektedir (2, 6).

Endometriozisli hastalardaki bir diğer önemli sorun da infertilitedir. İnfertilite ile başvuran kadınların %21-47'sinde, kronik pelvik ağrısı olanların %71-87'sinde endometriozis mevcuttur (2). İnfertil hastaların ise %25-50'sinde endo-

metriozis tesbit edilebildiği bildirilmiştir. Endometriozisli hastalarda değişime uğramış pelvik anatomi ve peritoneal fonksiyon, endokrin ve ovulatuvar anormallikler, endometriumdaki hormonal ve hücresele aracılı immunitite fonksiyonlarındaki farklılaşmaların infertilitede rol aldığı bildirilmektedir (4, 8). Bizim çalışmamızda hastaların doğurganlıkları ile ilgili bilgilere ulaşamadığından endometriozis ve infertilite birlikteliği hakkında yorum yapılamamıştır.

Endometriozis, toplumda yaygın olarak görülmesinin yanı sıra kitle oluşturup malignite şüphesi uyandırmasından dolayı da önemli bir hastalıktır. Serum CA125 düzeyleri endometrioziste ve diğer malign ve benign durumlarda yükselebilmektedir (7). En sık tutulan bölge olan overlerde, kitlelerin malignite şüphesi uyandırmasından dolayı genellikle operasyon esnasında frozen inceleme yapılmaktadır. Bizim serimizde malignite şüphesi nedeniyle overde kitlesi olan olguların 77 (%23)'sine frozen inceleme yapıldığı görüldü. Vakaların 5'inde endometrioid karsinom ve 1 vakada da berrak hücreli karsinom tanısı verildiği, diğer vakaların benign olarak raporlandığı görüldü. Endometriozisli hastalarda artmış bir kanser insidansı olduğu birçok çalışmada bildirilmiştir. Yapılan çalışmalar, over kanserli hastalarda özellikle endometrioid adenokarsinom ve berrak hücreli karsinomun endometriozis ile birlikteliğinin bulunduğunu göstermektedir (7, 8, 13). Epitelyal over kanseri olgularında endometriozis görülme sıklığı, endometrioid tip için %21.2, berrak hücreli tip için %39.2, seröz tip için %3.3, müsinöz tip için %3 olarak bildirilmektedir (8). Atipik endometriozis olgularında şiddetli endometrial atipi, prekanseröz lezyonlarla ilişkilendirilmekte ve bu vakalarda daha sık oranda kanser gelişimi bildirilmektedir (7). Bununla birlikte, sadece sitolojik ve / veya yapısal olarak atipik endometriozisin gerçek bir neoplastik durum oluşturduğu ileri sürülmektedir. Over kanserini düşündüren preoperatif ultrasonografik bulgusu bulunmayan endometriomaların %1-3'ünde atipik endometriozis görülür. Endometriotik implantlar pelvisin her yerinde gözlenirken, endometriozis ile ilişkili malignitelerin tipik olarak endometriomalarda ortaya çıktığı bildirilmiştir (8).

Endometriozis medikal veya cerrahi tedavilere rağmen nüks etme potansiyeli bulunan bir hastalıktır. Endometriozis tedavisi, endometriozise bağlı gelişen ağrının tedavisi ve endometriozise bağlı infertilitenin tedavisi olacak şekilde iki ana başlık altında incelenmektedir. Ağrı tedavisinde medikal tedavi olarak non steroidale antiinflamatuar ilaçlar ve hormonal tedavi yöntemleri kullanılmaktadır. Medikal tedavilere yanıt alınmadığı durumlarda veya malignitenin ekarte edilemediği durumlarda cerrahi tedavi yöntemleri uygunmaktadır. Ayrıca ovaryan endometriomalarda medikal tedavi yetersiz kalmakta ve cerrahi eksizyon yapılması gerekmektedir. İnfertilitenin tedavisinde hastanın takip edilmesi, medikal ve cerrahi tedavi yöntemleri, ovaryan stimülasyon, invitro fertilizasyon yöntemleri kullanılabilir (12).

SONUÇ

Endometriozis için histopatolojik tanı koydurucu kriterler Hematoksilen Eozin boyası ile yapılan incelemede benign görünümdeki endometrial glandların ve stromanın görülmesi, eski kanama bulgularının olması ve immunohistokimyasal CD10 boyası ile endometrial stromanın boyanması olarak sıralanabilir (**Resim 1**). Bazı durumlarda belirgin endometrial epitel bulunmayabilir veya kesitlere gelmemiş olabilir. Böyle durumlarda stromal hücreler kolaylıkla inflamatuvar hücrelerle karışabilmektedir ve yanlış yorumlanabilmektedir. Eski kanama bulgularının olması her zaman için aklımıza endometriozisi getirmeli ve ayırıcı tanıda gerekirse immunohistokimyasal yöntemler kullanılmalıdır. Bizim çalışmamızda endometriozis olgularının %80'inin overlerde bulunduğu görüldü. Bu nedenle overlerde kanamalı görünümdeki kistlere yaklaşımda endometriozis her zaman akılda tutulmalıdır.

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KAYNAKLAR

1. Laganà AS, Garzon S, Götte M, et al. The Pathogenesis of Endometriosis: Molecular and Cell Biology Insights. *Int J Mol Sci*. 2019;20(22):5615.
2. Falcone T, Flyckt R. Clinical management of endometriosis. *Obstet Gynecol* 2018;131(3):557-71.
3. Uysal G, Çağlı F, Aksoy H, et al. Endometrioziste Yeni Medikal Tedavi Yöntemleri. *Kafkas Med Sci* 2015;5(3):109-19.
4. Karadadaş N, Hurşitoğlu BS. Endometriozisli İnfertil Hastaya Yaklaşım. *Türkiye Klin Jin Obstet* 2012;5(2):86-91.
5. Acarkan T. Endometriozis. *Barnat* 2016;10 (1):5-8.
6. Makiyan Z. Endometriosis origin from primordial germ cells. *Organogen*. 2017;13(3):95-102.
7. Beşe T. Endometriozis ve Kanser. *Türkiye Klin Jin Obstet* 2010;3(3):85-91.
8. Vercellini P, Viganò P, Somigliana E, Fedele L. Endometriosis: pathogenesis and treatment. *Nat Rev Endocrinol* 2014;10(5):261.



9. Kuru O. Karın Duvarı Endometriozisi: Vaka Serisi ve Literatür Derlemesi. JGON 2019;16(1):1-3.
10. Saridoğan E, Saridoğan E. Endometriozisli Kadında İnfertilitenin Yönetimi. TJRMS. 2017;1(2):87-91.
11. Wang Y, Nicholes K, Shih IM. The Origin and Pathogenesis of Endometriosis. Annu Rev Pathol 2020;15:71-95.
12. Arslan B, Okyay RE. Endometriozis Tedavisi. Türkiye Klin Jin Obstet 2015;8(4):104-11.
13. Jeffrey D. Seidman BMR, le-Ming Shih,, Kathleen R. Cho aRJK. Epithelial Tumors of the Ovary. In: Robert J. Kurman LHE, Brigitte M. Ronnett, editor. Blaustein's Pathology of the Female Genital Tract. 7 ed. Switzerland: Springer; 2019. p. 934-5.



Aquaporin-1 and Aquaporin-3 Density Decreases in Meniscal Tissue During Aging: An Experimental Animal Study

Yaşlanma Sırasında Menisküs Dokusunda Aquaporin-1 ve Aquaporin-3 Yoğunluğu Azalır: Deneysel Bir Hayvan Çalışması

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ABSTRACT

Aim: The menisci plays a crucial role in absorbing shock and providing stability thanks to their particular anatomy and physiology. Menisci exhibit histological, biochemical, and morphological degenerative changes during the process of aging. Aquaporins (AQPs) are membrane water channels that regulate the water contents of cells. We compared expression of aquaporin1 (AQP1), aquaporin3 (AQP3), and type I collagen in the meniscal tissues of young and aged rats using immunohistochemistry.

Material and Method: In this study, 14 Wistar albino rats (180-400 g) were used. Animals were divided into two equal groups; Group I: two-month old animals (n=7), Group II: 18-month-old animals (n=7). Meniscal tissues were dissected and examined histopathological and immunohistochemical. After routine histological procedure, sections of 4-5 µm thickness were obtained and embedded in paraffin. Sections were stained immunohistochemically for AQP1, AQP3, and type I collagen with hematoxylin-eosin.

Results: Immunohistochemically, expression of AQP1, AQP3, and type I collagen were demonstrated in young and old rats. In aged rats, the number of fibrochondrocytes was too few and cracks were too many compared to young rats. It was found that the immunoreactivity of AQP1, AQP3, and type I collagen in meniscal tissues were significantly reduced by aging.

Conclusion: Our results suggest that expression of AQP1, AQP3 and type I collagen in meniscus tissue may be related to age.

Keywords: Menisci, aging, aquaporin 1, aquaporin 3, type I collagen, immunohistochemistry

ÖZ

Amaç: Menisküsler, özel anatomileri ve fizyolojileri sayesinde çok emiliminde ve stabilitenin sağlanmasında önemli rol oynarlar. Menisküsler yaşlanma sürecinde histolojik, biyokimyasal ve morfolojik dejeneratif değişiklikler gösterir. Aquaporinler (AQP'ler) hücrelerin su içeriğini düzenleyen membran su kanallarıdır. Genç ve yaşlı sıçanların menisküs dokularında aquaporin1 (AQP1), aquaporin3 (AQP3) ve tip I kollajen ekspresyonunu immünohistokimya kullanarak karşılaştırdık.

Gereç ve Yöntem: Bu çalışmada 14 adet Wistar albino sıçan (180-400 g) kullanıldı. Hayvanlar iki eşit gruba ayrıldı; Grup I: iki aylık hayvanlar (n=7), Grup II: 18 aylık hayvanlar (n=7). Menisküs dokuları diseke edildi ve histopatolojik ve immünohistokimyasal olarak incelendi. Rutin histolojik prosedürün ardından 4-5 µm kalınlığında kesitler alındı ve parafine gömüldü. Kesitler immünohistokimyasal olarak AQP1, AQP3 ve tip I kollajen için hematoksilen-eozin ile boyandı.

Bulgular: İmmünohistokimyasal olarak, genç ve yaşlı sıçanlarda AQP1, AQP3 ve tip I kollajen ekspresyonu gösterildi. Yaşlı sıçanlarda, genç sıçanlara kıyasla fibrokondrosit sayısı çok az ve çatlaklar çok fazlaydı. Menisküs dokularında AQP1, AQP3 ve tip I kollajenin immünoaktivitesinin yaşlanma ile önemli ölçüde azaldığı bulundu.

Sonuç: Menisküs dokusunda AQP1, AQP3 ve tip I kollajen ekspresyonunun yaşla ilişkili olabileceğini düşündürmektedir.

Anahtar Kelimeler: Menisküs, yaşlanma, aquaporin 1, aquaporin 3, tip I kollajen, immünohistokimya

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INTRODUCTION

The menisci are two oval (crescent shaped) fibrocartilages that rest medially and laterally between the tibial plateau and femoral condyles (1). These structures play a crucial role in load-bearing, shock absorption, stability and joint lubrication within the knee joint. Human meniscal tissue contains 72% water, 22% collagen, 0.8% glycosaminoglycans, and 0.12% DNA (2). Menisci modulate the complex biomechanics of the knee joint. This task becomes apparent when several conditions such as meniscal tears, partial and total meniscectomy, and meniscal degeneration lead to development or progression of knee osteoarthritis (OA) (3). Underlying mechanisms of pathophysiology in aging cartilaginous tissues have been recently studied with animal models.

Aquaporins (AQPs), now numbering 13 as known human AQPs, are members of a family of water channel proteins expressed throughout the human body. AQPs play a role in transporting water and small solutes in several kinds of tissues, they also act as water reserves depending on the type of the tissue (4). AQP1 is expressed all around the human body and can be selectively permeated by water. In addition to water, AQP3 transports glycerol and urea as well, therefore it is also named aquaglyceroporin. Mobasher et al. demonstrated expression of AQP1 and 3 in equine articular chondrocytes using immunohistochemistry, western blotting and quantitative flow cytometry (5). It was shown that AQP1 has major roles in degeneration of intervertebral discs with aging (6). Li et al. showed that AQP3 expression decreased with increasing age in both skin and normal human epidermal keratinocytes (7). Osteoarthritis (OA) is a complicated disease which involves the entire synovial joint. OA of the knee can be seen in older adults, the menisci exhibit degenerative changes too, and these alterations can be presented as tears on imaging tests.

About 70% of the wet weight of normal articular cartilage is water. Water transfer in articular cartilage is essential for a healthy cartilage environment (8). It has been well known that the amount of water decreases in the body by the aging process. However, the expression pattern of AQP1 and AQP3 of meniscal tissue in aged rats is unclear. Therefore, we aimed to investigate whether there were changes in expression of AQP1, AQP3, and type I collagen in meniscal tissue by aging.

MATERIAL AND METHOD

Animal Selection

In this study, 14 female Wistar albino rats (180-400 g) were used. Animals were divided into two equal groups according to their ages. Two-month old rats created Group 1 (n=7), and 18-month old rats formed Group 2 (n=7). Before the procedure, rats were kept at room

temperature (22±1°C) and 40-50% humidity. The light pattern was set as 12 hour day and 12 hour night. Eating and drinking was ad libitum. Physical examinations of rats were performed daily during the observation period, which lasted one week. This study was performed in an experimental research unit after the approval of University Local Ethics Committee (2014-HADYEK-49).

Sample Collection

Following anesthesia with ketamine/Xylazine (50/10 mg/kg), the animals were sacrificed via exsanguination. For immunohistochemical and histopathological examinations, the menisci were removed and fixed in 10% formalin solution. Following routine histological procedures, tissues were then embedded in paraffin.

Histological examination

After routine histologic follow-ups, meniscus tissues were embedded into paraffin blocks. 4-5 µm thick sections were taken from paraffin-embedded tissues and stained with hematoxylin-eosin (H&E) method. The stained sections were examined under a light microscope (Zeiss Axio Lab A1).

Immunohistochemistry

Immunohistochemical staining was performed according to previously described protocol with minor modification (5). 4-5 µm thick-serial sections taken from paraffin blocks were placed on polylysine coated microscope slides (Sigma-Aldrich, St. Louis, MO, USA) and incubated overnight at 56°C. Tissue sections were deparaffinized in xylene and rehydrated by passing through graded alcohol series. Then they were taken into distilled water and boiled in citrate buffer solution pH:6 in a microwave oven (600W) for 5 minutes for antigen retrieval. It was treated with H₂O₂ to prevent endogenous peroxidase activity. In order to prevent base staining, after treating with Ultra V Block (Ultra V Block, TA-125-UB, Thermo Fisher Scientific Inc., USA) solution, it was incubated with primary antibody (Aquaporin 1 rabbit polyclonal IgG, Abcam, ab-15080, California, USA; Aquaporin 3 mouse monoclonal IgG, Abcam, ab-125219, Cambridge, UK; Anti-collagen I antibody, Abcam, ab6308, California, USA) for 60 minutes. After primary antibody application, secondary antibody (biotinylated anti-mouse IgG, Diagnostic BioSystems, KP 50A, Pleasanton, USA) was applied for 30 minutes, streptavidin horseradish peroxidase was performed for 30 minutes and 3-Amino-9-ethyl carbazole (AEC) chromogen was applied and then counterstaining was performed with Mayer's hematoxylin. For the tissues prepared for negative control, phosphate buffered saline (PBS) was used instead of primer antibody and other steps were performed similarly. The tissues that were passed through PBS and distilled water were closed with an appropriate solution. The preparations were examined, evaluated and photographed under a research microscope (Zeiss Axio Lab A1).

Evaluation immunohistochemistry

Evaluation of the AQP1 and AQP3 immunohistochemical labeling was performed using H-SCORE analyses as previously described protocol (9). Immunohistochemical labeling of the menisci tissues were semi-quantitatively evaluated using the following categories: 0 (no staining), 1+ (weak but detectable staining), 2+ (moderate or distinct staining), and 3+ (intense staining). For each tissue, an H-SCORE value was derived as follows. First, the sum of the percentages of cells that stained at each intensity category was calculated, and then, that value was multiplied by the weighted intensity of the staining using the following formula: $H-SCORE = \sum Pi (i+1)$. In this formula, 'i' represents the intensity scores, and 'Pi' is the corresponding percentage of the cells. Five randomly selected areas were evaluated under a light microscope on each slide (40x objectives). Two investigators, who were not informed about the type and source of the tissues, determined the percentage of cells for each intensity within these areas at different times. The combined average score of both observers was used.

Type I collagen expression was evaluated immunohistochemically according to the method previously described by Kanter et al. (10). In this method, density of immuno-reactivity was evaluated at two sections for each animal, at 400x magnification, and using eight fields at each section. The evaluation was made according to the following classifications: absence (-), a few (+), medium (++), high (+++), and very high (++++).

Statistical analysis

Statistical analyzes was performed using IBM-SPSS 20 program. Data are presented as mean±standard deviation (SD). Independent-sample t test was used for comparing groups in terms of H-score values. $p < 0.05$ was considered statistically significant.

RESULTS

Histological findings

The meniscal tissue from young and aged rats were stained with hematoxylin-eosin (H&E) and examined by light microscopy (Figure 1A and Figure 1B). Meniscal tissue of young rats didn't show any pathological findings in meniscal tissue, although meniscal tissue of aged rats represented mild decrease in number of fibrochondrocytes and high number of cracks.

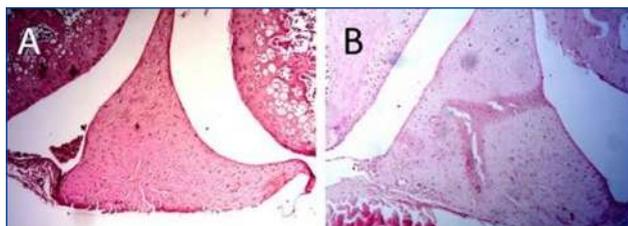


Figure 1. A) Hematoxylin and eosin (H&E) staining x10 of meniscal tissue of young rats. B) Hematoxylin and eosin (H&E) staining x10 of meniscal tissue of aged rats.

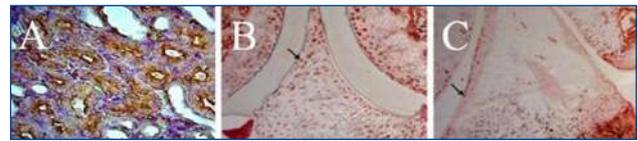


Figure 2. A) AQP1 positive control tissue staining section in the rat menisci. B) AQP1x10 meniscal tissue section in young rats. C) AQP1x10 meniscal tissue section in elderly rats. The tip of the arrows indicates the positive fibrochondrocytes stained with AQP1 antibody.

Immunohistochemical findings

Immunohistochemistry was used to show the localization of AQP1 and AQP3 in young and aged rats shown in Figure 3 and Figure 4.



Figure 3. A) AQP3 positive control tissue staining section in the rat menisci. B) AQP3 x10 meniscal tissue section in young rats. C) AQP3 x10 meniscal tissue section in elderly rats. The tip of the arrows indicates the positive fibrochondrocytes stained with AQP3 antibody.

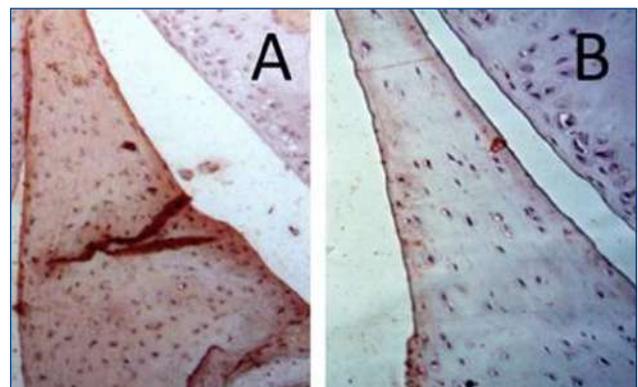


Figure 4. Immunohistochemical staining for type I collagen in meniscus tissues of rats x40. A) Type I collagen immunoreactivity in young rats. Arrow points to immunopositive staining. B) Type I collagen immunoreactivity in elderly rats. Arrow points to immunopositive staining.

H-SCORE analysis revealed that the staining intensity and the number of cells positively stained for AQP1 and AQP3 in menisci significantly decreased in aged rats. H score values presented in Figure 5.

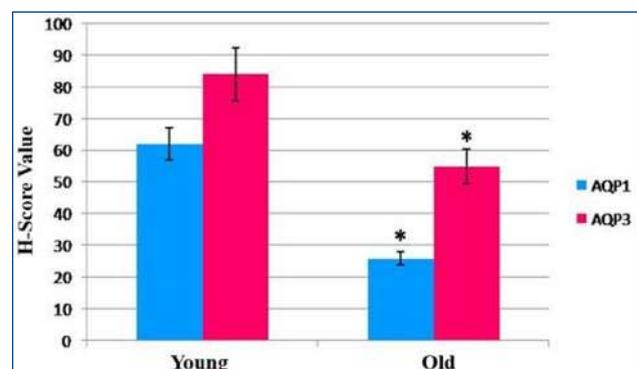


Figure 5. H-score values of AQP1 and AQP3 in young and elderly rats. The data are represented as mean±SD. * $p < 0.0001$, # $p = 0.001$ old rats versus young rats.



Positive control staining for AQP1 and AQP3 have been made (**Figure 2A – 3A**). When young and aged rats were compared, the AQP1 and AQP3 expression in the meniscal tissue were significantly lower in aged rats ($p < 0.001$) (**Figure 2B-C, 3B-C, 5**). In addition, the meniscal tissue of aged rats showed significantly decreased type I collagen immunoreactivity (+) ($p < 0.001$), whereas increased type I collagen immunoreactivity in young rats (+++) was observed (**Figure 4**).

DISCUSSION

Main functions of the menisci include buffering axial, rotational and shearing forces and protecting the cartilage (11). Meniscal cells are usually regarded as a cross between chondrocytes and fibroblasts, known as fibrochondrocytes. Therefore they display features of both fibroblasts and chondrocytes. These cells are essential for tissue homeostasis because they produce, maintain and/or degrade the extracellular matrix, a primarily composed type I collagen. Proteoglycans, elastin, water and other collagen types constitute the other matrix components (12). The high hydration rate and strong permeability of the meniscal tissue enables the transportation of nutrients and metabolic substances.

Aging is a physiologic process that continues lifelong and can lead to progressive changes in adaptation response to stress and functions of organs and systems. Aging causes degeneration of meniscal tissue and decreases the number of fibrochondrocytes (11,13). OA is a progressive disease involving all joint structures such as bone, cartilage, meniscus and synovial fluid. Underlying pathophysiology of the disease involves imbalance between production and breakdown of matrix components in the articular cartilage. This eventually leads to ongoing destruction of the tissue. At cellular and tissue level, cartilage in OA exhibits a lack of balance in matrix biosynthesis and degeneration. Aging is the most frequent risk factor of OA. Meniscal degeneration contributes to the development or progression of knee OA. During the aging process, the menisci degenerate at micro and macro levels and this leads to pain and dysfunction in the knee joint.

AQPs are widely expressed in the human body, especially in cell types in which fluid transport occurs, including epithelial cells in many organs. However it is also expressed in some cell types that do not involve fluid transport, such as adipocytes (14). AQP1 is permeable to water and O_2 . This inhibits rapid volume deformation under osmotic pressure and facilitates O_2 diffusion across the plasma membrane (6). AQP1 in chondrocytes favors a role for AQP1-mediated water transport across the synovial small vessels and the plasma membrane of chondrocytes in load-bearing joints (15). AQP3 plays a role

as a water channel to facilitate glycerol permeability and water transport across cell membranes (16). AQP3 is also highly expressed in several tissues such as renal, tracheal and bronchial and epithelial tissues, as well as choroid plexus, articular chondrocytes, subchondral osteoblasts and synovial epithelium in bone/cartilage tissue, expression of three distinct AQPs has been described: AQP1 and AQP3 in equine articular chondrocytes (5). AQP1 in human articular chondrocytes (17), and AQP9 in mouse osteoclast cells (18). Liang et al. reported that AQP1 expression in mouse articular chondrocytes results in high plasma membrane water permeability and increases chondrocyte migration and adhesion (19). Using AQP1 knock-out mice, this study shows for the first time that an AQP water channel in chondrocytes has a functional role. In many other cell types, AQP1 enhances cell migration, probably through its polarized distribution in lamellipodium and its co-localization with ion channels including Na^+/H^+ , Cl^-/HCO_3^- ; and Na^4/HCO_3^- . Fast fluid transfer through AQP water channels driven by ion transport increases lamellipodium movement, and this in turn leads to cell migration (20).

Lack of AQP3 is related with impaired corneal (21), and cutaneous wound (22) healing in mice, and with improper colonic epithelial cell proliferation in a mouse model of colitis (23). Immune cells express AQP3, and its deficiency in these cells in mice weakens the function of macrophages (24), and T cells (25). Since AQP3 has various roles, including both beneficial and deleterious, it would be very difficult to establish a feasible therapeutic window for an AQP3 modulator (26).

It has been known for a long time that water content decreases in the body with the aging process. In meniscal tissue, aging causes reduction of collagen tissue, fibrochondrocytes and water (27,28). It was reported that AQP1 expressed extensively in the body. It was shown that the expression of AQP3 decreases the degeneration tissue of the human lumbar disc (29). Tas et al. reported that AQP1 and AQP3 expression significantly decreased the nucleus pulposus and annulus fibrosus in aged rats compared to young rats (30). Kyung et al stated the relation between AQPs and extracellular matrix quality of knee hyaline cartilage (31). On the contrary, information about presence of AQP3 in meniscal tissue is limited. Besides, the effects of AQP1 and AQP3 on the pathogenesis of meniscal degeneration still remain unclear. Therefore in the present study, we aimed to evaluate whether AQP1 and 3 expression changes in the aging process. According to our knowledge, this study is the first in analyzing the AQP1 and AQP3 expression in meniscal tissue with aging.

Our data revealed that AQP3 expression exists in meniscal tissue. In addition, the expression of AQP1, AQP3, and type 1 collagen decreased significantly in aged rats compared to young rats.

CONCLUSION

Meniscal degeneration increases with aging. The decreased expression of AQP1 and AQP3 in meniscal tissue as a result of aging supported the fact that AQPs play an important role in meniscal degeneration and these may be initial factors in knee degeneration. These findings should be supported with further studies using different methods. Advances in research on therapeutic agents that regulate water permeation through AQPs have been helpful in treating the meniscal diseases.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Gaziosmanpaşa University Animal Experiments Ethics Committee (Decision No: 2014-HADYEK-49).

Referee Evaluation Process: Externally peer-reviewed.

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

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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.

REFERENCES

- King D. The function of semilunar cartilages. *J Bone Joint Surg* 1936;18:1069-76.
- Herwig J, Egner E, Buddecke E: Chemical changes of human knee joint menisci in various stages of degeneration. *Ann Rheum Dis*. 1984;43:635-40.
- Song Y, Greve JM, Carter DR, Giori NJ. Meniscectomy alters the dynamic deformational behavior and cumulative strain of tibial articular cartilage in knee joints subjected to cyclic loads. *Osteoarthritis Cartilage* 2008;16:1545-54.
- Takata K, Matsuzaki T, Tajika Y. Aquaporins: water channel proteins of the cell membrane. *Prog Histochem Cytochem* 2004;39:1-83.
- Mobasheri A, Trujillo E, Bell S, et al. Aquaporin water channels AQP1 and AQP3, are expressed in equine articular chondrocytes. *Vet J* 2004;168(2):143-50.
- Wang F, Zhu Y. Aquaporin-1: a potential membrane channel for facilitating the adaptability of rabbit nucleus pulposus cells to an extracellular matrix environment. *J Orthop Sci* 2011;16:304-12.
- Li J, Tang H, Hu X, Chen M, Xie H. Aquaporin-3 gene and protein expression in sun-protected human skin decreases with skin ageing. *Australas J Dermatol*. 2010;51(2):106-12.
- Kuettner KE, Aydelotte MB, Thonar EJ-MA. Articular cartilage matrix and structure: a minireview. *J Rheumatol* 1991;18:46-7.
- Ortak H, Cayli S, Ocaklı S, et al. Age-related changes of aquaporin expression patterns in the postnatal rat retina. *Acta Histochem*. 2013;115:382-8.
- Kanter M. Thymoquinone attenuates lung injury induced by chronic toluene exposure in rats. *Toxicol Ind Health* 2011;27(5):387-95.
- Pauli C, Grogan SP, Patil S, et al. Macroscopic and histopathologic analysis of human knee menisci in aging and osteoarthritis. *Osteoarthritis Cartilage*. 2011;19(9):1132-41.
- Musumeci G, Loreto C, Carnazza ML, Cardile V, Leonardi R. Acute injury affects lubricin expression in knee menisci: an immunohistochemical study. *Ann Anat*. 2013;195(2):151-8.
- Fisseler-Eckhoff A, Müller KM. (Histopathological meniscus diagnostic). *Orthopade*. 2009;38(6):539-45.
- Verkman AS, Anderson MO, Papadopoulos MC. Aquaporins: important but elusive drug targets. *Nat Rev Drug Discov* 2014;13(4):259-77.
- Mobasheri A, Wray S, Marples D. Distribution of AQP2 and AQP3 water channels in human tissue microarrays. *J Mol Histol* 2005;36:1-14.
- Zeuthen T, Klaerke DA. Transport of water and glycerol in aquaporin 3 is gated by H⁺. *J Biol Chem*. 1999;274(31):21631-6.
- Trujillo E, González T, Marín R, Martín-Vasallo P, Marples D, Mobasheri A. Human articular chondrocytes, synovial cells and synovial microvessels express aquaporin water channels; upregulation of AQP1 in rheumatoid arthritis. *Histol Histopathol*. 2004;19(2):435-44.
- Aharon R, Bar-Shavit Z. Involvement of aquaporin 9 in osteoclast differentiation. *J Biol Chem*. 2006;281(28):19305-9.
- Liang HT, Feng XC, Ma TH. Water channel activity of plasma membrane affects chondrocyte emigration and adhesion. *Clin Exp Pharmacol Physiol*. 2008;35(1):7-10.
- Bai C, Fukuda N, Song Y, Ma T, Matthay MA, Verkman AS. Lung fluid transport in aquaporin-1 and aquaporin-4 knockout mice. *J Clin Invest*. 1999;103(4):555-61.
- Levin MH, Verkman AS. Aquaporin-3-dependent cell migration and proliferation during corneal re-epithelialization. *Invest Ophthalmol Vis Sci*. 2006;47:4365-72.
- Hara-Chikuma M, Verkman AS. Aquaporin-3 facilitates epidermal cell migration and proliferation during wound healing. *J Mol Med*. 2008;86:221-31.
- Thiagarajah JR, Zhao D, Verkman AS. Impaired enterocyte proliferation in aquaporin-3 deficiency in mouse models of colitis. *Gut*. 2007;56:1529-35.
- Zhu N, Feng X, He C, et al. Defective macrophage function in aquaporin-3 deficiency. *FASEB J*. 2011;25:4233-9.
- Hara-Chikuma M, Chikuma S, Sugiyama Y, et al. Chemokine-dependent T cell migration requires aquaporin-3-mediated hydrogen peroxide uptake. *J Exp Med*. 2012;209:1743-52.
- Verkman AS, Anderson MO, Papadopoulos MC. Aquaporins: important but elusive drug targets. *Nat Rev Drug Discov*. 2014;13(4):259-77.
- Ghosh P, Taylor TK. The knee joint meniscus. A fibrocartilage of some distinction. *Clin Orthop Relat Res*. 1987;(224):52-63.
- Fox AJ, Bedi A, Rodeo SA. The basic science of human knee menisci: structure, composition, and function. *Sports Health*. 2012;4(4):340-51.
- Li SB, Yang KS and Zhang YT. Expression of aquaporins 1 and 3 in degenerative tissue of the lumbar intervertebral disc. *Genet Mol Res* 2014;13:8225-33.
- Taş U, Caylı S, Inanır A, et al. Aquaporin-1 and aquaporin-3 expressions in the intervertebral disc of rats with aging. *Balkan Med J* 2012;29:349-53.
- Kyung BS, Jung KW, Yeo WJ, Seo HK, Lee YS, Suh DW. Differential regulation of the water channel protein aquaporins in chondrocytes of human knee articular cartilage by aging. *Sci Rep*. 2021;11(1):20425.



The Effect of Risk Factors on Mortality in Central Line Associated Bloodstream Infections Developing in the Intensive Care Unit

Yoğun Bakım Ünitesinde Gelişen Santral Venöz Kateter İlişkili Kan Dolaşım Yolu Enfeksiyonlarında Risk Faktörlerinin Mortalite Üzerine Etkisi

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ABSTRACT

Aim: Central venous catheters (CVCs) are commonly used for treatment and monitoring in intensive care units. Despite its benefits, CVCs can also result in infectious complications. Central venous catheter associated-bloodstream infection (CVC-BSI) is one of the most common complications of CVC. The aim of the study is to examine the clinical features of CVC-BSIs developing in the intensive care unit and the risk factors affecting mortality.

Material and Method: From 2017 to 2021, a total of 245 patients aged 18 years and older who had developed CVC-BSI and had been admitted to all intensive care units of the hospital were retrospectively evaluated. Patient age, gender, comorbidities, length of stay in the ICU, ICU unit monitored, use of total parenteral nutrition (TPN), isolated microorganism, infection rate, and APACHE 2 score were evaluated.

Results: From 2017 to 2021, a total of 245 patients aged 18 years and older who had developed CVC-BSI and had been admitted to all intensive care units of the hospital were retrospectively evaluated. 171 of 245 patients were 65 years or older. There was a significant difference between being 65 years of age and older and mortality (p:0.002). There was a significant relationship between female gender and mortality (p:0.045). Fifty-seven patients (%32) had femoral catheters, 117 (%65.7) had subclavian/jugular catheters, and 4 (%2.2) had hemodialysis catheters. The study found no significant relationship between the site of CVC insertion and mortality (p:0.539). Likewise, no significant relationship was found between TPN use, secondary infection development, and mortality. While gram-negative bacteria were the most commonly isolated causative agents CNS (coagulase-negative staphylococcus) was the most commonly isolated microorganism in CVC-BSI.

Conclusion: Central venous catheter-related blood stream infections are common and life-threatening infections in intensive care units. It was found that this type of infections particularly increases mortality in female and geriatric patient groups. However, it was revealed that the APACHE 2 score, catheter site, and TPN use are not effective on mortality.

Keywords: Central venous catheter-related bloodstream infectin, Healthcare-associated infection, mortality, APACHE 2

ÖZ

Amaç: Santral venöz kateterler (SVK 'ler) yoğun bakım ünitelerinde tedavi ve izlem amacıyla yaygın olarak kullanılmaktadır. Yararlı etkilerine rağmen CVC enfeksiyöz komplikasyonlara yol açabilir. Santral venöz kateter ilişkili kan dolaşımı enfeksiyonu (SKİ-KDE), SVK' nin en sık görülen komplikasyonlarından biridir. Çalışmanın amacı yoğun bakım ünitesinde gelişen SVK-KDE'lerin klinik özelliklerini ve mortaliteyi etkileyen risk faktörlerini incelemektir.

Gereç ve Yöntem: Hastanemiz tüm yoğun bakım ünitelerinde 2017-2021 yılları arasında yatmış 18 yaş ve üzeri olan, SKİ-KDE gelişmiş 245 hastayı retrospektif olarak değerlendirdik. Hastaların yaş, cinsiyet, ek hastalık, yoğun bakım yatış süresi, takip edildiği yoğun bakım birimi, total parenteral nutrisyon (TPN) kullanımı, izole edilen mikroorganizma, enfeksiyon hızı, APACHE 2 skoru değerlendirildi.

Bulgular: 2017-2021 yılları arasında hastanenin tüm yoğun bakım ünitelerine başvuran, CVC-BSI gelişen 18 yaş ve üzeri toplam 245 hasta retrospektif olarak değerlendirildi. Hastalar 18-99 yaş aralığındaydı. 245 hastanın 171 tanesi 65 yaş ve üzerindediydi. 65 yaş ve üzeri olmanın mortaliteyle arasında anlamlı fark olduğu görüldü (p:0,002). Hastaların 129 (%52,6)'u kadın, 116 (%47,3) erkekti. Kadın cinsiyetle mortalite arasında anlamlı ilişki bulunmuştur (p:0,045). Hastaların 57'sinde (%32) femoral kateter, 117'sinde (%65,7) subklavian/juguler kateter, 4'ünde (%2,2) hemodiyaliz kateteri vardı. Çalışmada SVK'nin yerleştirildiği yer ile mortalite arasında anlamlı bir ilişki bulunamadı (p:0,539). Benzer şekilde TPN kullanımı, sekonder enfeksiyon gelişimi ve mortalite arasında da anlamlı bir fark bulunamadı. SKİ-KDE' de en sık izole edilen patojen gram negatif bakteriler iken, KNS (koagülaz negatif stafilokok) en sık izole edilen mikroorganizmaydı.

Sonuç: Santral venöz kateterle ilişkili kan dolaşım enfeksiyonları yoğun bakım ünitelerinde sık görülen ve yaşamı tehdit eden enfeksiyonlardır. Bu enfeksiyonların özellikle kadın cinsiyet ve yaşlı hasta gruplarında mortaliteyi artırdığı belirlendi. Ancak APACHE 2 skoru, kateter yeri ve TPN kullanımının mortalite üzerine etkili olmadığı saptandı.

Anahtar Kelimeler: Santral venöz kateter ilişkili kan dolaşımı enfeksiyonu, sağlık hizmeti ilişkili enfeksiyon, mortalite, APACHE 2

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INTRODUCTION

Central venous catheters (CVC) are widely used in intensive care units (ICU) and especially in critically ill patients. Considering the critical condition of patients, the use of CVC plays a vital role in hemodynamic monitoring. It allows the administration of intravenous fluids, antibiotics and other drugs, blood products if necessary, and total parenteral nutrition (TPN). Correlated with the increase in catheter use, the incidence of catheter-related bloodstream infections (CVC-BSI) is increasing yearly¹. The development of catheter-related bloodstream infection significantly affects the patient's hospitalization duration, mortality rates, hospital costs, prognosis of the disease and patient's life quality (1-3). Due to factors such as patients having chronic illnesses, broad-spectrum antibiotic use, prolonged hospital stays, and multiple invasive procedures, infections are more common in intensive care units. While the infection rate among patients in regular hospital wards is 5-10%, it is 20-25% in intensive care patients. On the other hand, the mortality rate is 53.6% (4,5).

Catheter use is the most common cause of infection (6). Despite many studies on catheter-related infections, the lack of data from developing countries such as Türkiye regarding intensive care units, primarily the surveillance of healthcare-associated infections (HAIs), including CVC-BSI, makes it mandatory to establish such surveillance.

The aim of the study is to examine the clinical features of CVC-BSIs developing in the intensive care unit and the risk factors affecting mortality.

MATERIAL AND METHOD

The study was approved by local ethics committee, dated on 21.11.2022 and with the registration number of 2022/024. From 2017 to 2021, a total of 245 patients aged 18 years and older who had developed CVC-BSI and had been admitted to all intensive care units of our Hospital were retrospectively evaluated. The diagnosis of Healthcare-Associated Infections was made based on the criteria of the Centers for Disease Control and Prevention and the National Health hospital care-Associated Infections Surveillance System. Infectious agents isolated from patients admitted to the ICU were identified using conventional methods and the VITEK2 Compact® (bioMérieux, France) automated system, while antibiotic susceptibility was determined by the disk diffusion method and automated system according to the Clinical and Laboratory Standards Institute (CLSI) criteria.

In patients with clinical signs and symptoms and no other infection focus except the central venous catheter, a diagnosis was made based on the growth of the same microorganism in blood culture samples

obtained from the catheter tip or a peripheral vein (7). The second infection episode that occurred in the patient and the microorganisms accepted as skin flora in the culture were not included in the study. Patient age, gender, comorbidities, length of stay in the ICU, ICU unit monitored, use of total parenteral nutrition, isolated microorganism, infection rate, and APACHE 2 score were evaluated.

Statistical Analysis

IBM SPSS v24.0 software was used for data analysis. Minimum, maximum, mean, and standard deviation were used to evaluate demographic data. Chi-square and Fisher's Exact tests were used to evaluate categorical data. Student t-test was used for the analysis of numerical variables. A one-way ANOVA test was used when comparing more than two groups. A p-value of less than 0.05 was considered statistically significant.

RESULTS

245 patients who developed CVC-BSI during a 4-year period between 2017 and 2021 were included in our study. The age range of the patients was 18-19. The age range is 70.4±17.4. 129 (52.6%) of the patients were female and 116 (47.3%) were male. 171 of 245 patients were 65 years or older.

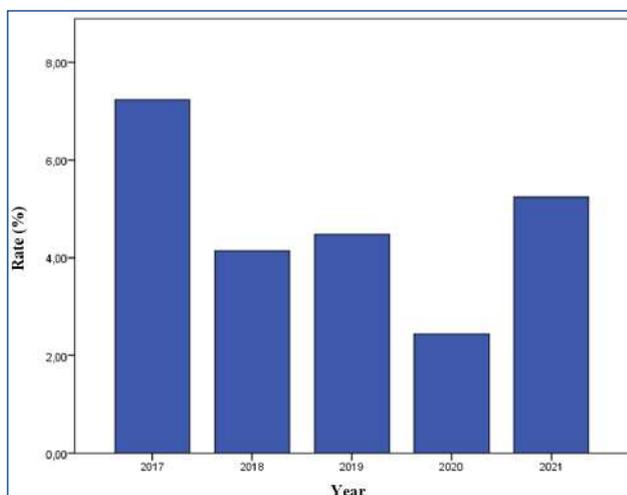
There was a significant relationship between older age and mortality (p:0.002). Demographic data and risk factors of patients diagnosed with CVC-BSI are shown in **Table 1**. There was a significant relationship between female gender and mortality (p:0.045). The CRBSI rates are reported as: the percentage of catheters that developed CRBSI; the number of CRBSIs per 1,000 catheter-days. Comparison of the densities of incidence per 1,000 catheter-days of CRBSI, and between the different accesses were done using regression analysis. The central catheter-associated infection rates for the years included in the study are shown in **Figure 1**. There was no statistically significant difference in infection rates between years (p: 0.406). Fifty-seven patients (%32) had femoral catheters, 117 (%65.7) had subclavian/jugular catheters, and 4 (%2.2) had hemodialysis catheters. The study found no significant relationship between CVC insertion site and mortality (p:0.539). Likewise, no significant difference was found between TPN use, secondary infection development, and mortality (**Table 1**). There was a significant difference between APACHE 2 score, TPN use, day of admission, development of the secondary Protocol and death (**Table 1**)

While gram-negative bacteria were the most commonly isolated causative agents, CNS (coagulase-negative staphylococcus) was the most commonly isolated microorganism in CVC-BSI. The isolated microorganisms and their survival status are shown in **Table 2**.

**Table 1. The clinical features of the patients and their relationship with mortality**

Variable	All (n: 245)	Surviving patients (n: 102)	Deceased patients (n: 143)	p
Age	70.4±17.4	65±18.9	74.3±15	<0.001*
Gender				0.045*
Female	129	46 (35.6%)	83 (64.3%)	
Male	116	56 (48.2%)	60 (51.7%)	
Geriatric status				0,002*
≥65 years	171	60 (35.1%)	111 (64.9%)	
<65 years	74	42 (56.8%)	32 (43.2%)	
Total Parenteral Nutrition Usage				0.581
Yes	118	47 (39.8%)	71 (60.2%)	
No	127	55 (43.3%)	72 (56.7%)	
Site of CVC insertion				0.539
Jugular/subclavian	117	56 (47.9%)	61 (52.1%)	
Femoral	57	26 (45.6%)	31 (54.4%)	
Hemodialysis	4	1 (25%)	3 (75%)	
Secondary infection development				0.496
Yes	4	1 (25%)	3 (75%)	
No	241	101 (41.9%)	140 (58.1%)	
The reason for hospitalization				<0.001*
CVD	53	31 (58.4%)	22 (41.5%)	
COVID-19	37	3 (8.1%)	34 (91.8%)	
Renal failure	25	10 (40%)	15 (60%)	
Trauma	23	15 (65.2%)	8 (34.7%)	
Pneumonia	20	9 (45%)	11 (55%)	
CHF	14	3 (21.4%)	11 (78.5%)	
General condition disorder	12	4 (33.3%)	8 (66.6%)	
Malignancy	8	6 (75%)	2 (25%)	
Sepsis	7	2 (28.5%)	5 (71.4%)	
Postoperative follow-up	6	1 (16.6%)	5 (83.3%)	
CAD	6	4 (66.6%)	2 (33.3%)	
Other neurological disorders	3	3 (100%)	0 (0.0%)	
Other	26	10 (38.4%)	16 (61.5%)	
Microorganism				0.126
Gram negative	112	40 (35.7%)	72 (64.2%)	
Gram positive	76	39 (51.3%)	37 (48.6%)	
Candida	57	23 (40.3%)	34 (59.6%)	

CVC: central venous catheter, CVD: cerebrovascular disease, CHF: congestive heart failure, COPD: chronic obstructive pulmonary disease, CAD: coronary artery disease. *: p<0.05

**Figure 1.** Catheter-related infection rates**Table 2. CVC-BSI causative microorganisms**

Microorganism	All	Alive	Not alive
CNS	60	29 (48.3%)	31 (51.6%)
<i>Candida nonalbicans</i>	45	17 (37.7%)	28 (62.2%)
<i>Acinetobacter baumannii</i>	38	8 (21.0%)	30 (78.9%)
<i>Klebsiella pneumoniae</i>	32	12 (37.5%)	20 (62.5%)
<i>Enterococcus faecium</i>	10	4 (40%)	6 (60%)
<i>Enterococcus faecalis</i>	9	4 (44.4%)	5 (55.6%)
<i>Pseudomonas aeruginosa</i>	8	3 (37.5%)	5 (62.5%)
<i>Staphylococcus aureus</i>	7	6 (85.7%)	1 (14.2%)
<i>Enterobacter cloaca</i>	3	1 (33.3%)	2 (66.6%)
<i>Klebsiella spp.</i>	3	0 (0.0%)	3 (100%)
<i>Acinetobacter lwafii</i>	3	1 (33.3%)	2 (66.6%)
<i>Serratia marcescens</i>	2	2 (100%)	0 (0.0%)
Other	7	6 (85.7%)	1 (14.2%)

CNS: Coagulase-negative staphylococcus CVC-BSI: Central venous catheter associated-bloodstream infection

DISCUSSION

Central venous catheter-related infections, particularly CVC-BSI, are common and life-threatening infections in intensive care units. In our study, it was found that this type of infection particularly increases mortality in female and geriatric patient groups. In our study, when examining the factors influencing the development of CVC-BSI in patients in the ICU, it was found that being over 65 years old and being female had an effect on mortality. It has been observed that there is a significant increase in mortality in the geriatric patient group (65 years and older) admitted to intensive care, especially compared to younger patients.

The rate of CVC-BSI in our intensive care unit is higher compared to the rate reported by the National Nosocomial Infection Surveillance Network (NNISN). In the study conducted by Meriç et al., the presence of comorbidity was not a risk factor for CVC-BSI development, but having more than two comorbid diseases was significant in terms of mortality (8). In the same study, the relationship between healthcare-associated infections and mortality in intensive care units of public hospitals was examined; being over 60 years old, having a high APACHE 2 score, and undergoing intubation and central venous catheterization were defined as risk factors. On the other hand, influential risk factors for the development of infection included staying in the ICU for more than seven days, receiving sedation, having a history of surgical intervention, and having respiratory failure. When the risk factors of device-related infections were examined, advanced age was found to be an important risk factor for CI-BSI (9). The most common comorbid disease in our study was cerebrovascular disease and there was no relationship with infection or mortality. In a study by Ahsen et al., cerebrovascular disease was the most common comorbid disease (10).

Immunosuppression, burns, TPN use, extreme ages, hospitalization for more than 3 days, femoral and jugular catheterization are reported as risk factors for CRBSI (11). In our study, a significant relationship between APACHE 2 score and mortality was not found. It is thought that the fact that only patients who developed CVC-BSI were evaluated in our study may have had an effect on this result. Knaus et al. showed a relationship between APACHE 2 score and mortality (12). In another study, CVC-BSI in intensive care patients was associated with total parenteral nutrition (TPN) use, increasing disease severity, and the number of days on mechanical ventilation (13). In catheter-related infections, there is an increase in infections when the catheterization period exceeds 5-7 days. Some studies have indicated that planned catheter replacement does not provide any advantage over

clinical indication-based replacement. However, as catheter tip colonization and bloodstream infections increase with the duration of catheterization, debates continue regarding planned replacement (14).

The rate of CVC-BSI ranges from 3-20%, depending on the catheter types used. On the other hand, it is still controversial which catheterization site carries a higher infection risk. Some studies indicate that the femoral entry site is more risky, while others indicate the jugular entry site (15,16). In the studies by Menteş et al., it was determined that subclavian catheterization is associated with a lower incidence of infection compared to other sites and carries a 2.5 times lower risk of catheter-related bacteremia than jugular catheterization (14). It was emphasized that the subclavian vein should be preferred over other catheter insertion sites to minimize catheter-related infections. The infection rate also increases in urgently applied catheters that remain in place for more than 72 hours (15,16). Lorente et al. found that the risk of developing CVC-BSI is higher in catheters inserted through the femoral vein (17). Other studies have also recommended minimizing the use of the femoral vein to prevent catheter-related bloodstream infections (18,19). However, in our study, despite the most commonly used catheter being inserted through the femoral vein, no significant difference was found between the catheter site and the development of infection. The virulence factors of microorganisms that cause CVC-BSI are essential in the development of catheter infections. Particularly, *S. epidermidis* and *P. aeruginosa* attach to the catheter through the adhesive glycocalyx "slime" factor and are protected in the host's defense cells (15). In our study, the most commonly encountered causative agents were *K. pneumoniae* and *S. aureus*, which had high virulence.

According to the Türkiye National Healthcare-Associated Infections Surveillance Network 2021 report, the rate of CVC-BSI in adult intensive care units has a weighted overall average of 2.9-6.7 per thousand (20). In our study, conducted between 2017-2021, the overall infection rate for all intensive care units was found to be 4.7, which falls within the average range for Türkiye. There was no significant difference in infection rates between the years.

CONCLUSION

Central venous catheter-related infections, particularly CVC-BSI, are common and life-threatening infections in intensive care units. It was found that this type of infection particularly increases mortality in female and geriatric patient groups. However, it was revealed that the APACHE 2 score, catheter site, and TPN use are not effective on mortality. It should be highlighted that it

is crucial to prevent these infections that can lead to mortality and morbidity. Therefore, placing the correct indication for central venous catheterization, following sterilization rules, knowing the common causative agent and initiating appropriate antibiotic therapy are essential factors that can be changed to prevent CVC-related infections.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Karatay University Faculty of Medicine Ethics Committee (Date: 21.11.2022, Decision No: 2022/024).

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.

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REFERENCES

- Pujol M, Hornero A, Saballs M, et al. Clinical epidemiology and outcomes of peripheral venous catheter-related bloodstream infections at a university-affiliated hospital. *J Hosp Infect.* 2007;67(1):22-9.
- Almuneef MA, Memish ZA, Balkhy HH, Hijazi O, Cunningham G, Francis C. Rate. Risk factors and outcomes of catheter-related bloodstream infection in a paediatric intensive care unit in Saudi Arabia. *J Hosp Infect.* 2006;62(2):207-13.
- L'Héritau F, Olivier M, Maugat S, et al. Impact of a five-year surveillance of central venous catheter infections in the REACAT intensive care unit network in France. *J Hosp Infect.* 2007;66(2):123-9.
- Karasu D, Yılmaz C, Durmuş G, et al. Assessment of Healthcare-Associated Infections in Critically Ill Patients Undergoing Prolonged Treatment in Intensive Care Units. *Clin J.* 2016;29(2):71-6.
- Cohen B, Saiman L, Cimiotti J, Larson E. Factors associated with hand hygiene practice in two neonatal intensive care units. *Pediatr Infect Dis J.* 2003;22(6):494-9.
- Henderson DK. Bacteremia due to percutaneous intravascular devices. In: Mandell GL, Bennett JE, Dolin R, eds. *Principles and Practice of Infectious Diseases* 4th ed. New York: Churchill Livingstone; 1995;2587-99.
- Horan T, Andrus M, Dudeck MA. CDC/NHSN surveillance definition of health-care associated infection and criteria for specific types of infections in the acute care setting. *Am J Infect Control* 2008;36(5): 309-32.
- Meriç M, Willke A, Çağlayan C, Toker K. Intensive care unit acquired infections: incidence, risk factors and associated mortality in a Turkish university hospital. *Jpn J Infect Dis.* 2005;58(5):297-302.
- Majumdar SS, Padiglioni AA. Nosocomial infections in the intensive care unit. *Anaesth Intensive Care Med.* 2012;13:204-8.
- Öncül A, Koçulu S, Elevli K. The epidemiology of nosocomial infections acquired in intensive care units of a state hospital. *MedBull Sisli Etfal Hosp.* 2012;46(2): 60-6.
- Kundakçı A, Özkalaycı Ö, Zeyneloğlu P, Arslan H, Pirat A. Risk Factors for Nosocomial Infections in a Surgical Intensive Care Unit. *J Turk Soc Intens Care.* 2014;12:25-35.
- Knaus WA, Draper EA, Wagner DP. APACHE II: A severity of disease classification system. *Crit Care Med.* 1985;13:818-29.
- Fridkin SK, Pear SM, Williamson TH, Galgiani JN, Jarvis WR. The role of understaffing in central venous catheter-associated bloodstream infections. *Infect Control Hosp Epidemiol.* 1996;17(3):150-8.
- Menteş Ö, Yiğit T, Harlak A, Şenocak R, Balkan M, Balkan A, ve ark. Catheter-Related Infections in a Surgical Intensive Care Unit. *Gülhane Med J* 2008;50:158-63.
- Hakyemez İN. Analysis of the frequency and risk factors of central venous catheter-associated infections. Specialization thesis. Istanbul: Okmeydanı Training and Research Hospital, Infectious Diseases and Clinical Microbiology. 2008.
- Pearson ML. Guideline for prevention of intravascular device-related infections. Part I. Intravascular device-related infections: An overview. The Hospital Infection Control Practices Advisory Committee. *Am J Infect Control* 1996; 24:262-77.
- World Health Organization. The burden of healthcare-associated infection worldwide. 2016. Retrieved from: http://www.who.int/gpse/country_work/burden_heai/en/ (Accessed March 10,2023)
- Lorente L, Henry C, Martín MM, Jiménez A, Mora ML. Central venous catheter-related infection in a prospective and observational study of 2,595 catheters. *Crit Care.* 2005;9(6):631-5.
- Timsit JF, Baleine J, Bernard L, et al. Expert consensus-based clinical practice guidelines management of intravascular catheters in the intensive care unit. *Ann Intensive Care.* 2020;7;10(1):118.
- Ministry of Health, Public Health General Directorate, Department of Communicable Diseases Presidency of the Republic of Türkiye. Summary Report on Standardized Equipment Use in Intensive Care Units in Türkiye 2021. Retrieved from: <https://inflow.saglik.gov.tr/> (Accessed March 10,2023).