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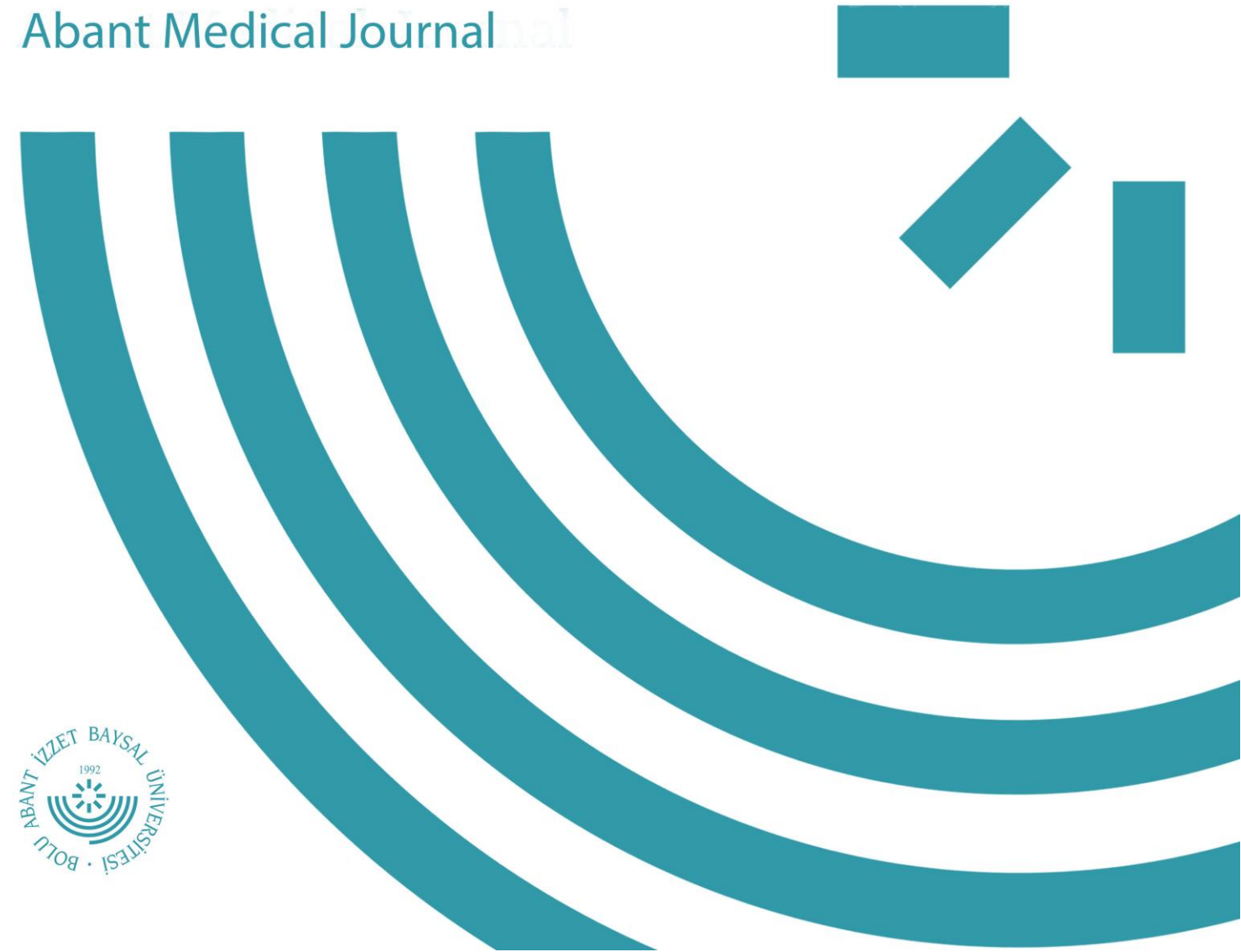

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Abant Tıp Dergisi

Abant Medical Journal

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Prognoses of Multicystic Dysplastic Kidney Patients: A Single Center Experience

Multikistik Displastik Böbrek Hastalarının Prognozları: Tek Merkez Deneyimi

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Abstract

Objective: In this study, it was aimed to evaluate the demographic characteristics and follow-up results of patients with multicystic dysplastic kidney (MCDK) in our pediatric nephrology clinic, based on the existing medical literature.

Materials and Methods: A retrospective analysis was conducted on the medical records of patients who presented to the Pediatric Nephrology Clinic at Selçuk University Faculty of Medicine between January 2011 and January 2022. The data of 21 patients diagnosed with MCDK were recorded and analyzed.

Results: Out of the total patients, 12 (57%) had left-sided MCDK, while 10 (43%) had right-sided MCDK. Three patients experienced urinary tract infections (UTIs). Among the patients with right-sided MCDK, one had a concurrent right ureterocele, and five showed hydronephrosis in the contralateral kidney. No urinary anomalies except MCDK were observed in the remaining patients. None of the patients exhibited proteinuria nor hypertension. Vesicoureteral reflux (VUR) was not detected in the five patients who underwent voiding cystourethrography. In the follow-up of the patients, MCDK was involuted in a mean of 16.2 ± 30.07 (1-107) months.

Conclusion: Multicystic dysplastic kidney in children has a good prognosis with conservative management. Periodic follow-up is important to prevent the potential development of hypertension or hyperfiltration injury.

Keywords: Multicystic Dysplastic Kidney, Survival, Childhood.

&

Öz

Amaç: Bu çalışmada çocuk nefroloji kliniğimizde multikistik displastik böbrek (MKDB) saptanan hastaların demografik özellikleri ve takip sonuçlarının literatür bilgileri eşliğinde değerlendirilmesi amaçlandı.

Gereç ve Yöntemler: Ocak 2011- Ocak 2022 yılları arasında Selçuk Üniversitesi Tıp Fakültesi Çocuk Nefrolojisi kliniğine başvuran hastaların dosyaları retrospektif olarak incelendi. Multikistik displastik böbrek (MKDB) tanısı alan 21 hastanın bilgileri kaydedildi ve analiz edildi.

Bulgular: Hastaların 12'sinde (%57) sol taraflı, 9'unda (%43) sağ taraflı MKDB mevcuttu. Üriner sistem enfeksiyonu (ÜSE) üç hastada görüldü. Sağ taraflı MKDB'si olan hastaların 1'inde sağ üreterosel, 5'inde karşı böbrekte hidronefroz mevcuttu. Diğer hastalarda MKDB dışında üriner anomali izlenmedi. Hastalarda proteinüri ve hipertansiyon tespit edilmedi. İşeme sistoüretrografi çekilen 5 hastada da vezikoüreteral reflü (VUR) tespit edilmedi. Hastaların izleminde MKDB ortalama 16,2 ± 30,07 (1-107) ayda involüsyona uğradı.

Sonuç: Çocuklarda MKDB konservatif yönetim ile iyi prognoza sahiptir. Hipertansiyon veya hiperfiltrasyon hasarının potansiyel gelişimini önlemek için periyodik takip yapılması önemlidir.

Anahtar Kelimeler: Multikistik Displastik Böbrek, Sağkalım, Çocukluk Çağı.

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Introduction

Multicystic dysplastic kidney (MCDK) is characterized as a non-hereditary manifestation of renal dysplasia, which frequently leads to organ dysfunction as a result of aberrant kidney development. It represents the most severe form of cystic renal dysplasia. Multicystic dysplastic kidney disease is one of the most common kidney abnormalities that can be identified during fetal ultrasound evaluation. It occurs in approximately one in 4300 live births (1). Typically, it presents unilaterally, with a predilection for the left side, and carries a favorable prognosis (2). However, the prognosis can substantially worsen in cases of bilateral involvement or conjunction with concurrent anomalies (3).

Although the underlying mechanisms governing the pathogenesis of these kidneys remain incompletely elucidated, they often exhibit spontaneous involution over time. Evidence from case series suggests that complete regression occurs in 60% of cases during the first five years of life (4, 5). In the absence of hypertension or neoplastic transformations, surgical intervention is generally not favored, and conservative surveillance proves sufficient (6).

The objective of this study is to determine the demographic characteristics and longitudinal outcomes of patients with MCDK who were followed up in our pediatric nephrology clinic in the last 10 years.

Materials and Methods

In this study, we conducted a retrospective analysis of the medical records of 21 patients who presented to the Pediatric Nephrology clinic at Selçuk University Faculty of Medicine between January 2011 and January 2022. The study was approved by the Selcuk University Local Ethics Committee (date: 01.03.2022 and approval number: 2022/120). The age and gender information of the patients were extracted from their respective medical files. Laboratory findings, including fully automated urinalysis, urine culture, and proteinuria levels, and results of antibiogram analyses were recorded. The presence of leukocyturia and significant bacteriuria (≥100,000 cfu/ml) observed in urine microscopy were utilized as diagnostic criteria for urinary tract infection. Proteinuria in the urine was deemed clinically significant if the spot urine protein/creatinine ratio exceeded 0.2 or if the 24-hour urine collection yielded protein levels above 4 mg/m2/hour. The diagnosis of the MCDK was based on urinary system ultrasonography (US) findings characterized by the presence of multiple cysts of varying sizes and the absence of normal renal parenchyma. Patients who presented with urinary tract infections and abnormal US findings underwent further investigation using Voiding cystourethrography (VCUG). Nuclear imaging results, encompassing Technetium-99m (Tc-99m) dimercaptosuccinic acid (DMSA) renal scintigraphy, diethylenetriaminepentaacetic acid (99mTc DTPA) renal scintigraphy, and mercaptoacetyltriglycine (MAG 3) renal scintigraphy, were meticulously documented. Blood pressure measurements were obtained using an oscillometric device. Measurements were taken on the right upper arm with a suitable cuff, in a sitting position (supine position in newborns) after resting for at least 5 minutes. Additionally, 24-hour continuous blood pressure monitoring data, obtained once a year, were recorded for comprehensive evaluation. The 24-hour, daytime, and nighttime mean systolic and diastolic BP readings, 24-hour mean arterial BP reading, systolic and diastolic BP loads in wake and sleep periods, the extent of dipping, and heart rate were analyzed. Blood pressure load is found by the ratio of systolic blood pressure and/or diastolic blood pressure measured by ABPM to the total number of measurements of those who are above 95p according to their age, gender, and height. Those with a blood pressure load of 25% or more were considered as hypertension.

Results

The files of patients with MCDK who applied to Selcuk University Faculty of Medicine between January 2011 and January 2022 were evaluated. Nine (43%) of the patients were female and 12 (57%) were male. Sixteen of the patients (76.2%) were diagnosed in the prenatal period. The mean age of the patients diagnosed in the postnatal period was 31.5 ± 36.5 months (2-81) and their complaints were vomiting and abdominal pain at the time of admission to the hospital. The patients were followed up for an average of 61,8±35.77 months (13-126). Twelve (57%) of the patients had left-sided, and 9 (43%) had right-sided MCDK. Urinary system infection (UTI) was seen in three patients. Right-sided MCDK was accompanied by a right-sided ureterocele in one patient, and hydronephrosis in the contralateral kidney in 5 patients. No urinary anomaly was observed in

other patients. Proteinuria and hypertension were not detected in the patients. Vesicoureteral reflux (VUR) was not detected in 5 patients who underwent voiding cystourography. Other patients did not undergo VCUG. In the follow-up of the all patients, MCDK was involuted in a mean of 16.2 ± 30.07 (1-107) months (Table 1).

Table 1

Demographic and clinical characteristics of patients diagnosed with unilateral MCDK

	Count	%
Sex		
Female	9	43
Male	12	57
Side		
Right	9	43
Left	12	57
Prenatal diagnosis		
Yes	16	76,2
No	5	23,8
UTI		
Yes	3	14,3
No	18	85,7
There is a urinary system anomaly	6	28,6
Ureterocele	1	4,8
Hydronephrosis	5	23,8
No urinary system anomaly	15	71,4
Involution Rate	21	100

Statistical analyses were performed using IBM SPSS statistical software version 22.0. The results were expressed as mean ± standard deviation (SD) (minimum-maximum) and percentages, ensuring a comprehensive and robust analysis of the data.

Discussion

Multicystic dysplastic kidney (MCDK) arises from aberrant metanephrosis differentiation, wherein the normal kidney tissue undergoes replacement by numerous cysts, undifferentiated epithelium, and primitive channels encapsulated by fibromuscular connective tissue (7). Although an underlying cause cannot be determined in most cases, 7-14% of patients have genetic disorders (1). They are known to be associated with the SALL1, HNF 1B, ROBO2, and CHD 1L gene mutations (8). Genetic or chromosomal abnormalities tend to elevate the likelihood of concurrent extrarenal abnormalities. Nevertheless, there exist case reports suggesting that MCDK may manifest due to intrauterine infections caused by agents such as adenovirus, cytomegalovirus, enterovirus, or as a consequence of the teratogenic effects exerted by antiepileptic medications like carbamazepine and phenobarbital (9, 10). In our study, genetic testing was regrettably omitted, however, there was no history of congenital infection or use of teratogenic drugs. Antenatal diagnosis holds paramount significance in safeguarding the contralateral kidney and enabling timely intervention in the presence of potentially associated urological anomalies. Moralıoğlu et al. reported the antenatal diagnosis rate as 94% in their study and as 50% by Kara et al. (11, 12). This rate was 76.2% in our study. This finding underscores the efficacy of perinatological follow-up in our institution.

Multicystic dysplastic kidney disease exhibits a higher prevalence in boys compared to girls, as supported by existing literature (12, 13, 14). Consistently, our study found a male-to-female ratio of 1.3/1, aligning with the literature. Similarly, MCDK was left-sided in 57% of patients in our study, in line with literature findings indicating a higher occurrence of MCDK on the left side (2, 15, 16). The prognosis is primarily influenced by the presence of additional anomalies and bilaterality, rather than the affected side, as bilateral involvement is often incompatible with life (3). Compensatory growth of the contralateral kidney begins during intrauterine life, but this growth is not observed in cases of contralateral kidney abnormalities, including rotational or positional anomalies, hypoplasia, areas of dysplasia, vesicoureteral reflux (VUR), ureterocele, ureteropelvic (UP) junctional stenosis, ureterovesical (UV) junctional stenosis, or genital abnormalities (5, 17). Studies indicate that 70-75% of MCDK cases are isolated and unilateral, while 25-30% are accompanied by genitourinary anomalies and a single functional kidney (1). Common urological anomalies in these cases involve VUR and urinary system obstructions (2, 18). The incidence of VUR in the contralateral kidney ranges from 5-26%, primarily consisting of low-grade (grades 1-2) VUR (5, 19). In our study, VUR was not detected in patients who underwent voiding cystourethrography (VCUG). However, in some cases, VCUG was not performed. The necessity of routine VCUG for all MCDK patients remains controversial. In the literature, VCUG is not recommended when two consecutive normal ultrasound examinations of the contralateral kidney are obtained, as the likelihood of detecting clinically significant VUR is low in such cases. Low-grade reflux associated with VUR is known to improve during the early stages of life (6, 20). However, some studies recommend VCUG only in patients with ureteral or pelvic dilatation, abnormal appearance of the contralateral kidney, or a history of symptomatic UTI (21, 22). The prevalence of UP junctional stenosis in the contralateral kidney varies between 1.1% and 13% in the literature, while ureterovesical junctional stenosis is reported to be present in 1-6% of cases (11, 19, 20). In our study, neither UP nor UV junctional stenosis was detected in patients, including those with hydronephrosis. Multicystic dysplastic kidney typically remains asymptomatic, with abdominal or flank pain and respiratory distress being rare symptoms resulting from the pressure effect of the abnormal kidney (15). Consistent with the literature, we found that only two of our patients presented with symptoms, one experiencing vomiting due to UTI and the other presenting with abdominal pain. Possible complications in patients with MCDK include UTIs, the development of malignancy, hypertension, and proteinuria. The incidence of UTIs in these patients has been reported to range from 2.5% to 34.7% (11, 23). This is particularly important in terms of the potential to cause damage to the contralateral kidney. Antibiotic prophylaxis is indicated, especially in cases accompanied by VUR in the contralateral kidney (12). In our study, the UTI rate was 14.3%, consistent with the literature (11, 12). Although mild hydronephrosis was present in the contralateral kidney of five patients, prophylaxis was not administered to any patient, as UTIs were not recurrent. While hypertension may not be observed in all MCDK patients, studies report a potential risk of hypertension in 17.7% of patients (5, 12). None of our patients exhibited hypertension. Blood pressure measurement, urinalysis to detect proteinuria, and kidney function tests including measurement of blood urea nitrogen and serum creatinine are recommended in the routine follow-up of patients, especially in children with anomalies in the contralateral kidney who are at risk of developing chronic kidney disease (5,24). Whittam et al. retrospectively reviewed a cohort of 84 patients, all of whom had Tc-99 m MAG3 or DMSA screening as a follow-up, and concluded that serial US has a high predictive value in diagnosis and that nuclear kidney scans do not provide additional benefit (25). The most recent recommendation in the literature is to follow-up patients with serial US rather than routine nuclear scanning, and nuclear scans should be used in the presence of indistinguishable US findings (26). In this study, we observed that nuclear imaging was frequently used in addition to serial US in the follow-up of the patients. In previous years, priority was given to nuclear imaging. This approach has declined in recent years. Resection of the multicystic dysplastic kidney is not recommended due to the lack of evidence supporting an increased risk of malignancy, particularly Wilms tumor, in MCDK. This assertion is supported by a systematic literature review encompassing 26 studies, which revealed no cases of Wilms tumor among 1041 children with unilateral MCDK (18). Furthermore, it is widely recognized that a majority of MCDK cases undergo spontaneous regression within the first year of life (4). Thus, surgical intervention was not pursued in any of our patients, as we observed involution in accordance with the existing literature, within an average time frame of 16.2 months.

Naturally, our study is subject to certain limitations, namely its retrospective design and the relatively small number of patients involved, which restricts the generalizability of our findings.

Conclusion

In conclusion, conservative management of MCDK in pediatric cases is associated with a favorable prognosis. Routine VCUG or prophylactic antibiotic administration is unnecessary. The incidence of UTIs in MCDK patients is not higher than that observed in the normal pediatric population. Serial ultrasound examinations typically suffice for monitoring purposes. Consequently, we propose a periodic follow-up schedule of every 6 months initially, transitioning to annual assessments for patients diagnosed with uncomplicated MCDK, aiming to detect and prevent potential complications such as hypertension or hyperfiltration-related renal damage.

Ethics Committee Approval: The study was approved by the Selcuk University Local Ethics Committee (date: 01.03.2022 and approval number: 2022/120).

Informed Consent: Consent was not obtained as it was a retrospective study.

Conflict of Interest: Authors declared no conflict of interest.

Financial Disclosure: Authors declared no financial support.

Author Contributions: Idea/Concept: İY.; Design: İY, HP; Supervision: HP; Funding: -; Materials: İY, HP; Data Collection/Processing: İY; Analysis/Interpretation: İY; Literature Review: İY; Drafting/Writing: İY.; Critical Review: İY, HP. The authors have accepted responsibility for the entire content of this manuscript and approved its submission.

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Interaction between the Caregiver Burdens and Spiritual Orientations of the Families of Children Receiving Home Care Services

Evde Sağlık Hizmeti Alan Çocukların Ailelerinin Bakım Veren Yükleri ve Manevi Yönelimleri Arasındaki Etkileşim

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Abstract

Objective: The permanent nature of possession of children receiving home care services (HCS) can represent a severe caregiver burden for parents. The purpose of this study was to examine the relationship between these parents' caregiver burdens and spiritual orientation.

Materials and Methods: The parents of 118 children receiving HCS participated in this cross-sectional, descriptive study. Data were collected using a Sociodemographic Information Form, the Spiritual Orientation Scale (SOS), and the Zarit Caregiver Burden Scale (ZCBS).

Results: The mother was the caregiver for 39.8% of the children receiving HHS, while both parents provided care for 55.9%. Income was lower than expenditure among 65.3% of caregivers, and 80.5% were housewives. The parents of children aged 1-6 years exhibited lower spiritual orientation levels and a higher caregiver burden than those with older children. Spiritual orientation levels were higher among parents with low education levels and income lower than expenditure.

Conclusion: Parents with high spiritual orientation scores were found to perceive a lower caregiver burden. This indicates the need for activities aimed at providing spiritual support for parents.

Keywords: Caregivers, Caregiver Burden, Home Care Services.

&

Öz

Amaç: Evde sağlık hizmeti (ESH) alan çocuklara sahip olmak bu durumun geçici olmaması ebeveynler için ciddi bakım yükü oluşturabilir. Çalışmada bu ebeveynlerin yaşadığı bakım yükü ile manevi yönelim arasındaki ilişkiyi incelenmesi amaçlamaktadır.

Gereç ve Yöntemler: Kesitsel tamamlayıcı çalışmaya 118 ESH alan çocuğun ebeveyni katılmıştır. Verilerin toplanmasında "Sosyodemografik Bilgi Formu", "Manevi Yönelim Ölçeği (MYÖ)", "Zarit Bakım Veren Yük Ölçeği" (ZBYÖ) kullanıldı.

Bulgular: Evde bakım hizmeti alan çocukların %39,8'nin bakım vereni sadece anne olup hem anne hem babanın bakım verme oranı %55,9 idi. Bakım verenlerin %65,3'nün geliri giderinden az, %80,5'i ev hanımı idi. Bir-altı yaş arası çocuğu olan ebeveynlerin daha büyük yaş grubunda çocuğu olanlara göre daha düşük manevi yönelim düzeylerine ve daha yüksek düzeyde bakım yüküne sahip oldukları belirlendi. Eğitim durumu düşük geliri giderinden az olan ebeveynlerin manevi yönelim düzeyleri yüksekti.

Sonuç: Araştırmada manevi yönelim puanı yüksek olan ebeveynlerin daha az bakım yükü algıladıkları ortaya çıktı. Bu bulgular ebeveynlere manevi destek sağlamaya yönelik etkinliklerin uygulanmasının gerekliliğini ortaya koymaktadır.

Anahtar Kelimeler: Bakım Veren, Bakıcı Yükü, Evde Bakım Hizmetleri.

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Introduction

An individual who cares for someone with difficulty in performing daily living activities due to a physical or mental disorder is known as a 'caregiver' (1). Disease survival times and average life expectancy have increased in line with advances in technology, the improvement of health services, and easier access to such services, and this has in turn led a rise in the numbers of individuals in need of care (2). Home care services (HCS) are a service provided by health personnel within the home for patients and relatives and are intended to increase patients' quality of life (3).

Children as well as adults receive HCS, and the concept of the caregiver is also an important one for these patients (3). Care services are not limited to providing medication and maintenance of treatment in terms of health, but also involve meeting personal care needs, such as washing and using the toilet. Despite entailing positive aspects such as increasing emotional communication with patients and providing psychosocial satisfaction, HCS also involve various downsides and difficulties (1,4). The physical and psychological health of parents must also be preserved while the child's needs are being met (5).

Studies have shown that the caregiver burden emerges as a multidimensional reaction resulting from psychological, physical, emotional, social, and economic problems deriving from caregiving (6). Adverse factors such as burnout-like states, a gradual decline in physical health, and depression may be seen because of long-term caregiving (6, 7).

HCS improves patients' quality of life by allowing them to live independently in their own living areas. Although the difficulties faced by the parents of children receiving this service are well-known, there are still gaps concerning effective strategies for overcoming them. The purpose of this study was to examine the relationship between spiritual orientations and the caregiver burden in parents of children receiving HCS. Examining the role of spiritual orientation in the context of difficulties encountered by the parents of these children, who may be described as 'special,' can yield valuable information for future research and play an effective role in meeting families' needs.

Materials and Methods

Pediatric patients registered with the HCS unit of a tertiary training and research hospital were included in this descriptive, cross-sectional study. The study was approved by the University of Samsun non-interventional Clinical Research Ethical Committee (date: 20.02.2023 and approval number: SÜKAEK-2023-4/8). Caregivers were contacted by telephone and informed about the aim of the study. Verbal consent was obtained from parents of children aged 0-18 registered with the HCS system and who agreed to participate. One hundred twenty-four parents of 181 patients registered with the HCS consented to take part. However, six parents were excluded due to deficient responses to questions or communication problems. Sample calculation performed using OpenEPI showed that 105 individuals would be sufficient with a 99.90% confidence interval and a 5% margin of error.

The first part of the research involved a sociodemographic information form investigating data such as age, sex, education, marital status, profession, number of years spent as a caregiver, the age of the child, presence of a diagnosed disease, and the number of drugs used.

The second part consisted of the Zarit Caregiver Burden Scale (ZCBS) developed in 1980 by Zarit, Reever, and Bach-Peterson. This 22-item scale is used to evaluate stress experienced by the caregivers of the elderly or others needing care. It employs a four-point Likert-type scale – never, rarely, often, or almost always (1). The reliability and validity study of the Turkish-language adaptation was performed in 2008 by İnci and Erdem (8). Possible scores range between 0 and 88, with higher scores indicating greater distress (1).

In the third part, the Spiritual Orientation Scale (SOS) was employed as a data collection tool. The SOS was developed by Kasapoğlu in 2015 for the purpose of evaluating the individual's spiritual orientations. A scale consisting of 16 items and a single dimension emerged as a result of validity and reliability studies. The lowest possible core on this seven-point Likert-type scale is 16, and the highest is 112. Higher scores indicate higher spiritual orientation (9).

Statistical Analyses

Statistical analysis was performed on Statistical Package for the Social Sciences for Windows version 20.0 software. Descriptive analyses were employed in data distribution and frequency analyses. Chi-square tests were applied to determine relationships between the caregiver burden and parameters such as patients' diagnoses, economic status, education levels, and the sex of the caregiver. Normality analysis was applied to continuous variables. Normally distributed data were analyzed using Pearson's correlation analysis and non-normally distributed data using Spearman's correlation analysis. The independent t-test was used to compare the means of two independent groups, and one-way analysis of variance (ANOVA) for comparing means of more than two independent groups. P values <0.05 were regarded as significant for all analyses.

Results

The parents of 118 children registered in the HCS system were included in the study. The mother alone was the caregiver for 41.6% of children receiving HCS, and both the father and mother for 56.9%. Mean ages were 30 ± 7.3 years (min 22, max 60) for the mothers and 41.2 ± 7.3 years (min 25, max 65) for the fathers. Thirty-nine percent of the participants were elementary school graduates and 18.6% were university graduates, while housewives represented the largest occupational group (80.5%). Analysis showed that 65.3% of parents regarded their income as lower than their expenditure. A chronic disease was present in 26.3% of the parents taking part in the survey. The mean age of the children receiving care was 10.4 ± 4.4 years (min 1, max 17). Analysis of causes of sequelae showed that 93.2% of patients had a congenital disease, the most common being cerebral palsy (34.7%).

Tracheostomy cannulae were present in 12.7% of the patients, and 7.6% were attached to a domestic-type ventilator. Percutaneous gastrostomy catheters were present in 5.1% of patients. In addition, 53.4% of the children receiving HCS were also receiving special education, and 43.2% were receiving physiotherapy exercises from a physiotherapist. Parents reported good oral hygiene at a level of only 32.2%, and 41.3% of patients were using four or more drugs. All recipients of HCS received a monthly home care support payment. The demographic data of the participants and the children receiving HCS are shown in Table 1.

Table 1

The Participants' Demographic Data

	N	%
Gender		
Male	64	45.8
Female	54	54.2
Special education		
Yes	63	53.4
No	55	46.6
Type of sequelae		
Congenital	110	93.2
Acquired	8	6.8
Individuals caring for the child		
Mother+Father	66	56.9
Mother only	49	41.6
Father only	3	2.5
Child's disease		
Cerebral Palsy	41	34.7
Metabolic Diseases	22	18.6
Congenital CNS deformities (Spina Bifida, CNS Defects/Microcephaly)	14	11.9
Refractory Epilepsy / Epileptic Encephalopathy	11	9.3
Chromosomal Diseases	10	8.5
Muscular Diseases (Duchene Muscular Dystrophy/Spinal Muscular Atrophy)	6	5.1
Post-Infection/Intoxication	5	4.2
Congenital Heart Diseases	4	3.4
Non-Vehicle Traffic Accident/Trauma	3	2.5
Chronic Pulmonary Diseases	2	1.7

Marital Status		
Married	115	97.5
Divorced	3	2.5
Duration of weekly care		
Certain days a week	2	1.7
Every day	116	98.3
Place of residence		
City	83	70.3
Outlying district	22	18.6
Small town-village	13	11.0
Education		
Elementary school	46	39.0
Middle school	20	16.9
High school	30	25.4
University and above	22	18.6
Employment status		
Mother+Father	8	6.8
Father only	85	72.0
Mother only	1	0.8
Both unemployed	24	20.3
Occupation		
Housewife	95	80.5
White collar	6	5.1
Self-employed	9	7.6
Health worker	3	2.5
Education/training	2	1.7
Private sector	3	2.5
Income		
Income less than expenditure	77	65.3
Income equal to expenditure	35	29.7
Income exceeding expenditure	6	5.1
Number of children in the home		
1	14	11.9
2	51	43.2
3	41	34.7
>=4	12	10.1
Home owner		
Yes	51	48.3
No	61	51.7
Presence of tracheostomy		
Yes	15	12.7
No	103	87.3
Domestic type ventilator		
Yes	9	7.6
No	109	
Percutaneous gastrostomy		
Yes	6	5.1
No	112	94.9
Number of drugs used		
0	16	13.6
1	16	13.6
2	15	12.7
3	22	18.6
4	15	12.7
5	14	11.9
6	9	7.6
>=7	11	9.1
Chronic disease in caregiver		

Yes	31	26.3
No	87	73.7
Physiotherapy		
Yes	51	43.2
No	67	56.8
Oral hygiene		
Yes	38	32.2
No	80	67.8

The present study examined the relationships between the sociodemographic features of the parents of children receiving HCS and their spiritual orientations and caregiver burden. The results showed that the parents of children aged 1-6 years had lower spiritual orientations than those of parents of children in the older age group (F= 3.288, p = 0.041) and a greater caregiver burden (F = 8.139, p=0.000). Mothers with a low level of education also exhibited higher levels of spiritual orientation (KW = 3.007, p= 0.033), but no significant association was observed with caregiver burden (KW=0.333, p=0.801) (Table 2). A high caregiver burden was also detected in the parents of children with sleep disorder (KW = 31.088, p= 0.000), but no significant difference was observed between their SOS scores (KW=0.573, p=0.565). Parents with income lower than expenditure registered low ZCBS scores (KW=3.337, p=0.039) and significantly high spiritual orientation scores (KW=3.188, p=0.045). Significant elevation in SOS scores was observed in the parents of children with good oral hygiene compared to those without (KW=5.177, p=0.025). Number of children, special education, performing physiotherapy exercises at home, and the presence of tracheostomy had no effect on the ZCBS or SOS. However, the families of children with percutaneous gastrostomy registered low ZCBS scores.

Table 2

Relationships Between Sociodemographic Findings and The SOS and ZCBS

	ZCBS		SOS	
	Mean+SD	Test (p)	Mean+SD	Test (p)
Child age group				
1-6 years	54.68±12.92	8.139 (.000)	64.92±13.99	3.288 (.041)
7-12 years	52.49±13.31		68.68±14.19	
13-17 years	43.54±11.63		73.59±13.30	
Maternal age group				
20-35 years	50.53±13.44	0.124 (.883)	69.02±13.16	0.104 (.902)
36-45 years	49.17±14.29		70.24±15.67	
46-60 years	49.77±10.79		69.10±11.33	
Education status				
Elementary school	48.52±13.84	0.333 (.801)	74.21±14.35	3.007 (.033)
Middle school	49.85±13.95		68.60±13.62	
High school	50.05±12.77		66.60±12.86	
University equivalent	52.00±13.41		65.13±13.78	
Number of children				
1	53.07±12.88	0.339 (.797)	65.57±11.67	0.575 (.632)
2	49.68±12.92		69.29±14.54	
3	48.95±14.96		70.85±14.95	
>=4	49.05±11.10		71.66±12.15	
Sleep disorder				
Yes	56.80±11.30	31.088 (.000)	62.03±11.76	0.573 (.565)
No	44.41±12.42		75.41±13.33	
Special education				
Yes	48.71±13.40	0.305 (.738)	71.39±12.39	2.145 (.148)
No	50.98±14.24		67.61±15.73	
Physiotherapy				

Yes	47.50±11.58	2.187 (.142)	71.17±12.38	0.895 (.346)
No	51.22±14.33		68.65±15.11	
Oral hygiene				
Yes	52.71±12.81	2.736 (.101)	65.42±12.99	5.177 (.025)
No	48.37±13.52		71.63±14.25	
Place of residence				
City	50.31±13.84	0.305 (.738)	68.74±12.62	0.573 (.565)
Outlying district	49.18±12.90		72.13±13.33	
Village	47.30±11.89		71.07±14.11	
Sex				
Male	50.25±12.62	0.177 (.675)	69.02±13.62	0.282 (.596)
Female	49.20±14.37		70.38±14.76	
Tracheostomy				
Yes	50.80±12.40	0.100 (.752)	67.73±13.75	0.310 (.579)
No	49.62±13.59		69.91±14.20	
Domestic-type ventilator				
Yes	51.24±12.36	0.145 (.518)	68.12±13.91	0.302 (.582)
No	49.81±13.64		69.27±14.09	
Percutaneous gastrostomy				
Yes	44.56±11.97	6.134 (.021)	73.86±14.27	2.102 (.155)
No	51.12±13.74		68.74±14.56	
Income				
Lower than expenditure	48.03±12.92	3.337 (.039)	71.37±14.13	3.188 (.045)
Equal to expenditure	51.71±13.72		67.88±12.74	
Greater than expenditure	61.16±12.38		57.50±16.59	

Abbreviations: SOS, Spiritual Orientation Scale; ZCBS, Zarit Caregiver Burden Scale.

Discussion

This study investigated the spiritual orientations and caregiver burden of parents of children receiving HCS.The woman generally assumes the primary role in the context of elderly individuals receiving HCS, with spouses or daughters acting as caregivers (10). Although this may vary depending on cultural and social conditions, children's caregivers are generally their mothers (11). The majority of caregivers in the present study were also mothers.

Ören et al. investigated the caregiver burdens of parents of disabled children and determined that maternal caregiver burdens tended to increase with age. In their investigation of the caregiver burden of mothers of children being treated in hospital, Beyzat et al. also determined a significant correlation between age and caregiver burden (12,13). However, maternal age and caregiver burden were negatively correlated in a study by Obrest et al. In contrast, caregiver burdens were parallel in all age groups in the present study (14). Although the caregiver burden was expected to rise with age, ZCBS scores in the present study were also high in younger mothers. Caring for a patient group receiving HCS may be more tiring and difficult. A study from Italy reported that parents devoted approximately nine hours a day to children receiving HCS, suggesting that providing intensive care is difficult and challenging for mothers from all age groups (15). In the present study, ZCGS scores were higher in the presence of percutaneous endoscopic gastrostomy. This may be due to the absence of feeding difficulties in the presence of percutaneous endoscopic gastrostomy, and to children feeding more easily.

In terms of primary diagnoses, neurological diseases, and particularly cerebral palsy, were markedly more common. This is consistent with a study of children receiving HCS from İzmir in Türkiye (16). These diseases are frequently seen in Türkiye due to the widespread nature of consanguineous marriages and persisting high rates of perinatal problems (17). In addition, the majority of neurological, metabolic, or genetic diseases

occurring at birth are progressive and irreversible, gradually leading to a decline in all body functions and causing children to become dependent on home care.

Interestingly, although most of individuals in a previous study were caring for patients receiving HCS seven days a week, the caregiver burden decreased as the number of days a week increased (18). The caregivers in the present study cared for their children seven days a week, for which reason no direct comparison was possible. The decrease in the caregiver burden may be associated with the strengthening of bonds with the individual concerned and increased experience on the subject of care provision.

Individuals' spiritual and religious needs are reported to increase in chronic diseases involving increased social support requirements (19). This derives from the unpredictable nature of the disease course and encourages a turning to spiritual matters to make one feel better and more positive (20). The parents of younger children in the present study exhibited low Zarit scores but high spirituality scores. The results of the study showed that there was no association between the carer's education level and the parent's caregiver burden, and that spiritual orientations were higher in parents with lower education levels. Other research findings have suggested no significant relationship between spiritual orientation and education levels (21). Individuals with poorer income levels exhibited lower ZCBS scores but higher SOS scores. Studies have reported that the presence of a disease that requires care increases the family's financial costs and the caregiver burden (22,23). The parents of children with life-restricting or threatening diseases usually have to change jobs. This results in emotional and physical difficulties expressed as the caregiver burden (24). Levels of spiritual well-being are regarded as a factor that facilitates adaptation to physical and psychological problems that lead to chronic diseases (25). High spirituality and a low caregiver burden among parents with low-income levels may be due to the profound and indubitable impact of placing one's faith in God in the face of overwhelming difficulties that leave one bereft of solutions (26). Shaw et al. reported that spiritual orientation can help parents cope better with traumatic experiences (27).

Being in the position of an involuntary and unplanned caregiver for their children leads to an adaptation process in parents (28,29). However, due to the permanent nature of this condition, parents have also been shown to experience anxiety and depression and a decrease in their psychological health (30,31). Even though the diseases and follow-up processes of children receiving care differ, it is more difficult for parents to raise children with special needs compared to their normally developing peers. This emphasizes the need to meet the spiritual support needs of parents primarily responsible for children with chronic diseases, such as those receiving HCS.

The present study has some limitations. First, patients receiving HCS and registered with our hospital were enrolled. The research was conducted with a sample including participants in the Samsun province of Turkey and is not representative of the general population. Biased responses may occur in all survey studies.

Conclusion

Being a parent caring for a chronically ill child represents a significant burden. It is important to identify the difficulties experienced by caregivers, to determine their caregiver burden, to provide the requisite social support to these children's caregivers, and to improve their quality of life in order for these patients to receive a better quality service and to better manage their diseases. This study observed a lower caregiver burden perception among mothers with high spiritual orientations. Various activities are therefore needed to provide spiritual support for these mothers.

Data Availability: All data generated or analyzed during the present study are included in this published article and supplementary information files.

Ethics Committee Approval: The study was approved by the University of Samsun non-interventional Clinical Research Ethical Committee (date: 20.02.2023 and approval number: SÜKAEK-2023-4/8).

Informed Consent: Caregivers were contacted by telephone and informed about the aim of the study. Verbal consent was obtained from parents of children aged 0-18 registered with the HCS system and who agreed to participate.

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Comparison of Antegrade and Antegrade/Retrograde Blood Cardioplegia Applications in Cardiac Surgery with Cardiopulmonary Bypass

Kardiyopulmoner Bypass Eşliğinde Yapılan Kardiyak Cerrahide Antegrad ile Antegrad/Retrograd Kan Kardiyoplejisi Uygulamalarının Karşılaştırılması

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Abstract

Objective: In the present study, it was aimed to determine the perioperative and postoperative early outcomes of coronary artery bypass grafting (CABG) operations with CPB by comparing intermittent antegrade and intermittent antegrade (Initial) combined with retrograde (Maintenance) blood cardioplegia applications.

Materials and Methods: 240 patients with similar characteristics who underwent CPB-guided CABG operation were included in the present study. Two groups were formed as Antegrade (Group 1) and Antegrade/retrograde (Group 2). In this context; the preoperative, intraoperative, and early postoperative results of the groups were compared.

Results: Gender, age, body surface area, flow, ejection fraction percentages, EuroSCORE and LMCA lesion presence values were similar in both groups (p>0.05). Cross-clamp time, total perfusion time, mean activated clotting time during CPB and perioperative drainage were similar in both groups (p>0.05). There was no statistically significant difference between the sodium, potassium, calcium, glucose, and lactate levels evaluated after CPB of the two groups (p>0.05). In addition, there was no statistically significant difference between the two groups in terms of defibrillation requirement, inotropic requirement, and IABP requirement after CPB (p>0.05).

Conclusion: Similar results were observed between antegrade cardioplegia alone and antegrade combined with retrograde cardioplegia in CPB-guided CABG operations. For this reason, we think that the antegrade cardioplegia technique alone will be more advantageous in terms of ease of application, not requiring additional invasive intervention, and eliminating the risks of the necessity of additional intervention. Furthermore, we think that the importance of case-based evaluation in cardioplegia techniques should not be ignored.

Keywords: Cardiopulmonary Bypass, Myocardial Perfusion, Antegrade, Retrograde.

&

Öz

Amaç: Bu çalışmada KPB eşliğinde koroner arter bypass greft (KABG) replasmanı yapılan vakalarda aralıklı antegrad ile aralıklı antegrad (Başlangıç) ardından retrograd (İdame) yoldan kan kardiyoplejisi uygulamalarını karşılaştırarak perioperatif ve postoperatif erken dönem etkilerini saptamak amaçlandı.

Gereç ve Yöntemler: KPB eşliğinde KABG replasmanı yapılan benzer özelliklere sahip 240 hasta dahil edildi. Antegrad (Grup-1) ve Antegrad/retrograd (Grup-2) olmak üzere iki grup oluşturuldu. Grupların preoperatif, intraoperatif ve erken dönem postoperatif sonuçları karşılaştırıldı.

Bulgular: Her iki grubun; cinsiyet, yaş, vücut yüzey alanı, flow, ejeksiyon fraksiyon yüzdeleri, EuroSCORE ve LMCA varlığı değerleri benzerdi (p>0,05). Her iki grubun; kross klemp süresi, total perfüzyon süresi, KPB sırasındaki ortalama etkinleştirilmiş pıhtılaşma zamanı ve perioperatif drenaj miktarı benzerdi (p>0,05). İki grubun KPB çıkışında değerlendirilen sodyum, potasyum, kalsiyum, glukoz ve laktat düzeyleri arasında istatistiksel olarak anlamlı fark yoktu (p>0,05). Ayrıca iki grubun KPB çıkışındaki defibrilasyon ihtiyacı, inotrop ihtiyacı ve İABP ihtiyacı arasında da istatistiksel olarak anlamlı fark yoktu (p>0,05).

Sonuç: KPB eşliğinde yapılan KABG replasmanı operasyonlarında tek başına antegrad kardiyopleji uygulama yöntemi ile antegrad ardından retrograd kardiyopleji uygulama yöntemi arasında, benzer sonuçlar saptandı. Bu nedenle uygulama kolaylığı ek invazif girişim gerektirmemesi açısından ve ek girişim gerekliliğinin risklerinin ortadan kalkması nedeniyle tek başına antegrad kardiyopleji uygulama yönteminin daha avantajlı olacağını düşünmekteyiz. Ayrıca kardiyopleji uygulama yöntemlerinde olgu bazlı değerlendirmenin önemi de göz ardı edilmemesi gerektiğini düşünmekteyiz.

Anahtar Kelimeler: Kardiyopulmoner bypass, Miyokardiyal Perfüzyon, Antegrad, Retrograd.

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Introduction

Ischemic heart diseases (IHDs) are among the leading causes of death worldwide (1). These diseases often require surgical treatment with the cardiopulmonary bypass (CPB) technique. Cardiac surgery with CPB has been performed for many years. Extracorporeal circulation techniques are used in CPB procedure. For this purpose, the functions of the heart and lungs are stopped and a heart-lung machine that performs artificial circulation and respiratory functions is used (2).

The heart-lung machine provides a bloodless field for cardiac surgery. The heart-lung machine contains an extracorporeal circuit that provides physiological support, in which venous blood is drained into a reservoir, oxygenated, and returned to the body using a pump. Teamwork between the surgeon, perfusionist and anaesthetist is crucial for a successful CPB administration. However, it is the responsibility of each area of expertise to reduce the complications that may occur and to develop strategies against them (3).

The myocardium must be protected since the heart is stopped during CPB. Therefore, various protection methods are applied. The most used and preferred ones are hypothermia and pharmacological techniques. In the pharmacological method, the heart is aimed to be protected with cardioplegia solutions. Besides, different solutions, components, and routes of administration have been developed to optimize myocardial protection with cardioplegia solutions. These include cold and warm blood and crystalloid solution via antegrade, retrograde or combined cardioplegia delivery approach (4). There is debate regarding the most appropriate cardioplegia application method in myocardial protection due to the variety of cardioplegia solutions, application methods and patient groups. In this study, we compared antegrade and antegrade/retrograde cardioplegia solutions in coronary artery bypass grafting (CABG) operations.

The aim of this study is to determine the early perioperative and postoperative effects of blood cardioplegia by comparing intermittent antegrade and intermittent antegrade (initial dose) and then retrograde (maintenance doses) blood cardioplegia applications in CPB-guided CABG operations.

Materials and Methods

A total of 240 patients who underwent CPB-guided CABG operation between 01.01.2019 and 30.08.2022 were retrospectively included in our study. A website was used to calculate the sample size of the groups (https://www.stat.ubc.ca/~rollin/stats/ssize/n2.html). The type I error rate was accepted as a maximum of 5%, while the type II error rate was accepted as a maximum of 20%. The effect size of the study was determined as ≥0.5. Case data, operative techniques, clinical and laboratory results (preoperative, intraoperative, and postoperative haematological and biochemical parameters) were reviewed retrospectively. Preoperative data, intraoperative data, and postoperative data were gathered from patient files and hospital records.

Ethical Approval

Approval from the local ethics committee was obtained before the related study (Ethics Committee of Harran University Clinical Research Ethics Committee with the decision dated 03.10.2022 and numbered HRU/22.19.14.). The study was conducted in accordance with the principles stated in the Declaration of Helsinki.

Exclusion and Inclusion Criteria

Patients treated with amiodarone before surgery, patients with a history of atrial fibrillation (AF) (preoperative AF and paroxysmal AF patients were excluded to determine the postoperative AF that may develop due to the application methods), patients with severe aortic valve insufficiency with valve pathology, those with moderate or higher mitral insufficiency or known systemic inflammatory disease, those who underwent emergency surgery or reoperation, chronic haemodialysis patients, those with acute coronary syndrome and concomitant congenital heart disease were excluded from the study. After applying the exclusion criteria, patients who underwent isolated CABG surgery consecutively with CPB and who did not undergo additional intervention were included in the study.

Creating Groups

In the present study, two groups were formed to evaluate the early effects of antegrade and antegrade/retrograde blood cardioplegia. Group 1 included 120 patients whom were used intermittent antegrade isothermal blood cardioplegia at 32°C. Group 2 included 120 patients whom were used intermittent retrograde blood cardioplegia at maintenance doses after the first dose of antegrade isothermal blood cardioplegia at 32°C.

Surgical Approach

Standard surgical techniques were used. After midline sternotomy, arterial cannulation was performed through the ascending aorta, and venous cannulation was performed through the right atrium with a two-stage venous cannula. Left internal mammalian artery graft was used for left anterior descending artery anastomosis in all cases. Saphenous vein was used as a graft for anastomosis of other coronary arteries. All patients underwent complete revascularization.

Inotrope Requirement

Inotropic agents were used for reasons such as low cardiac output syndrome and acute hypotension following coronary artery bypass surgery. The inotropic agents consisted of noradrenaline, dopamine and dobutamine.

Cardiopulmonary Bypass (Perfusion) Method

Patients' blood flow rates during extracorporeal circulation were determined according to body surface areas (2.4 lt/min/m2). An oxygenator and tubing set suitable for the patient's weight and appropriate cannula diameters according to body surface areas were used. Membrane oxygenator/tubing sets with integrated arterial filters were used. Tubing set venous line diameter was used as 1/2 and the arterial line diameter was used as 3/8. 32oC hypothermia was applied to all patients during extracorporeal circulation. Arterial line pressures were maintained on average between 150-180 mmHg during CPB. By providing adequate anticoagulation, the activated clotting time (ACT) was kept at 480 seconds and above. 1200 ml of balanced solution (Isolyte), 150 ml of 20% mannitol, 5000 units of heparin and 2 g of cefazolin were used as the prime solution.

Cardioplegia Solution

Isothermic blood cardioplegia solution (32oC) was used. The initial cardioplegia dose was administered as kgx15ml (full dose) as the solution amount, and the maintenance doses were administered as half dose (1/2). In the preparation of the cardioplegia solution, oxygenated patient blood taken from the extracorporeal circulation equipment was mixed with potassium chloride, magnesium, and sodium bicarbonate.

Statistical Analyses

Statistical analyses were performed using SPSS® 16.0 computer program. Mean and standard deviations were calculated for continuous and ordinal data. Kolmogorov Smirnov test and Shapiro-Wilk test were used to evaluate normal distribution. Student t test and Mann Whitney U tests were used to evaluate normal and non-normally distributed data, respectively. Frequency and percentage analyses were performed for nominal data and Chi Square test was used for comparisons. A p value less than 0.05 was considered statistically significant.

Results

In this study, the demographic data of the groups included gender, age, body surface area (BSA), flow, ejection fraction percentages (EF%), EuroSCORE values, presence of left main coronary lesion (LMCA=Left Main Coronary Artery) and CABG counts (Table 1), while intraoperative data included cross-clamp time, total perfusion time, mean activated clotting time (ACT) during CPB and perioperative blood drainage amount, which were similar with no statistically significant difference between the two groups ($p>0.05$) (Table 2). There was no statistically significant difference between the sodium, potassium, calcium, glucose, and lactate levels evaluated at the CPB output of the two groups ($p>0.05$) (Table 1). Moreover, there was no statistically significant difference between the two groups in terms of defibrillation requirement, inotropic requirement, and IABP requirement at CPB output ($p>0.05$) (Table 2).

Table 1
Preoperative Data

		Group 1 (n=120)	Group 2 (n=120)	P
Gender (n, %)	Male	76, (63.3%)	70, (58.3%)	0.254
	Female	44, (36.7%)	50, (41.7%)	0.509
Age (years) (Mean±SD)		73.05±3.55	71.33±6.73	0.333
BSA (m2) (Mean±SD)		1.88±0.17	1.89±0.18	0.812
Flow (lt) (Mean±SD)		4.48±0.42	4.49±0.43	0.989
EF% (Mean±SD)		47.16±8.42	46.79±8.37	0.702
EuroSCORE (Mean±SD)		4.55±1.43	4.57±1.41	0.825
LMCA (n, %)	NO	74, (61.66%)	71, (59.16%)	0.792
	YES	46, (38.33%)	49, (40.83%)	0.396
Number of CABGs, (n, %)	II	12, (10%)	14, (11.66%)	0.381
	III	63, (52.5%)	58, (48.33%)	0.517
	IV	38, (31.66%)	39, (32.5%)	0.985
	V	7, (5.83%)	9, (7.5%)	0.253

Mean±SD: Mean±Standard Deviation; **n, %:** Number, percent; **BSA**: Body Surface Area; **EF%**: Ejection Fraction; **LMCA**: Left main coronary artery lesion, **CABG**: Coronary artery bypass graft.

Table 2
Intraoperative and Postoperative Data

		Group 1 (n=120)	Group 2 (n=120)	P
Kross Clamp Time (Minute) (Mean±SD)		59.75±17.78	63.80±15.40	0.096
Total Perfusion Time (Minute) (Mean±SD)		85.43±23.84	91.01±23.81	0.121
Mean ACT (Seconds) (Mean±SD)		659.02±136.94	682.54±150.76	0.170
Perioperative Drainage Amount (ml) (Mean±SD)		179.88±23.02	181.17±23.50	0.373
CPB output Na (mEq/L) (Mean±SD)		140.62±3.36	140.06±4.05	0.063
CPB output K (mEq/L) (Mean±SD)		4.41±0.45	4.43±0.39	0.739
CPB output Ca (mg/dL) (Mean±SD)		8.74±4.74	8.78±4.71	0.733
CPB output Glucose (mg/dl) (Mean±SD)		176.64±54.60	174.24±60.10	0.491
CPB output Lactate (mmol/L) (Mean±SD)		1.56±0.88	1.86±1.28	0.104
Defibrillation Requirement (n (%))	NO	78 (65%)	71 (59.2%)	0.212
	YES	42 (35%)	49 (40.8%)	0.425
Inotrope Requirement (n (%))	NO	13 (10.8%)	16 (13.3%)	0.346
	YES	107 (89.2%)	104 (86.7%)	0.693
IABP Requirement (n (%))	NO	111 (92.5%)	109 (90.8%)	0.408
	YES	9 (7.5%)	11 (9.2%)	0.816
Postoperative Drainage Amount (ml) (Mean±SD)		1113.80±307.67	1135.00±313.86	0.568
Extubation Time (Hour) (Mean±SD)		6.99±2.33	6.57±2.81	0.141
ICU Length of Stay (Hours) (Mean±SD)		31.20±7.29	32.85±8.67	0.599

Mean±SD: Mean±Standard Deviation; **n (%):** Number, percent; **ACT**: Activated Clotting Time; **IABP**: Intra-aortic Balloon Pump; **ICU**: Intensive Care Unit; **Na**: Sodium; **K**: Potassium; **Ca**: Calcium.

Discussion

Today, in addition to hypothermia, the pharmacological arrest method with coronary perfusion (cardioplegia) is used to perform cardiac operations by stopping the heart and providing a still and bloodless environment. Thus, the heart is safely stopped, the continuity of energy production is ensured, and the harmful effects of ischemia on the heart are prevented (5,6). Cardioplegic solutions are currently accepted and applied solutions to protect the myocardium during aortic clamping (7). These solutions have been proven to be reliable by various experimental studies and are intended to be distributed to all parts of the heart with their administration routes. Nonetheless, the main focus today is on their composition, temperature, administration times and routes of administration (8-10).

In order to provide adequate myocardial protection, the cardioplegic solution should be distributed evenly to all areas of the myocardium. For this purpose, cardioplegia can be administered directly from the coronary ostium or aortic root as antegrade and retrograde from the ostium of the coronary sinus (11). In this study, we aimed to compare antegrade and antegrade combined with retrograde cardioplegia solutions in CABG patients.

Among the advantages of this study is that no significant difference was determined between the antegrade technique and the antegrade combined with the retrograde technique as a way of applying cardioplegia solutions for myocardial protection in cardiac surgery accompanied by CPB. In cardiac surgery, time planning and minimizing the time of the patient's connection to the extracorporeal circulation equipment (Heart-lung machine) is of great importance. In this regard, we think that it would be more advantageous to prefer the antegrade technique as the cardioplegia application method to save time.

Retrograde cannulation as a cardioplegia route of administration requires additional invasive intervention to the heart as it is performed with an additional entry through the right atrium. Due to this additional cannulation and decannulation, bleeding control time increases and even carries a significant risk of haemorrhage. We think that the retrograde route of administration may even be disadvantageous for these reasons.

Hirata et al. (12) aimed to evaluate the myocardial distribution of cardioplegia solution given as antegrade and retrograde in the same type of patients. In their study, they initially gave cardioplegia induction as an antegrade and then retrograde. They evaluated the intramyocardial distribution of the cardioplegic solution they gave to patients with heart valve disease and coronary artery disease using myocardial contrast echocardiography during surgery. They stated that the retrograde cardioplegia solution was less homogeneously distributed in heart valve patients and was not delivered to the middle part of the interventricular septum in two-third of the patients. They expressed that the transmural myocardial distribution in the anterior, lateral and posterior walls of the left ventricle was similar in both application methods. In coronary heart disease patients, they showed that the cardioplegia solution given retrogradely in the coronary collateral state associated with the complete occlusion of the coronary arteries was well delivered, however, the cardioplegia solution was not delivered through the antegrade route. They stated that delivery could not be achieved in both application methods to the areas with myocardial infarction. Consequently, they stated that planning strategies for myocardial protection have important effects, so knowing the exact anatomy of the coronary artery and vein of the patients is necessary and important in the administration of cardioplegia in the adequate way (12). In our study, we believe that there is no difference between the results of both methods, so it would be more accurate and important to evaluate and determine the cardioplegia application technique individually for each patient.

In some studies, it is also argued that there are advantages at different points related to both cardioplegia application techniques (13-14). In their study, Jiang et al. (13) compared antegrade and continuous retrograde del Nido cardioplegia in David I operation. As a result of their study, they found that Troponin I level (TnI), creatine kinase myocardium band level (CKMB), left ventricular ejection fraction (LVEF), ventilation times, length of intensive care unit stay and length of hospital stay were similar in both groups. Nevertheless, they found that the lactate level was slightly higher in the antegrade group compared to the retrograde group. They found that the incidence of heart block was higher in the retrograde group. As a result of their study, they stated that antegrade and continuous retrograde del Nido cardioplegia could be used safely and effectively in David I operation, but continuous retrograde del Nido cardioplegia was associated with higher transient AV block rate and lower lactate level that did not require permanent pacing (13). Brant et al. (14) investigated the effects of antegrade and retrograde perfusion protection on cardiac function in dogs after transplantation in their experimental study. As a result of their study, they stated that functional protection was superior in the antegrade group at the beginning, yet retrograde group's hearts functioned better after reperfusion (14).

Some studies argue that retrograde or antegrade and retrograde (combined) application techniques are superior to the antegrade application method alone (15-16). Cicek et al. (15) compared the effects of antegrade cardioplegia and antegrade-retrograde (combined) cardioplegia on inflammatory response and left ventricular systolic functions in coronary bypass surgery. In their study, they stated that the mean postoperative EF decrease was less in patients who were given cardioplegia with the combined method, and

that TNF-α levels were lower and other results were similar. As a result, they thought that co-administration of retrograde and antegrade cardioplegia was more advantageous in terms of myocardial protection than antegrade cardioplegia (15). Franke et al. (16) compared the effect of retrograde (29 patients) and antegrade (29 patients) crystalloid cardioplegia on troponin-I value in coronary surgery with elective coronary artery bypass grafting. In their study, they stated that a significantly higher cardiac troponin-I concentration was observed in the antegrade group 24 hours after the aortic cross-clamping. Therefore, they thought that retrograde cardioplegia was advantageous in myocardial protection in ischemic heart disease (16). Unlike the results of our study, we think that the fact that they state that the retrograde method is advantageous is due to the fact that the result at a certain time was evaluated in a limited number of patients and on a single parameter.

Lee et al. (17) compared different myocardial protection techniques in aortic stenosis. In their study, they compared three groups: combined antegrade and retrograde cold blood cardioplegia, antegrade crystalloid cardioplegia using histidine-tryptophan-ketoglutarate (HTK) solution, and retrograde cold blood cardioplegia. They established that they obtained similar early and late clinical results in all three groups (17). In this study, we think that different cardioplegic solutions used outside the application routes also have an effect on similar results despite different application methods. Therefore, we believe that the evaluation of different routes of administration (antegrade, retrograde and combined) will yield more general results in studies using the same cardioplegia solution in similar patient groups.

Lebon et al. (18) compared combined antegrade and retrograde cardioplegia with endovascular coronary sinus catheterized retrograde cardioplegia in minimally invasive mitral valve surgery. As a result of their study, they stated that retrograde cardioplegia alone provided comparable myocardial protection to combined antegrade and retrograde cardioplegia in minimally invasive mitral valve surgery, yet retrograde administration was not sufficient to achieve asystole in one-fifth of their patients (18). As seen in this study, it was observed that retrograde application alone was disadvantageous, and the combined method was superior. In our study, it was seen that there was no difference between the antegrade technique and the combined technique, and they showed similar results. Thus, the antegrade technique alone bears greater importance as it has fewer procedures and bleeding risks.

In their study, Kaukoranta et al. (19) evaluated myocardial protection during antegrade and retrograde cardioplegia. They compared patients with similar characteristics who underwent the elective CABG operation procedure. As a result of their study, they stated that the postoperative course was smooth in both groups, but retrograde mild hypothermic blood cardioplegia led to metabolic changes compatible with right ventricular ischemia, therefore, caution should be exercised when providing retrograde normothermic blood cardioplegia in patients with right ventricular hypertrophy, poor right ventricular function or severe preoperative myocardial ischemia (19). We also think that preoperative and other variables should be evaluated in the selection of cardioplegia application methods.

Ozbek et al. (20) compared intermittent antegrade and continuous retrograde isothermic blood cardioplegia applications after a single dose of antegrade in isolated CABG operations. In their study, they concluded that antegrade and retrograde cardioplegia, which are among the myocardial protection techniques used in patients who underwent isolated coronary artery bypass grafting, showed very similar results and both methods could safely provide myocardial protection (20). This study, which is similar to our study, supports our results.

The limitations of the present study are that it is single-center and retrospective. Moreover, only the cases with CABG operations were included in our study. We believe that the inclusion of more multi-center groups with different cardiac diagnoses and more patients in the study will yield more comprehensive results.

Conclusion

Similar results were found between antegrade cardioplegia alone and antegrade combined with retrograde cardioplegia in CPB-guided CABG operations. For this reason, we think that the antegrade cardioplegia technique alone will be more advantageous in terms of ease of application, not requiring additional invasive intervention and eliminating the risks of the necessity of additional intervention. We think that this method

will change daily clinical practice. In addition, we think that the importance of case-based evaluation in cardioplegia techniques should not be ignored.

Ethics Committee Approval: The study was approved by the Harran University Clinical Research Ethics Committee (date: 03.10.2022 and approval number: HRU/22.19.14).

Informed Consent: Consent was not obtained as it was a retrospective study.

Conflict of Interest: Authors declared no conflict of interest.

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A Retrospective Study on Kidney Transplant Recipients Diagnosed with COVID-19

Böbrek Nakli Alıcılarında COVİD-19 Deneyimi Retrospektif Çalışma

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Abstract

Objective: Solid organ transplantation may cause a predisposition to coronavirus disease-2019 (COVID-19) infections. In the present study, it was aimed to investigate the outcomes of kidney transplant recipients diagnosed with COVID-19.

Materials and Methods: In this retrospective cohort study, files of 1034 kidney transplant recipients from one center were reviewed. 95 of these patients had contracted COVID-19 between March 1, 2020, and March 31, 2021. In this context, patients were divided as survivors and non survivors. Statistical analysis was performed with a student-t test and p<0.05 was accepted as the threshold of significance.

Results: Related 95 patients with COVID-19, were males (58 (61%)). The mean age of all patients was 48.6 ± 11.2 years, and 31 of these patients had received cadaveric transplants (32.6%). Most symptoms were seen in similar frequency in the two groups, with fever in 31%, cough in 39%, myalgias in 59%, and diarrhea in 20%. On the other hand, while only 24% of the survivor group experienced dyspnea, all of the non-survivor group had dyspnea (p<0.05).

Mortality was 12.6% (12 patients). Non-survivors were older (55.89 ± 6.99 vs 47.56±11.33 years; p<0.05), in terms of a higher body mass index (28.8 ± 5.5 vs 25.5 ± 5.0 kg/m2; p< 0.05), more frequently having diabetes (50% vs. 30%; p< 0.05), with longer hospitalization durations (8.5 ± 10.6 vs 3.05 ± 5.93 days; p<0.01) than survivors. Besides, leukocytosis (15.24 ± 8.80 vs 7.13 ± 3.39 /mm3), increased liver function tests (ALT and AST (632 ± 1041 and 2722 ± 4662 vs 22.8 ± 16.8 and 23.3 ± 12.6 (U/L) p<0.001), increased ferritin (2301.3 ± 1349.1 ng/ml vs 898.4 ± 1007.6 ng/ml, p< 0.05), increased lactate dehydrogenase (554±305 vs 252±130 mg/dl, p<0.001), increased procalcitonin (1.310±1.285 vs 0.108±0.105 ng/ml, p<0.001) were more frequent in non-survivors. Estimated glomerular filtration rate levels were lower (11.12 ± 1.89 vs 50.75 ± 21.99 ml/min, p<0.05). Hemodialysis was required for all non-survivors and 2% of survivors. Survival was significantly lower in patients with cadaveric transplants (Kaplan Meier analysis; p<0.05).

Conclusion: Renal transplant recipients with COVID-19 experienced had an increase in terms of acute kidney injury and mortality in the present study. Furthermore, mortality was higher in cadaveric patients.

Keywords: Acute Kidney Injury, Coronavirus Disease 2019, Renal Transplant Recipients.

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Öz

Amaç: Solid organ nakli olanlar, Koronavirüs Hastalığı-2019 (COVİD-19) enfeksiyonlarına yatkın olabilir. Bu çalışmada COVİD-19 tanısı alan böbrek nakli alıcılarının sonuçlarının sunulması amaçlandı.

Gereç ve Yöntemler: Bu retrospektif kohort çalışmada, 1 Mart 2020 ile 31 Mart 2021 tarihleri arasında bir merkezden 95 böbrek nakli alıcısının dosyaları kullanıldı, 95'ine COVİD-19 tanısı konuldu. Hastalar hayatta kalanlar ve hayatta kalmayanlar olarak ayrıldı. İstatistiksel olarak student t testi yapıldı ve p<0.05 düzeyi anlamlı kabul edildi.

Bulgular: 95 hastanın 58'i (%61) erkek olup, yaş ortalaması 48,6±11,2 yıl, kadavra nakli yapılan 31 hasta (%32,6) vardır. Belirtiler olan ateş %31, öksürük %39, miyalji %59, ishal %20, genel olarak benzerdi; nefes darlığı hayatta kalanların %24'ünden olduğu halde hayatını kaybedenlerin tümünde mevcuttu (p<0,05). Mortalite 12 (%12,6) idi. Ölenler daha yaşlıydı 55,89±6,99 ve 47,56±11,33 (p<0,05), vücut kitle indeksi daha yüksekti 28,8 ± 5,5 ve 25,5 ± 5,0 kg/m2 (p< 0,05), diyabet %50 ila 30 (p< 0.05) daha belirgindi. Ölenlerde hastanede kalış süresi 8.5±10.6 güne karşılık 3,05 ± 5,93 gün (p< 0,01) daha uzundu.

Ölenlerde lökositoz 15,24 ± 8,80 ve 7,13 ± 3,39 /mm3, karaciğer fonksiyon testleri ALT ve AST 632 ± 1041 ve 2722 ± 4662 ila 22,8 ±16,8 ve 23,3 ± 12,6 U/L, (p<0,001), ferritin 2301,3 ± 1349,1 ve 898,4 ± 1007,6 ng/ml (p<0,05), laktat dehidrojenaz 554 ± 305 ve 252 ± 130 (mg/dl) (p<0,001), prokalsitonin 1,310 ± 1,285 ve 0,108 ± 0,105 ng/ml (p<0,001) artmıştır. Tahmini glomerüler filtrasyon hızı düzeyleri 11,12 ± 1,89'a karşılık 50,75±21,99 ml/dk (p<0,05) azalmıştır. Hayatta kalmayanların tümü ve hayatta kalanların %2'sinin hemodiyaliz ihtiyacı vardı. Kaplan Meier analizinde kadavra hastalarında sağkalım anlamlı olarak daha düşüktü (p<0,05).

Sonuç: COVİD-19'lu böbrek nakli alıcılarında akut böbrek hasarı ve mortalite oranı artmıştır, kadavradan nakilli hastaların sağkalımı daha düşük olmuştur.

Anahtar Kelimeler: Akut Böbrek Hasarı, Coronavirüs-19 Hastalığı, Böbrek Nakli Alıcıları.

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Introduction

Coronavirus disease 2019 (COVID-19) was first reported from Wuhan. Most clinical symptoms are similar to influenza, which include fever, cough, myalgia, dyspnea, diarrhea, anosmia, and taste problems. Co-morbidities may affect the defense against viral disease. Sepsis, pneumonia, acute respiratory distress syndrome, multi-organ failure, and eventually death may be seen in this disadvantaged group.

The first report on COVID-19 infections in renal transplant recipients is also from Wuhan, China, which documented 10% mortality (1 in 10 patients) (2). Solid organ transplant recipients may be more likely to experience severe COVID-19 infection, as they are on immunosuppressive treatment. It is well known that transplant recipients are more likely to contract COVID-19 infection and to experience a more severe disease. Knowledge of COVID-19 infections in kidney transplant recipients continues to increase. Those with a high mortality risk are the elderly and those with co-morbidities such as hypertension, cardiovascular disease, and diabetes mellitus (3).

As the disease is still prevalent worldwide, it is important to report all relevant COVID-19 data. We aimed to present the demographics and clinical features with outcomes of COVID-19 infection among a large number of renal transplant recipients at one center.

Materials and Methods

This study was designed as a retrospective cohort review of 1034 kidney transplant recipients in Acibadem Bursa Hospital registry, among whom 95 were found to have COVID-19 in between March 1, 2020 and March 31, 2021. The study was approved by the Acıbadem Mehmet Ali Aydınlar Üniversitesi Tıbbı Araştırmalar Değerlendirme Kurulu (date: 22.04.2022 and approval number: 2022-07/10). Patient demographics, clinical presentations, laboratory data, immunosuppressive medications, and treatment modalities, along with age, sex, weight, type of transplantation, primary kidney disease, presence of comorbid conditions, clinical outcomes and duration of hospitalization were determined.

Biochemical tests including kidney function tests, liver function tests, lactate dehydrogenase (LDH), D-dimer, ferritin, C-reactive protein (CRP), complete blood count, procalcitonin.

Statistical analysis was performed with SPSS-22 for Windows (SPSS Inc. Chicago IL, USA). The continuous variables were expressed as mean and standard deviation or as median and interquartile range, depending on the normality of distribution. The Mann–Whitney test was used to compare the variables that weren't normally distributed. Student's t-test was used to compare the variables with normal distribution. To compare the qualitative data, the chi-square test or Fisher's exact test (when chi-square test assumptions did not hold due to low expected cell counts) was used. Kaplan Meier analysis was used as a survival test. Survivor patients and non survivors were compared and $p<0.05$ level was used for statistical significance.

Results

The 95 renal transplant recipients who had COVID-19 had a mean age of 48.6±11.2 years, 58 (61%) males, 31 (32.6%) had received cadaveric transplants, 10 (10.5%) had primary renal disease with diabetes, 10 (10.5%) had glomerulonephritis, 6 (6.3%) had autosomal dominant polycystic kidney disease, 4 (4.2%) had amyloidosis, 5 (5.2%) had vesicoureteral reflux. Most symptoms were seen in similar frequency in the two groups, with fever in 31%, cough in 39%, myalgias in 59%, and diarrhea in 20%. On the other hand, while only 24% of the survivor group experienced dyspnea, all of the non-survivor group had dyspnea ($p<0.01$).

The mortality rate was 12.6% (12 patients). Non-survivors were older (55.89±6.99 vs 47.56±11.33 years; $p=0.015$) in terms of a higher body mass index (28.8 ± 5.5 vs 25.5 ± 5.0 kg/m2; $p=0.047$), more frequently having diabetes (50% vs. 30%; $p=0.005$), with longer hospitalization durations (8.5 ± 10.6 vs 3.05 ± 5.93 days; $p=0.009$) than survivors (Table 1).

Leukocytosis (15.24 ± 8.80 vs 7.13 ± 3.39/mm3), increased liver function tests (ALT and AST) (632 ± 1041 and 2722 ± 4662 vs 22.8 ± 16.8 and 23.3 ± 12.6 (U/L) $p=0.001$), increased ferritin (2301.3 ± 1349.1ng/ml vs 898.4 ± 1007.6ng/ml, $p=0.029$), increased lactate dehydrogenase (554 ± 305 vs 252 ± 130 (mg/dl), $p<0.001$), increased procalcitonin (1.310 ± 1.285 vs 0.108 ± 0.105 (ng/ml), $p<0.001$) were more frequent in non-survivors. Estimated

glomerular filtration rate levels were lower (11.12 ± 1.89 vs 50.75 ± 21.99 ml/min, p=0.004) (Table 2). Hemodialysis was required for all non-survivors and 2% of survivors. Survival duration was shorter in cadaveric transplant recipients, according to Kaplan Meier analysis (Figure 1).

Table 1
Baseline Demographics, Symptoms, And Comorbidities of Kidney Transplant Recipients With COVID-19

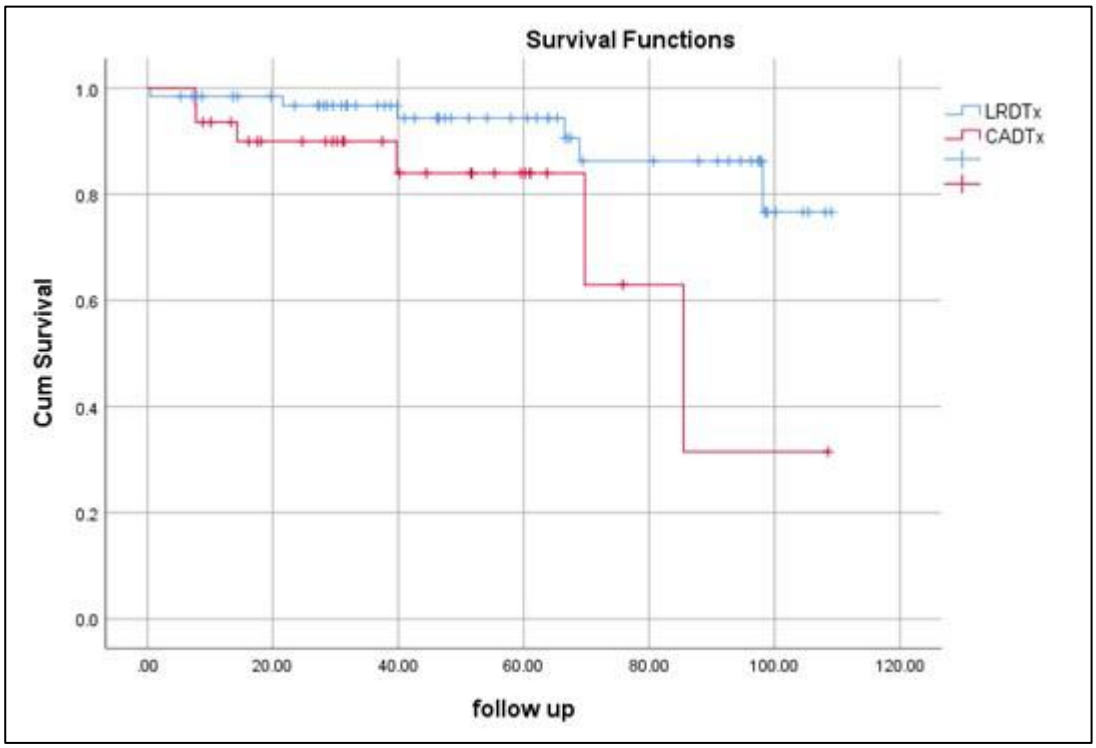
	Total (n:95)	**Survivors (n:83)**	**Non-Survivors (n:12)**	***p***
Age (years)	48.61±11.20	47.56 ± 11.33	55.89 ± 6.99	**0.015**
Height (cm)	166.4±10.30	165.9 ± 10.40	169.6 ± 9.38	0.262
Weight (kg)	72.11±16.08	70.26 ± 15.09	84.28 ± 17.78	**0.004**
BMI (kg/m2)	25.9±5.2	25.5 ± 5.0	28.8 ± 5.5	**0.047**
Male (%)	61	58	83	0.634
Cadaveric tx (%)	33	30	50	0.173
DM (%)	33	30	50	**0.005**
Heart disease (%)	23	22	33	0.377
HT (%)	37	35	50	0.317
Smoking (%)	28	29	25	0.781
Fever (%)	31	29	42	0.375
Cough (%)	39	42	17	0.244
Dyspnea (%)	34	24	100	**0.000**
Myalgias (%)	59	58	67	0.693
Diarrhea (%)	20	18	29	0.548
Chest radiographic findings consistent with viral pneumonia (%)	85	83	100	0.283
Favipravir (%)	95	94	100	0.550
Hospitalization (%)	40	36	75	**0.034**
Hospitalization days	3.74±6.87	3.05 ± 5.93	8.50 ± 10.7	**0.009**

BMI: Body mass index, **DM**: Diabetes mellitus, **HT**: Hypertension.

Table 2
Laboratory Data of Kidney Transplant Recipients With COVID-19

	Total (n:95)	**Survivors (n:83)**	**Non-Survivors(n:12)**	***p***
White-cell count (/mm3)	7.62±4.21	7.13 ± 3.39	15.2 ± 8.80	**0.001**
Lymphocyte count(/mm3)	15.4±11.1	16 ± 11.2	7.30 ± 7.11	0.193
Platelet count (/mm3)	231.4±82.7	236.7 ± 80.5	150.3 ± 89.2	0.080
ALT (U/L)	69.7±290.4	22.8 ± 16.8	632 ± 1041	**<0.001**
AST (U/L)	211.6±1232.5	23.33 ±12.6	2722 ±4662	**<0.001**
BUN (mmol/L)	34.43±24.50	31.02 ± 19.71	86.67 ± 36.07	**<0.001**
eGFR (ml/min)	47.70±23.67	50.75 ± 21.99	11.12 ± 1.89	**0.004**
Creatinine (mg/dl)	4.05±10.56	4.00 ± 10.92	4.71 ± 0.88	0.912
Ferritin (ng/ml)	1006.3±1083.7	898.4 ± 1007.6	2301.3 ±1349.1	**0.029**
D-dimer (µg/L)	86.2±295.1	93.6± 307.5	4.65 ± 4.03	0.624
C-reactive protein (mg/L)	15.43±39.07	15.32 ± 40.40	16.92 ± 4.34	0.946
Procalcitonin (ng/ml)	0.279±0.600	0.108 ± 0.105	1.310 ± 1.285	**<0.001**
Lactate dehydrogenase (mg/dl)	277±166	252 ± 130	554 ± 305	**0.001**
Creatine kinase (U/L)	156.9±357.4	46.40 ± 40.86	451.7 ± 673.4	0.094

ALT: Alanine aminotransferase, **AST**: Aspartate aminotransferase, **BUN**: Blood urea nitrogen, **eGFR**: Estimated glomerular filtration rate.



LRDTx: Living related donor transplantation, **CADTx**: Cadaveric donor transplantation.

Figure 1. Survival Functions

Discussion

The present study includes a relatively large number of patients. The mortality rate of COVID-19 in renal transplant recipients is high and essentially connected with old age, obesity, diabetes mellitus, presence of dyspnea, high inflammatory biochemical markers, and cadaveric transplant recipients.

In this study, patients were predominantly male and were in the 5th decade, having mostly primary renal diseases, diabetes, glomerulonephritis, autosomal dominant polycystic kidney disease, amyloidosis, and vesicoureteral reflux. In a report from USA Montefiore Medical Center in New York, Akalin et al. reports 26 renal transplant recipients with COVID-19, of which 72% were males, with a median age of 60 years, 94% with hypertension, 69% with diabetes, and 75% had received a deceased donor kidney (4). In the international TANGO consortium of 144 patients, including renal transplant recipients presenting with COVID-19 in twelve centers, 66% were males, aged 62 years and causes of original kidney disease included diabetes mellitus in 30%, glomerulonephritis in 17%, hypertension in 14%, and polycystic kidney disease in 9%. Most patients (78%) had a cadaveric kidney transplantation (5).

In the present study which included 95 patients, 61% male and a mean age of 49 years, cadaveric transplantation 32.6%, primary renal disease with diabetes 10.5%, glomerulonephritis 10.5%, autosomal dominant polycystic kidney disease 6.3%, amyloidosis 4.2%, vesicoureteral reflux 5.2%. Symptoms were similar overall; fever 31%, cough 39%, myalgia 59%, and diarrhea 20%, but all non-survivor group had dyspnea than 24% of the survivor group significantly.

Generally, clinical findings of COVID-19 included cough and dyspnea as respiratory symptoms and at least 2 of new deficiencies of taste or smell, sore throat, headache, myalgia, chills, fever and diarrhea. Diarrhea was especially more frequent in renal transplantation patients (6). More than 80% of patients showed only mild symptoms or no symptoms at all. In hospitalized patients 50% need oxygen supplementation and 20-25% experience conditions like respiratory failure, and intubation, systemic shock, multi-organ failure (7). Incubation periods may range from 2 to 14 days. Most of the complications occur within 12 days (8).

Mortality rates may be higher at the beginning of the pandemic due to insufficient number of tests, initial results of Johns Hopkins Coronavirus Resource Center (https://coronavirus.jhu.edu/map.html) were 8-15% to nowadays 3% in the United States and would be much lower (9).

In the general population of COVID-19 patients' autopsies from lungs unique microvascular findings revealing significant injury of endothelium were found. Microangiopathy and thrombosis were seen in respiratory tract pathology, and microthrombus formation in the kidney, heart, brain and limbs was also described (10). Macrophage activation and cytokine storm lead to release of tissue factor and coagulation factors activation, and finally a multisystem inflammatory syndrome may be seen (11).

In the present study, COVID-19 symptoms at admission were myalgia, cough, dyspnea, fever, and diarrhea. There were no significant differences in the frequency of symptoms among survivor and non-survivor groups, except dyspnea which was present in all patients in the non-survivor group. Akalin et al found initial symptoms as fever in 58%, and diarrhea in 22% of patients. Stable patients without respiratory system symptoms (22%) were followed in outpatient clinic (4). The predominant constitutional symptoms on admission were high fever, dyspnea (67%), followed by myalgia (53%) and diarrhea (5). The classical symptoms of viral disease may seem less severe in renal transplant recipients due to immunosuppressive medications.

We found that all non-survivors had dyspnea. Hypoxia and dyspneic condition in COVID-19 was found to be a mortality risk factor in various studies (6, 12, 13). In the present study, 12 of 95 patients have died, with a mortality rate of 12.6%. Some transplant centers in New York reported mortality and hospitalization rates as 13%–30% and 32%–100%, respectively. Italy, Spain, and France mortality rates were between 19% to 50% (12-18).

A review conducted with 10926 COVID-19 patients pointed out solid organ transplantation as a mortality risk factor with an odd ratio of 6 (20), while another study compared transplant patients (38 kidneys and 9 non-kidney organs) with 100 hospitalized non-transplant controls and did not find a correlation between transplantation and death (21). Supporting this, in a multicenter cohort study including over 4000 adults and investigating admission to intensive care units with COVID-19, Molnar et al found that mortality within 4 weeks of ICU hospitalization was similar in transplant and non-transplant patients (22).

In the present study, non-survivors were older, higher body mass index scores, with diabetes, and had a longer hospitalization time. Factors associated with higher mortality in the literature include advanced age, diabetes, obesity, weakness, chronic heart, kidney and lung disease, and longer duration of dialysis (19). Mortality predictors were reported as lymphopenia, increased d-dimer, IL-6, procalcitonin, C-reactive protein, ferritin, and lactate dehydrogenase (18).

In the present study, significant increases in leukocyte counts, liver function tests (ALT and AST), ferritin, lactate dehydrogenase and procalcitonin values were found in the non-survivors group, in comparison with the survivors.

Although the mortality rate is higher in males, female patients during SARS-CoV-2 infection can achieve a significantly stronger T-cell activation than male patients (23) In our study mortality rates were the same among male and female gender.

Development of acute kidney injury in coronavirus patients my occur via several mechanisms. The infection may directly harm kidney cells. SARS-CoV-2 uses ACE-2 as a cell passage receptor (24), and in humans, ACE-2 is expressed in renal proximal-tubular cells and podocytes (25, 26). COVID micro-particles were detected in proximal tubular cells and podocytes in a post-mortem kidney pathology study in 26 coronavirus patients from China; those micro-particles were consistent with diffuse intense renal-proximal tubular injury and periodic vacuolation of podocytes (27). SARS-CoV-2 viral micro-particles additionally are recognized in persistent blood, with a normal time of a few weeks between infection identification in the blood and AKI. It can be suggested that just renal contamination may be a key cycle forcing the occurrence of this high-risk condition (28, 29). One study discovered that SARS-CoV-2 may also enter target cells that deplete CD 147, which is extraordinarily delivered in the kidneys, as a cell surface receptor (30, 31). Sepsis likely is one of the main etiological conditions of AKI in those sick patients (32) and is normal in perished Coronavirus patients. To be sure, about 20% of seriously hospitalized Coronavirus patients had viral sepsis and deep respiratory

distress syndrome (ARDS) (33). Advancement of AKI could be seen in severe sepsis and hypoxia associated with acute tubular necrosis and various hyperinflammation conditions (34). This hyperinflammation is directly related to cytokine release syndrome (CRS), which leads to intra-renal aggravation and expanded vascular porousness (35). CRS was detected in Coronavirus patients, with especially increased levels of IL-6 (36). Organ crosstalk may likewise oversee AKI pathogenesis. To be sure, ARDS and related hypoxemia, irritation, and intubation could lead to the debasement of renal hemodynamics and usefulness (37). Annat et al (38) tracked down filtration that continuous positive pressure ventilation was enough to diminish pee yield, glomerular filtration rate, and renal blood flow, possibly causing AKI. Medication or hyperventilation-related rhabdomyolysis can likewise bring about rounded poisonousness. Investigations of Coronavirus diagnosed patient kidney pathology have proposed that rhabdomyolysis might be an infectious condition as confirmed by the pigmented projects filled tubules and expanded degrees of creatine phosphokinase (27). At last, various pathogenic elements are probably going to add to the frequency and seriousness of AKI in patients experiencing Coronavirus. In the present study, renal transplant recipients with COVID-19 were found to have an increased rate of acute kidney injury and that survival was lower in cadaveric transplant patients. AKI, as indicated by estimated glomerular filtration rate levels, was lower in non-survivors and all non-survivors needed hemodialysis.

Although there was no data about difference between deceased and alive related kidney transplantation for survival from COVID-19; in the present study pointed out that survival was lower in cadaveric patients. This may be due to our relatively large series of patient.

Limitations of this study was a retrospective study design, and absence of advanced biochemical tests like IL-6, and postmortem pathologic examinations.

Conclusion

Factors associated with increased mortality in renal transplant recipients experiencing COVID-19 infection include cadaveric transplantation, advanced age, higher body mass index, presence of co-morbidities like diabetes, presence of dyspnea, a longer hospitalization duration, and acute kidney injury.

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Ethics Committee Approval: The study was approved by the Acıbadem Mehmet Ali Aydınlar Üniversitesi Tıbbı Araştırmalar Değerlendirme Kurulu (date: 22.04.2022 and approval number: 2022-07/10).

Informed Consent: Consent was not obtained as it was a retrospective study.

Conflict of Interest: Authors declared no conflict of interest.

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Author Contributions: Idea/Concept: SD; Design: HÇ; Supervision: MŞ, MED; Funding: HÇ, ABO; Materials: -; Data Collection/Processing: HÇ; Analysis/Interpretation: SD; Literature Review: EH; Drafting/Writing: EH; Critical Review: HÇ, MED, EH, MŞ, ABO, SD. The authors have accepted responsibility for the entire content of this manuscript and approved its submission.

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Approach To Pregnant Women with Mechanical Mitral Valve Prosthesis: A Case Report

Mekanik Mitral Kapak Protezi Olan Gebeye Yaklaşım: Olgu Sunumu

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Abstract

Cardiovascular diseases are one of the leading causes of maternal mortality. The management of pregnant women with mechanical valve prosthesis is difficult. Fetal-maternal mortality and morbidity are high. Selection of the most appropriate anticoagulant that will minimize fetal, maternal mortality and avoid embryopathy risk should be tailored according to the needs of each individual patient.

In this paper, in the light of the literature, we aimed to discuss our patient, who delivered at 39th gestational week after a pregnancy before which she had not been provided with prepregnancy counseling and during which she did not attend follow-up visits.

These patients prepregnancy counseling, follow-up visits, anticoagulant management during pregnancy, and prophylaxis and management of complications at the postpartum period are very important and require close follow-up.

Keywords: Mechanical Prosthesis, Mitral Valve, Pregnancy, Hearth Desease

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Öz

Kardiyovasküler hastalıklar anne ölümlerinin en önemli sebeplerindendir. Mekanik kapak protezi olan gebe hastalarda yönetim zordur. Fetal-maternal mortalite ve morbidite yüksektir. Fetal, maternal mortalite ve morbiditeyi en aza indirecek, embriyopati riski oluşturmayacak en uygun antikoagülan seçimi hastaya göre planlanmalıdır. Mekanik kapak protezi olan hastalarda gebelik öncesi danışmanlık, gebelik sürecinde takip ve antikoagülan yönetimi, postpartum dönemde de profilaksi ve komplikasyon yönetimi çok önemlidir, yakın takip gerektirir. Biz bu yazımızda gebelik öncesi danışmanlık almamış, gebelik süresinde de takiplere uyumu olmayan, otuz dokuzuncu gebelik haftasında doğumu yaptırılan olgumu literatür eşliğinde tartışmayı amaçladık.

Anahtar Kelimeler: Mekanik Protez, Mitral Kapak, Gebelik, Kalp Hastalıkları

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Introduction

Cardiovascular diseases are one of the leading causes of maternal mortality (1). Patients with mechanical valve prosthesis have an increased thromboembolic risk in pregnancy. High-risk patients, such as those with mechanical heart valves who contemplate pregnancy, should receive counseling service prior to pregnancy in order to prevent maternal mortality and morbidity (1). In patients who need valve replacement, valve repair should be carried out if possible; whenever valve replacement is required, the advantages and disadvantages of bioprosteheses and mechanical valves should be discussed with the patient in detail, and the patient should be informed about what to expect when she plans pregnancy (2). I aimed to present my patient with a discussion of the existing literature in order emphasize that pregnant patients with mechanical mitral valve prosthesis, who have an extremely high mortality rate, should not be left unmonitored as in our patient, and that planning should be done very well before pregnancy. This paper was published after the patient's written consent was obtained.

Case Report

A 23-year-old woman with a history of a pregnancy had received a mitral valve prosthesis at the age of 17 years. She had been using a vitamin K antagonist since her surgery. She had not had any complication after valve replacement. However, she had not attended regular follow-ups. When she had learned that she had been pregnant, her body weight had been 36 kg and her BMI (body mass index) 12.5 kg/m2. Her INR (international normalized ratio) level had been 7 at that time. She had not received any pre-pregnancy counseling. She and her husband were informed about possible complications of pregnancy; she was also provided with detailed information about the embryopathic effects of the anticoagulants and the option of pregnancy termination. She and her husband stated that they desired the continuation of pregnancy and that they took possible risks. When the patient presented, she had already been taking low-molecular-weight heparin as a substitute of vitamin K antagonist. However, since anti-Xa monitoring was not performed in our center, she was referred to a tertiary center. Since the use of vitamin K antagonists in the first trimester is controversial, she was admitted and heparinized at that center. Although she suffered episodes of abortus imminence with intermittent episodes of vaginal bleeding as well as subchorionic hematoma on ultrasonography, her follow-up continued uneventfully. When she reached 12th week of gestation, a vitamin K antagonist was started with a target INR level of 2.5-3, with care being taken that the dose of vitamin K antagonist did not exceed 5 mg. She was called for follow-up visits every 2 weeks and instructed to be followed up by an obstetrician and a cardiologist at a tertiary center. She was followed up with the vitamin K antagonist until the 34th week of gestation. She had no abnormality on echocardiography during her pregnancy. She did not experience any gestational complication, either. The patient received help to gain weight with the supervision of a dietician from the very beginning of her pregnancy. When her pregnancy progressed further, her cardiologist switched her anticoagulant back to low-molecular-weight heparin in order to reduce the risk of embryopathy, in line with the recommendations in the literature. Low-molecular-weight heparin was started at a dose of 6000 units twice a day. She later suffered intrauterine growth retardation of her baby at subsequent follow-ups. Therefore, weekly controls were begun. On 35th week of gestation the patient was referred to the tertiary center for planning the delivery and the follow-up of anticoagulant regimen. However, she neither presented to the tertiary center nor to my outpatient clinic. When she finally returned to the clinic, she was 39 weeks pregnant. She was informed about a considerably high maternal and fetal mortality risk at her gestational week, and was referred to the tertiary center for urgent delivery. At that time, the fetus was 35 weeks old. At the tertiary center caesarean section was selected as the delivery method. Her preoperative platelet count was 84 103/μL, and general anesthesia was preferred for anesthesia. Her postpartum follow-up was uncomplicated. The infant had an atrial septal defect with a size of 5.5 mm. The infant is still under the follow-up of a pediatric cardiologist. The patient's early postpartum follow-up was not complicated by a hemorrhagic or thromboembolic event. After hemostasis was achieved, the adult cardiology specialist started vitamin K antagonist in combination with low-molecular-weight heparin and adjusted the INR level. She had no problem at her follow-up on the 10th postpartum day. She presented with vaginal bleeding on the 25th postpartum day and was found to have a hemoglobin level of 6.5 g/dL and an INR level of 2.3. Her endometrial cavity was curetted with a bumm curette, and the bleeding was controlled by the infusion of 2.5 units of oxytocin per hour, with a total fluid infusion rate of 100 cc/h. When her hemodynamic status was stabilized,

she was referred to the tertiary center to receive erythrocyte suspension under the supervision of the adult cardiology specialist. When she was re-checked one week later, she had no recurrent bleeding, and her hemoglobin level was found to be 9 g/dL. Although a patient with mechanical valve prosthesis became pregnant, which is associated with high fetal and maternal mortality, and was non-compliant with medical treatment and follow-up until the 39th week of gestation, she did not suffer any significant complication except for an episode of late postpartum bleeding. Her close follow-up still continues at our clinic.

Discussion

It has been reported that 25% of pregnancies in women with cardiac disease are complicated with fetal and neonatal complications (3). Pregnant women with high-risk valvular disease should be followed by a team consisting of a cardiologist, an anesthesiologist, and a perinatologist (2). In pregnant women with valvular disease, intravascular volume increases in the later stages of pregnancy and may cause reduced effort capacity and increased symptoms. The factors that increase the thromboembolic event risk in pregnant women with valvular heart disease include atrial fibrillation, history of thromboembolism, mitral valve prosthesis, and multiple valve prostheses. Our patient was also at high risk due to having a mechanical heart valve at the mitral position.

Women requiring valve replacement should be evaluated in detail regarding their future pregnancy plans. The patients should be informed about the morbidity and mortality risk of thromboembolic events. The decisions regarding valve repair or replacement, and if replacement is decided, whether a bioprosthesis or mechanical valve will be used, should be thoroughly discussed regarding the possible risks. Patients with mechanical valve prosthesis are included in WHO (World Health Organization) class III, which indicates serious maternal mortality and morbidity risk. Patients with bioprosthesis are considered in WHO class II. ESC (European Society of Cardiology) 2018 and ACC (American College of Cardiology) 2020 guidelines recommend patient follow-up with at least weekly anti-Xa measurement (2,4). In order to reduce thromboembolic event risk, these patients should use anticoagulants at therapeutic doses (2).

The risk of embryopathy with vitamin K antagonists is low in the first 5 weeks; thus, regular use of vitamin K antagonists should be recommended until the patient becomes pregnant. However, when vitamin K antagonists are used between 6th and 12th weeks of gestation, they may cause nasal hypoplasia, bone hypoplasia, and optic atrophy in a dose-dependent manner. This risk is omitted at doses below 5 mg (5). In a study by Küçüker et al., only one case of warfarin embryopathy was observed in 36 pregnancies, in which the daily dose of warfarin exceeded 5 mg. The authors did not observe warfarin embryopathy at doses below 5 mg (6). While patients using vitamin K antagonists at doses above 5 mg have a fetal problem incidence of 74.2%, the incidence is reduced to 8.8% by doses below 5 mg. We also stopped vitamin K in the first trimester of our patient's pregnancy, and took care not to exceed the dose of 5 mg/day.

A metaanalysis found that maternal mortality rate is 1.8% with bioprostheses 1.8% and 1.3% with mechanical prostheses. Hemorrhagic complications occurred in 1.6% of patients with bioprosthesis and 6.1% of those with mechanical prosthesis. On the other hand, valve thrombosis occurred in no patient with bioprosthesis and 4.7% of those with mechanical valve prosthesis. Fetal loss occurred in 13.5% of patients with bioprosthesis and 29.2% with mechanical prosthesis. The most important cause of maternal mortality with bioprosthetic valves is the loss of valvular functions. The metaanalysis did not determine an ideal valve prosthesis in women who plans to become pregnant. The need for continuous low-dose anticoagulants in pregnant women with a mechanical valve prosthesis was stressed (7).

It is recommended that when a woman with a mechanical valve prosthesis becomes pregnant, LMWH (low-molecular-weight heparin) or UFH (unfractionated heparin) should be administered in a controlled manner in the first 12 weeks, followed by a vitamin K antagonist at a dose lower than 5 mg provided that adequate INR level can be reached. It was also recommended to return to LMWH or UFH when the expected delivery date approaches, no later than one week before the delivery (2). It is considered that the maternal and fetal outcomes with low-molecular-weight heparin are better than those with UFH due to more stable concentrations achieved with low-molecular-weight heparin (8).

American working groups recommend that therapeutic anticoagulation should be carried out with a vitamin K antagonist and heparin with frequent follow-ups. They do not recommend the use of low-molecular-weight

heparin for patients with a mechanical valve prosthesis unless anti-Xa level measured 4-6 hours after the last dose is maintained between 0.8 and 1.2 u/ml (2). When thromboembolic risk is considered high, aspirin 75-100 mg can be added to the regimen (6).

In patients with a moderate-to-high risk valvular disease, the delivery can be performed via vaginal route provided that adequate analgesia and anesthesia are administered and the valsalva maneuver is avoided. However, if there is severe aortic stenosis or the above criteria cannot be met, caesarean section should be recommended. Medications used for the induction of labor or prophylaxis of postpartum hemorrhage are also important and should be used in a controlled fashion. Oxytocin reduces mean arterial pressure and total peripheral vascular resistance, which may cause sudden cardiac decompensation due to a reduced afterload. Thus, this medication should be used with caution. Oxytocin can be administered at a rate of 2.5-7.5 IU/hour in an elective caesarean section and 7.5-15 ıu/hour in an intrapartum caesarean section. Albeit extremely rare, cardiovascular events after misoprostol use have been reported; thus, it is better not to use it unless there is a compelling indication. Methergine should not be used for pregnant women because it can cause vasoconstriction, coronary vasospasm, and elevated pulmonary pressure. According to the American Society of Anesthesiologists, a small amount of water ingestion should be allowed and dehydration be avoided during labor. IV fluids should be infused at 1 ml/kg per hour.

Low-dose combined spinal-epidural anesthesia is recommended for delivery in patients with a high cardiovascular risk. If general anesthesia is necessary, rapid sequential intubation is preferred after administering 100% oxygen. All drugs should be titrated slowly to preserve hemodynamic stability (9).

Infective endocarditis prophylaxis should be given to patients with prosthetic valves, those with a previous history of bacterial endocarditis, and high-risk patients with complex congenital cyanotic heart disease (10). The patient should be followed in the hospital for at least 48 hours after birth. Patients should be followed for cardiac events for at least 6 months after the delivery.

Conclusion

Patients with mechanical valve prosthesis who wish to become pregnant should receive pre-pregnancy counseling and make their plans at a tertiary center with a team consisting of a perinatologist, a cardiologist, a neonatologist, and an anesthesiologist. The same team should be present during delivery, and there should be an intensive care facility in the center of delivery. Considering high maternal mortality, pregnancy should be carefully considered during the decision-making process, and frequent and regular follow-ups should be performed by the obstetrician and the cardiologist. There is still no clear recommendation as to which anticoagulation regimen should be used, and the optimum anticoagulation regimen is unclear. More comprehensive studies are needed in the management of these patients.

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Conflict of Interest: Authors declared no conflict of interest.

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Case Report: Atlantoaxial Subluxation

Olgu Sunumu: Atlantoaksiyel Subluksasyon

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Abstract

Rotational atlantoaxial subluxations are more common in pediatrics. It is associated with post-traumatic, rheumatoid arthritis and respiratory tract infection (Grisel syndrome). Cock-Robin head position is frequently seen. Neck pain and neck stiffness are other common presenting symptoms. In this case report, we aimed to present the clinical symptoms, diagnosis, imaging and treatment of rotational attoaxial subluxation in a pediatric age group patient who came to the emergency department after trauma with cock-robin head posture.

Keywords: Atlantoaxial Subluxation, Pediatrics, Sports Injury.

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Öz

Rotasyonal atlantoaksiyel subluksasyonlar pediatrik hastalarda daha fazla görülür. Travma sonrası, romatoid artrit ve solunum yolu enfeksiyonu (Grisel sendromu) ile ilişkilidir. Sıklıkla Cock-Robin baş pozisyonu görülür. Boyun ağrısı, ense sertliği, diğer sık basvuru semptomlarıdır. Bu vaka sunumuzda acil servise travma sonrası gelen pediatrik yaş grubunda Cock-Robin baş duruşu ile gelen hastada rotasyonel atlatoaksiyel subluksasyonun klinik semptom, tanı, görüntüleme ve tedavisini sunmayı amaçladık.

Anahtar Kelimeler: Atlantoaksiyel Subluksasyon, Pediatri, Spor Yaralanması.

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Introduction

Rotational atlantoaxial subluxations are more common in pediatrics. It is associated with post-traumatic (the incidence of cervical spinal trauma varies between 1% and 4% of all pediatric traumas) (1), rheumatoid arthritis and respiratory tract infection (Grisel syndrome). Cock-Robin head position (57%) (20 degrees lateral flexion, 20 degrees rotation, 10 degrees flexion) is frequently seen. Neck pain (67%) and neck stiffness (53%) are other common presenting symptoms (2). Rotational atlantoaxial subluxations are the forward slippage of the C1 vertebra over the C2 vertebra. Incidence increases in syndromes with cervical ligament laxity. It tends to be more common after trauma, especially in pediatric patients. The most common trauma mechanisms are fall (36%), motor vehicle accident (11%), blunt trauma (11%) and sports injury (9%). Non-traumatic etiology includes syndromes that cause ligament laxity, such as Grisel syndrome, rheumatoid arthritis, and Down syndrome. The most common presenting symptoms are torticollis, neck stiffness, neck joint movement limitation, neck pain, and sternocleidomastoid muscle spasm. Depending on the severity of subluxation, transverse ligament damage may accompany it. Facet joint may be dislocated bilaterally or unilaterally. Classified by Field&Hawkins classification. Type I: rotation without anterior shift; The transverse ligament is intact and dense axis serves as a pivot point. Type II: There is rotation and anterior displacement between 3-5 mm, the transverse ligament is injured and the facet surface serves as the pivot point. Type III: Both lateral atlantoaxial joints are subluxed anteriorly, there is an anterior shift greater than 5 mm, and the transverse ligament and facet capsules are injured. Type IV: there is posterior subluxation of both lateral atlantoaxial joints. The treatment plan varies according to the field hawking classification (3). Accordingly, type I traumas can be treated with cervical spine immobilization after reduction. In type II lesions, if reduction is achieved within 14 days from luxation, immobilization with halo is recommended in children, but if the diagnosis is delayed more than 14 days, posterior atlantoaxial or occipitoatlantoaxial arthrodesis is recommended. Type III and IV lesions are all treated with posterior arthrodesis after reduction.

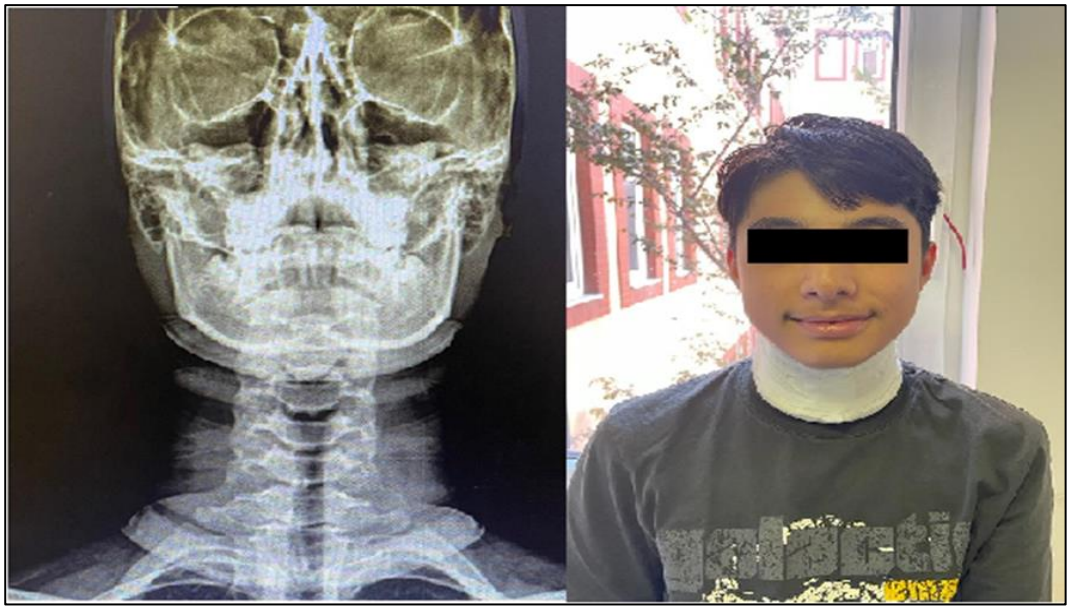
Case

A 13-year-old male patient suffered rotational trauma after a fall while playing volleyball at school. He quit sports after he developed a stiff neck complaint that developed 1 hour after the trauma. Oral myorelaxant treatment is applied at home. Patients complaints persists at home for 2 days, then applied to the emergency service when he developed pain in the left arm.Patient has no history of upper respiratory tract infection, no fever, no known history of rheumatological disease.There is a complaint of pain in the left arm while standing, which is relieved by lying down on emergency admission.In the physical examination, it was observed that the neck was in right 30 degrees of lateral flexion, 20 degrees of flexion and 20 degrees of left rotation(cock-robin posture). No significant neuromotor deficit was found on neurological examinaton. On Computed Tomography Scan ımages there was dense asymmetry (deviation to the left) and the anterior atlantodentin distance was shorter than 3 mm. He was admitted to the service with the initial diagnosis of Field & Hawkins type 1 rotational atlantoaxial subluxation. NSAIDs and muscle relaxant medications were ordered for the patient, who was monitored in traction with rigid collar. On cervical MRI images, it was seen that the transverse ligament was intact (Picture 1). During the 3-day service follow-up and outpatient clinic follow-ups, it was seen that the patient's neck deformity and radiculopathic pain improved and the neck joint range of motion was within normal limits. It was observed that there was no recurrence in the outpatient clinic follow-ups (Picture 2).

Discussion

Patients diagnosed with rotational atlantoaxial subluxation without receiving treatment, deformity may be permanent. Diagnosis can be made with plain radiographs or with computed tomography images MRI imaging is required specifically to evaluate the transverse ligament (4). Rotasyonal atlantoaksiyel subluksasyon tedavi algoritmalarında konsensus bulunmamaktadır. There is no consensus on rotational atlantoaxial subluxation treatment. It becomes difficult to create a treatment algorithm because there is no strong correlation between the Fielding & Hawkings classification and the severity of trauma, the time to admission to the clinic after trauma affects the prognosis, and the severity and etiology of the trauma that creates the pathology directs the prognosis Rotational atlantoaxial subluxation, whose pathophysiology is not fully understood, is divided into 4 subtypes by the Fielding Hawkings classification Accordingly, radiological

Picture 1. Displaying transverse ligament



Picture 2. Outpatient clinic follow-ups

studies show that the transverse ligament is intact in type 1 lesions It has been observed that fielding hawkings type 1 patients respond to conservative treatment with NSAID, myorelaxant treatment, soft collar, but especially in the early period (diagnosed and reducted within 1 month), rigid collar and occipitomental traction are treatment options. Field&Hawkings type 3-4 patients require arthrodesis surgery. In patients with late diagnosis or recurrent subluxations, arthrodesis surgery is planned if there is no response to conservative treatment. However, apart from the approaches based on this radiological classification, there are also stepwise treatment algorithms that prioritize clinical features According to this treatment algorithm, patients are followed under a neck collar and analgesic medication for the first 3 days until their complaints disappear. If there is no regression in symptoms, patients are followed with closed reduction for 3 days and rigid collar for 4 weeks. In case of recurrent subluxation, it is recommended to follow up with halo traction for 6 weeks. For patients who persisted subluxation, it is recommended to be treated with open reduction and posterior stabilization surgery. Additionally, there are clinical algorithms based on patients diagnose time period with rotational atlantoaxial subluxation. According to this algorithm, it is recommended to follow up with nsiad and collar for acute-onset patients diagnosed within 2 weeks. If there is no response to the treatment for 2 weeks or if the diagnosis is already 2 weeks late, NSAID, Halter traction and benzodiazepine treatment is planned. If there is no response to treatment for 2 weeks, skeletal traction, NSAID and benzodiazepine treatment are recommended. If there is no response to treatment for another 2 weeks, surgical treatment (posterior arthrodesis) is planned. (5) In the case we presented, it was observed that the symptoms of our patient, who was diagnosed early and diagnosed with Fielding Hawkings classification type 1, improved only after 3 days of follow-up with myorelaxant medication and rigid collar. Cure was achieved with conservative treatment without the need for occipitomental traction or halo traction, and he was discharged with rigid collar. During outpatient clinic follow-up, no recurrence was observed, he had no symptoms, and his neck joint range of motion was within the physiological limit.

Informed Consent: Written consent was obtained from the patient.

Conflict of Interest: Authors declared no conflict of interest.

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An Unexpected Cause of Abdominal Pain in Pregnancy: A Case Report

Gebelikte Karin Ağrısının Beklenmeyen Bir Nedeni: Olgu Sunumu

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Abstract

Acute abdomen during pregnancy is a condition that requires rapid diagnosis and treatment and threatens both maternal and fetal health. Adnexal masses may present different clinical presentations during pregnancy. The important thing is rapid diagnosis and application of the appropriate treatment method. Adnexal torsion should be kept in mind in the differential diagnosis of patients presenting with acute abdomen during pregnancy. Early diagnosis and treatment are vital for organ-preserving surgery.

In this article, we presented the successful treatment of a patient with laparoscopy surgery who applied to our clinic due to acute abdomen and was diagnosed with left ovarian torsion at 12 weeks' gestation.

Keywords: Acute Abdominal Pain, Ovarian Torsion, Pregnancy.

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Öz

Gebelikte akut batın tablosu, hızlı tanı ve tedavi edilmesi gereken ve hem maternal hem de fetal sağlığı tehdit eden bir durumdur. Adneksial kitleler gebelikte farklı klinik tablolar sergileyebilmektedirler. Önemli olan hızlı tanı ve uygun tedavi yönteminin uygulanmasıdır. Gebelik sırasında akut batın kliniği ile başvuran hastalarda ayırıcı tanıda adneksiyal torsiyon mutlaka akılda tutulmalıdır. Erken tanı ve tedavi organ koruyucu cerrahi yapılması açısından hayati öneme sahiptir.

Bu yazıda kliniğimize akut batın nedeniyle başvuran 12 haftalık gebelik ile birlikte sol over torsiyon tespit edilen olgunun laparoskopi cerrahi ile başarılı bir şekilde tedavisini sunduk.

Anahtar Kelimeler: Gebelik, Akut Karın Ağrısı, Over Torsiyonu.

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Introduction

Adnexal torsion during pregnancy is a rare obstetric emergency. It can easily be misdiagnosed since the patients often have nonspesific clinical features. Early detection and therapy is essential to preserve the ovary.

Here we present our experience with of adnexal torsion in the first trimester, managed by laparoscopic approach.

Case report:

A 24-year-old healthy woman, gravida 7 para 6, admitted to the emergency room of Diyarbakır ministry of health maternity hospital with a gradually worsening right lower quadrant pain, nausea and emesis. Her abdominal examination was significant with rebound and guarding. She was a febrile, hemodynamically stable. White blood cell count in her CBC was 12,600 /mcL. Ultrasonography revealed a single viable fetus of 12 week of gestation and simple cyst located in the right adnexa with the measurement of 8x7x6 cm. no free fluid was reported. Doppler flow to the right adnexa was found to be deteriorated. Considering the clinical findings, she was diagnosed as adnexal torsion and laparoscopy was immediately performed.

Intraoperative findings included a gravid uterus, a normal appendix and abdominal organs and a right ovarian cyst of approximately 8 cm. her right ovary had a bluish hue in consequence of twisting twice at the infundibulopelvic ligament. Detorsion of the twisted adnexa was carefully performed by blunt probes, nevertheless, the cyst was punctured and the cyst contents- approximately 200 ml of yellow simple fluid- was aspirated. After the homeostasis was controlled, the operation was completed.

The patient, whose postoperative condition was normal, was discharged home after preventive treatment against uterine contractions. The following day. The pregnancy has continued uneventfully to date.

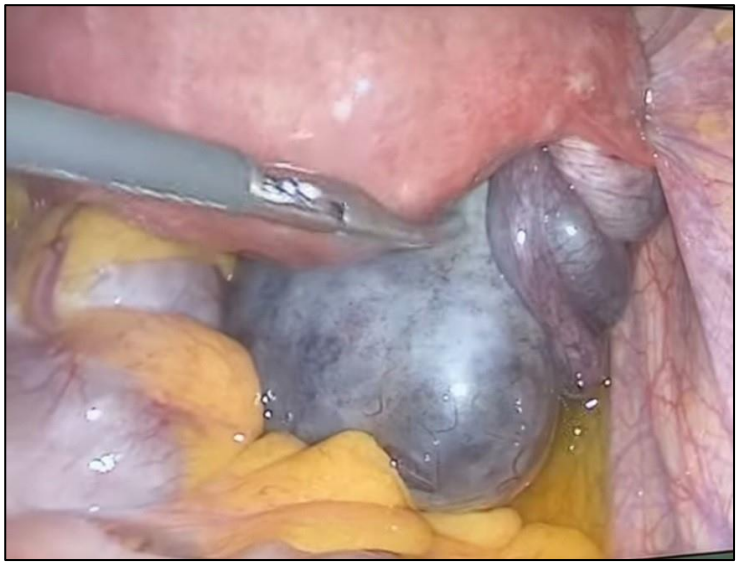

Figure 1: Itraoperative view of torsioned over

Discussion

The most common complaint of pregnancy is abdominal pain and pelvic discomfort. Symptoms of torsion arise similarly in both pregnant and nonpregnant patients such as right sided pelvic pain with or without nausea and vomiting (1,2). Uterine rupture, urethral or renal colic, HELLP syndrome, appendicitis and leiomyoma necrosis should be excluded in the differential diagnosis. Alterations in common presentation of serious acute abdominal events are expected owing to the state of pregnancy. Pregnancy also changes normal biochemical parameters. All these factors can lead to unsuccessful or delayed diagnosis (1).

Among gynecological emergencies, adnexal torsion accounts for 3% of all surgical interventions (2). The incidence of ovarian torsion during pregnancy is 1:10,000 to 5:10,000 pregnancies; 16% of pregnancies are achieved by ovulation induction and complicated by ovarian hyperstimulation. (3,4). The highest incidence is in the first trimester. As the size of the adnexal mass increase, it has tendency to twist and be unable to unwind

itself accordant with the changing situation of the adnexal mass and gravid uterus. Adnexal torsion is more common between the 10th and 17th weeks of gestation, this is probably due to the transport of adnexal masses by the pregnant uterus through the pelvic cavity together with a larger surrounding environment in the second trimester (5). The right ovary is torsioned more often than the left. In our case of 12-week-gestation, a simple cyst caused torsion of the right adnexa reluctant with the literature.

Widespread use of pelvic ultrasonography with Doppler evaluation brings with early diagnosis of adnexal torsion. The ovary twists around its pedicle and torsion occurs resulting in the circulatory stasis. Sonographic findings associated with the diagnosis of adnexal torsion include unilateral ovarian enlargement, peripheral cystic structures of the ovary, marked stromal edema, decreased or absent Doppler flow in pelvic fluid and ovary, and these were mostly detected in our patient (2).

Previous studies have shown that laparoscopy is not associated with an increased risk of spontaneous miscarriage or preterm birth (6). Laparoscopic surgery during pregnancy is shown to provide shorter hospital stay as well as decreased maternal and fetal morbidity (7). Therefore, we preferred laparoscopic intervention in this case. Detorsion of twisted adnexas should be considered as the first step in treatment. Since progesterone is secreted from the corpus luteum gravidita. It is important to protect the adnexa in pregnant women, especially in the first 12 weeks of pregnancy. Detorsion of hemorrhagic adnexa has no danger of thromboembolic complications, as well (8). The twisted adnexa were carefully detorsioned in our patient. However, the cyst perforated, so preventive progesterone treatment continued during postoperative period. In a study, Zweizig et al. (8) showed that overall morbidity was 12% in the salpingo-oophorectomy group and 3% in the conservatively treated control group.

In conclusion, Adnexal torsion should be considered in case of abdominal pain during pregnancy. Delayed diagnosis leads to a decreased chance of ovarian preservation. Laparoscopy allows appropriate surgical treatment with low fetal and maternal morbidity.

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