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EARLY POSTOPERATIVE UROLOGICAL AND SURGICAL COMPLICATIONS AFTER KIDNEY TRANSPLANTATION BY A LIVING AND CADAVERIC DONOR

Abstract

Organ transplantation and kidney transplantation, in particular, has aroused public interest and excited the medical community for centuries. Nowadays, kidney transplantation is an established surgical method for the treatment of end-stage chronic renal failure with good long-term results. Despite the continuous progress and development of transplantology, a number of postoperative surgical and urological complications still occur today, which could compromise the success of this operative method.

Aim: Our aim is to update the knowledge in transplantology and to summarize our data on early postoperative urological and surgical complications after kidney transplantation.

Material and methods: This study is based on a retrospective analysis of the disease history of 35 patients who underwent kidney transplantation at the Clinic of Urology at the University Hospital "Alexandrovska", Sofia for the period from 02.2018 to 12.2019. All possible early surgical and urological complications were followed up, including symp-

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tomatic and asymptomatic manifestations that do not require active invasive treatment.

Results: The team focused on complications such as ureteral stricture, urinary retention, ureteral necrosis, urinoma, DJ stent problems, hematoma, vascular stenosis, thrombosis, lymphocele, urinary tract infection, hernia or inflammation in the area of the surgical wound. Early postoperative complications were found in 46% of the observed transplant patients. Urological complications were found in 26% of them. The incidence of urinary tract infections in transplanted patients was 26%. During the follow-up period there were no cases of urinary retention, stricture of the ureter and urinoma in the group of patients. The incidence of surgical complications in the transplanted patients was 29%. The incidence of postoperative hematomas was 23%. Postoperative lymphocele was diagnosed in one patient, which shows a complication rate of 3% for this diagnosis. The incidence of surgical wound infection in transplanted patients during the follow-up period was 3%. No cases of venous or arterial thrombosis and hernia in the area of the operative wound were observed during the follow-up period.

Conclusions: Our results show that the frequency of the different early postoperative urological and surgical complications correspond to the data found in literature from other transplant centers. The average length of hospital stay in the Clinic of Urology, University Hospital "Alexandrovska" for transplanted patients may be extended due to the specific nature of the health care system in the country. The transplantation activities in our clinic correspond to the world standards.

Keywords: kidney, transplantation, urological, surgical, complications

INTRODUCTION

Brief historical data on kidney transplantation

Organ transplantation as well as kidney transplantation in particular has aroused public interest and excited the medical community for many years. The first scientifically documented transplants date back to the 19th century, when it was mainly in the form of skin transplants. During the first 60 years of the 20th century, the rapid development of antiseptics, anesthe-

siology, and vascular surgery created better conditions for the development of organ transplantation. In 1902, the Austrian surgeon H. Ullman from Vienna performed the first kidney transplantation on a dog, which was assessed as technically successful. He implanted the kidney in the dog's neck area, anastomosing the ureter on the skin so that he could monitor diuresis - the kidney excreted urine for five days. In 1906, the first attempts at kidney transplantation from animals to humans were made by Dr. Mathieu Jaboulay from Lyon, but these operations proved unsuccessful. In 1933, Dr. Yu Yu Voronoy from Kiev performed the first kidney transplantation from a cadaver by. The recipient lived for 4 days and the transplanted kidney never worked. In 1952, the first kidney transplantation from a living donor (mother of a child) was performed by Prof. Hamburger in Paris. Unfortunately, the transplantation had a very short period of success. On December 23, 1954, Dr. Joseph Murray from Boston performed the first successful kidney transplantation. The transplantation was performed between identical twins - isotransplantation. Oscar Creech and Keith Reemtsma transplanted a kidney and a heart from a chimpanzee to a human. The survival of several of the patients for months suggests that in the presence of quality immunosuppressive therapy, organ transplantation between different species (xenotransplantation) is possible. Thomas Starzl tried to transplant a kidney from a baboon to a patient in a very severe condition, but the operation was unsuccessful. In 1967 Eurotransplant organization was founded by van Rood in Leiden. He succeeded to prove that HLA compatibility played a key role in the acceptance of the new organ by recipients and their survival. In 1968, “The Report of the Ad Hoc Committee of Harvard Medical School to Examine the Definition of Brain Death” set new horizons for the development of transplantology, recognizing the state of irreversible coma as a state of death.

The first kidney transplantation in Bulgaria was performed in 1968 in Pirogov Hospital by Prof. Minkov, et al. The recipient was a child, whose solitary kidney was removed after an injury. The patient underwent transplantation of two kidneys placed in the pelvis. On February 1, 1969, Prof. N. Atanasov and Prof. St. Lambrev performed the first organ transplantation

in Alexandrovska Hospital, where a 42-year old woman who was suffering from endemic nephropathy received a kidney transplant. The Clinic of Urology of UMHAT "Alexandrovska", over time, has become a leading center in the country for kidney transplantation.

Kidney transplantation today

Kidney transplantation is now an established surgical method for the treatment of end-stage of chronic renal failure with good long-term results. Organs are transplanted from patients with diagnosed brain death and from living donors. Compared to dialysis (hemodialysis, peritoneal dialysis), kidney transplantation significantly improves the quality of life of the patients, their physical endurance, promotes social integration and reduces the incidence of chroniodialysis-related diseases. From an economic point of view, kidney transplantation leads to a significant reduction of treatment costs for patients with end-stage chronic renal failure. Successful kidney transplantation, including follow-up of the patient during the first year, costs as much as two years of dialysis. The average duration of transplanted kidney function after transplantation is 9 years. There are cases in which good graft function was observed after 20 years or more. Life expectancy in transplanted patients is significantly longer than in dialysis patients.

Postoperative complications of kidney transplantation

Despite the continuous progress and development of transplantology, a number of postoperative surgical and urological complications still occur today. They could compromise the success of this surgical method. Such postoperative complications mean for the patients both development of additional ailments and hospitalizations.

Surgical postoperative complications include vascular problems such as venous and arterial thrombosis of the graft, renal artery stenosis, lymphocele etc. Other complications are related to the surgical wound - infections, dehiscence and hernias. Hemorrhagic complications include diffuse tissue bleeding and bleeding from the vascular anastomoses. The most common complications are related to the operative wound (between 12-36%), followed by hematomas (between 2 and 25%) and the least common are vascular complications (between 1 and 12%).

Urological complications also affect the postoperative period in kidney transplantation. These include urine leakage from the vesico-ureteroneostomy, urinoma, ureteral obstruction, urinary tract infections, vesicoureteral reflux, urolithiasis. The urological complications after a successful kidney transplantation have a frequency rate between 2-37%.

The timely diagnosis and appropriate treatment of surgical and urological complications is of great importance. There are numerous, mostly retrospective studies in the literature on the frequency of surgical and urological complications after kidney transplantation and their relevant risk factors. Most articles focus on single surgical or urological complications. Studies that summarize all possible complications are extremely rare.

AIMS AND TASKS

Our goals and tasks were to update our knowledge in transplantology, to acquaint ourselves with the current scientific literature and data on this issue, and to summarize our data on early postoperative urological and surgical complications after kidney transplantation. We also set for ourselves the goal to evaluate our results and compare them with the data available in contemporary medical literature on this topic.

MATERIAL AND METHODS

This study is based on a retrospective analysis of the disease history of 35 patients who underwent kidney transplantation in the Clinic of Urology, University Hospital "Alexandrovska", Sofia for the period from 02.2018 to 12.2019 (Table 1.). The cohort of patients consists of 28 men and 7 women. The mean age of the patients was 43 years (median 42 years). The mean age of women and men was 41 and 44 years, respectively. One of the men received a second kidney transplant. The study included transplantations from living and cadaveric donors. In our study, the number of kidney

transplants from a living donor was 13 and those from a cadaveric donor was 22. The follow-up period for early postoperative complications was 60 days after surgery.

Table 1

Kidney transplantations, performed from a living and cadaveric donor in the Clinic of urology, University Hospital "Alexandrovska", Sofia for the period from 02.2018 to 12.2019.

Year	2018	2019	Total
Cadaveric donor	13	9	22
Living donor	5	8	13
Total	18	17	35

The following were causes for chronic renal failure in the cohort of patients: chronic glomerulonephritis in 21 patients, nephrosclerosis in 5 patients, hypertensive nephropathy in 4 patients, polycystosis in 3 patients, and chronic pyelonephritis in 2 patients (Table 2.).

Table 2

Causes for chronic renal failure (CRF) in the cohort of patients

Causes for CRF	Number of patients (35)
Chronic glomerulonephritis	21
Nephrosclerosis	5
Hypertensive nephropathy	4
Polycystosis	3
Chronic pyelonephritis	2

It is difficult to draw conclusions about the epidemiology of the disease from the place of residence of the recipients because of increased migration of the population within the country (Table 3.).

Table 3

Distribution of the transplanted patients from living and cadaveric donors by the place of residence.

Residence	Patients	Residence	Patients	Residence	Patients
Aytos	1	Devin	1	Petrich	1
Balchik	1	Dobrich	2	Plovdiv	1
Bezmer	1	Kotel	1	Pokrovnik	1
Belene	1	Kresna	1	Ribnovo	1
Breznitsa	1	Krumovitsa	1	Sofia	4
Burgas	1	Merdanya	1	Srem	1
Varna	3	Oven	1	Stara Zagora	2
Voyvodino	1	Pazardjik	1	Targovishte	1
Godetch	1	Pernik	2	Shumen	1

Methodology of kidney transplantation in the Clinic of Urology, University Hospital "Alexandrovska", Sofia

The kidney is prepared on a specially organized work table before performing the transplantation itself. An in-depth examination and assessment of the whole organ is performed – it is examined for anatomical features and abnormalities of the vessels and the ureter, for the integrity of the renal capsule and for the presence of any other abnormalities. The perirenal adipose tissue is removed until the renal capsule is presented. The renal vein and artery are dissected and if lateral branches are present they are ligated. The ureter is dissected of excess tissue while maintaining its blood supply.

In the Clinic of Urology, University Hospital "Alexandrovska", Sofia kidney transplantation is performed heterotopically, retroperitoneally, contralaterally in the respective fossa iliaca. A slightly inclined pararectal incision is made 2 cm above crista iliaca anterior superior. After incising the adipose tissue, the abdominal muscles are dissected in a dull way. The

peritoneum is pushed medially and thus the retroperitoneal space is reached, where the iliac vessels are dissected.

The external iliac artery and vein are carefully freed from the surrounding lymphatic pathways, which are ligated. This is followed by the formation of the venous anastomosis (end to side) between the donor renal vein and an external iliac vein by a running polypropylene 5-0 or 6-0 suture. Similarly, the arterial anastomosis (end to side) is formed between the donor renal artery and the iliac artery. After removing the clamps from the venous and, subsequently, from the arterial circulation, the kidney is inspected for turgor, perfusion and areas without blood supply.

Upon successful revascularization of the transplanted kidney, the ureteroneocystostomy is performed. The implantation of the donor ureter is performed using the Lich-Grégoire extravesical technique in the area of the bladder dome. The bladder is filled in advance with sodium chloride solution, then opened between two threads – bladder wall holders. This is where the implantation of the ureter is performed, after its shortening, longitudinal incision at the distal end and intubation with a DJ stent. The anastomosis is performed with a 5-0 monofilament resorbable suture and a running suture through all layers of the bladder wall. Bassini-Röhl antireflux plasty is performed to finish the ureteroneocystostomy.

The mean operative time for the kidney transplantation in the Clinic of Urology, University Hospital "Alexandrovska", Sofia is 186 minutes. The average duration of surgery for a cadaveric donor transplantation is 195 minutes, whereas living donor transplantation has an average operative time of 171 minutes.

RESULTS

All possible early surgical and urological complications were followed up, including these with symptomatic and asymptomatic manifestations. The research team monitored the patients for ureteral stricture, urinary retention, urethral necrosis, urinoma, DJ stent related problems, hematoma, vascular narrowing, thrombosis, lymphocele, urinary tract infection, hernia or inflame-mation in the area of the surgical wound.

In the cohort of 35 patients, early complications were manifested in 16 patients (46%) - 8 patients (23%) transplanted from a living donor and 8 patients (23%) transplanted from a cadaveric donor. Both urological and surgical complications were observed in 3 patients during the follow-up period (Table 4.).

Table 4

Frequency of the early urological and surgical complications in the transplanted patients for the period from 02.2018 to 12.2019 in the Clinic of Urology, University Hospital "Alexandrovska", Sofia.

Early complications	Total	Men	Women
Number of patients	35	28	7
Number of patients with urological complications	9 (26%)	7	2
Urinary infections	9 (26%)	7	2
Number of patients with surgical complications	10 (29%)	9	1
Hematoma	8 (23%)	7	1
Lymphocele	1 (3%)	1	0
Surgical wound infection	1 (3%)	1	0

22 kidney transplantations from cadaveric donors were performed during the period from 02.2018 to 12.2019 at the Clinic of Urology, University Hospital "Alexandrovska", Sofia. Out of them, 17 of the recipients were men and 5 were women. Early urological complications were observed in 4 patients (18%), 3 (18%) of whom were men and 1 was a woman (20%). Four transplant patients had a urinary tract infection which required antibiotic treatment. Early surgical complications were observed in 5 patients (23%) transplanted from a cadaveric donor, all of the patients men. We observed 3 (14%) cases of hematoma, 1 (5%) lymphocele and 1 (5%) infection of the surgical wound. All three of the patients diagnosed with hematoma, required revision of the surgical intervention (Table 5.).

Table 5

Frequency of early urological and surgical complications in patients transplanted from a cadaveric donor for the period from 02.2018 to 12.2019 in the Clinic of urology, University Hospital "Alexandrovska", Sofia.

Early complications	Total	Men	Women
Number of patients	22	17	5
Number of patients with urological complications	4 (18%)	3 (18%)	1 (20%)
Urinary infections	4 (18%)	3 (18%)	1 (20%)
Number of patients with surgical complications	5 (23%)	5	0
Hematoma	3 (14%)	3	0
Lymphocele	1 (5%)	1	0
Surgical wound infection	1 (5%)	1	0

13 kidney transplantations from a living donor during the period from 02.2018 to 12.2019 at the Clinic of Urology, University Hospital "Alexandrovska", Sofia. Out of these transplantations, 11 of the recipients were male and 2 were female. Early urological complications were observed in 5 patients (38%), 4 (36%) of whom were men and 1 was (50%) female. Five transplanted patients had a urinary tract infection which required anti-biotic treatment. Early surgical complications were observed in 5 patients (38%) transplanted from a living donor, 4 (36%) of whom were male and 1 (50%) was female. Five (38%) postoperative hematomas were diagnosed and in 4 of the patients surgical revision was necessary (Table 6.).

Table 6

Frequency of the early urological and surgical complications in patients transplanted from a living donor for the period from 02.2018 to 12.2019 in the Clinic of Urology, University Hospital "Alexandrovska", Sofia.

Early complications	Total	Male	Female
Number of patients	13	11	2
Number of patients with urological complications	5 (38%)	4 (36%)	1 (50%)
Urinary infections	5 (38%)	4 (36%)	1 (50%)
Number of patients with surgical complications	5 (38%)	4 (36%)	1 (50%)
Hematoma	5 (38%)	4 (36%)	1 (50%)

The average hospital stay of the transplanted patients in the Clinic of Urology, University Hospital "Alexandrovska" was 16 days, ranging between 9 and 23 days. The average hospital stay of recipients from a cadaveric donor, who developed early complications was 15 days, compared to 14 days for patients without complications. The average hospital stay of recipients from a living donor, who developed early complications was 18 days, compared to 17 days for patients without complications. Our results do not show a significant difference in the mean hospital stay in transplanted patients from living and cadaveric donors, who develop or do not develop early postoperative complications.

DISCUSSION

Kidney transplantation is a routine method of treatment for patients with end-stage of chronic renal failure, that shows good long-term results [2]. A significant decrease in the incidence of urological and surgical postoperative complications has been achieved over the years with the development of transplantology and different minimally invasive techniques [4]. This is of great importance, because the occurrence of such complications after kidney transplantation may lead to increased morbidity and mortality in transplanted patients [20].

UROLOGICAL COMPLICATIONS

The occurrence of urological complications after kidney transplantation is relatively common. These complications are divided into early and late, according to their time of onset. The frequency of these complications is between 3% and 37%, according to the modern scientific literature data [1]. In the Clinic of Urology, University Hospital "Alexandrovska", Sofia 35 patients underwent transplantation in the period from 02.2018 to 12.2019, and 9 of them had some urological complications. This shows that the incidence of urological complications in transplanted patients during this period is 26%, which corresponds to the data in international literature on

the subject. It is necessary to specify the various criteria for assessing these complications, in order to present our results in more depth. It is noteworthy, that different authors present the urological complications differently, which explains the relatively wide range of their frequency. Some authors note only these complications, which require surgery [23]. Others include complications, such as reflux, macroscopic hematuria and urinary tract infections [29]. There are researchers, who classify the appearance of lymphocele after kidney transplantation as a urological complication. Our results include both asymptomatic or conservatively treated complications, as well as those, that required invasive intervention. Lymphoceles in our study were classified as a surgical complication. Our results also take into account the type of donation. A distinction is made between patients transplanted from a living and a cadaveric donor. The incidence of urological complications was 38% in patients transplanted from a living donor and 18% in patients transplanted from a cadaveric donor.

Urinary tract infections

In the Clinic of Urology, University Hospital "Alexandrovska", Sofia, 35 patients underwent transplants for the period from 02.2018 to 12.2019 and 9 of them were diagnosed with postoperative urinary tract infections. This shows, that the incidence of urinary tract infections in patients who underwent a transplant during this period is 26%. In patients, who received a transplant from a living donor, the frequency is higher - 38%. Patients, who received a transplant from a cadaveric donor show a frequency of UTI of 18%. Postoperative hematomas around the graft were also found in 3 patients, diagnosed with urinary tract infection, requiring revision of the kidney transplant.

Urinoma

The formation of an urinoma is an early urological complication. Most often they are in the area of ureteroneocystostomy. The cause of urinomas could be necrosis of the ureter, surgical error during the anastomosis, insufficient length of the ureter, lesion during explanation or dissection of the ureter. The incidence of urinomas after kidney transplantation has been noted between 1% and 12% in the scientific literature. Some authors, such as Gonzalo Rodriguez et al. [16], Hernandez et al. [18/19] and

Burmeister et al. [6] note all cases of postoperative urinomas. Other authors, such as Dinckan et al. [9], Nie et al. [25] and Streeter et al. describe necrosis of the ureter as a separate complication. According to their results, its frequency is between 0.3% and 2.9%.

No cases of urinoma were observed in the transplant patients in our clinic during the follow-up period.

Strictures of the ureter

Ureteral strictures are mainly late urological complications. They could be due to a surgical problem in the area of ureteroneocystostomy, torsion of the transplanted kidney and ureter or fibrosis, as a result of ischemia [17]. The data show a frequency between 1% and 8%. Streeter et al. describe a higher incidence of ureteral strictures in transplanted patients from a living donor, than from a cadaveric donor, but the difference remains statistically insignificant [36]. The treatment of ureteral strictures in transplanted patients may include percutaneous nephrostomy, balloon dilatation of the ureter and stent fixation. In complicated cases, when the stricture is in the area of the anastomosis, it is possible to perform reimplantation of the ureter. A ureteroplasty is performed when the stricture is in the proximal or middle part of the ureter [3].

In the transplanted patients in our clinic no cases of stricture of the ureter were observed in the follow-up period.

Urinary retention

Urinary retention in transplanted patients can occur as both an early and a late urological complication, depending on whether there is supravesical, vesical or subvesical obstruction [10]. As an early complication, it may be a result of edema or kinking of the ureter, clotting and compression by a hematoma or lymphocele in the iliac fossa. As a late complication, urinary retention occurs as a result of ureteral stenosis or obstruction after the removal of the ureteral stent. Urinary retention may also be due to strictures of the urethra or meatus, benign prostatic hyperplasia, urolithiasis

and an acute rejection of the graft [36]. The frequency of urinary retention after kidney transplantation is between 2% and 20%, according to scientific data [35]. The wide frequency range is due to the different designs and criteria of the various studies. The incidence of supravesical retention is between 2.9% and 10.5%, according to the scientific data [24].
No cases of urinary retention were observed in the transplanted patients in our clinic during the follow-up period.

SURGICAL COMPLICATIONS

This group includes vascular complications (venous or arterial thrombosis, arterial stenosis), surgical wound complications (dehiscence, infection, hernia) and hemorrhagic complications [8]. The current scientific literature shows that the frequency of surgical complications varies between 15% and 34% [30, 31]. These values depend on what the different authors consider to be a surgical complication and what the follow-up period is of the patients.

In the Clinic of Urology, University Hospital "Alexandrovska", Sofia, 35 patients underwent transplants for the period from 02.2018 to 12.2019 and 10 of them developed surgical complications. This shows that the incidence of surgical complications in patients who received a transplant during this period is 29%. In patients who received a transplant from a living donor, the frequency is higher - 38%. Patients who received a transplant from a cadaveric donor show a frequency of 18% for these complications.

Hematoma

Hematomas after kidney transplantation are most common in the first postoperative days. The cause of postoperative hematomas is most often bleeding from the small non-ligated hilum vessels of the graft or from the small, retroperitoneally located vessels of the recipient. Particularly at risk are overweight patients and those taking platelet aggregation inhibitors or anticoagulant therapy [27]. Postoperative hematomas lead to delayed graft function and prolonged dialysis treatment with an increased risk of additional hemorrhage. Often, the postoperative bleeding in transplanted patients stops spontaneously. Recent publications on this topic show an incidence of postoperative bleeding and the appearance of hematomas between 3% and 25% [26]. In cadaveric donation, this frequency is slightly

higher between 7% and 25.4% [28]. In living donation, the incidence of postoperative hematomas is between 3.9% and 17.1% [22].

In the Clinic of Urology, University Hospital "Alexandrovska", Sofia, 35 patients underwent transplants for the period from 02.2018 to 12.2019 and 8 of them developed postoperative hematoma. This indicates, that the incidence of hematomas in patients who received a transplant during this period is 23%. In patients who received a transplant from a living donor, the frequency is higher - 38%. Patients who received a transplant from a cadaveric donor show a frequency of 14%. A revision of the surgical intervention was required in 7 of the patients with postoperative hematoma. From a therapeutic point of view, it is appropriate for large hematomas to have broad indications for revision in order to prevent secondary infections or abscesses. Small symptomatic hematomas could be drained percutaneously.

Lymphocele

Lymphoceles are considered an early complication after kidney transplantation. Most often they are a result of insufficient ligation of the perivascular lymphatic vessels in the area of the iliac vessels of the recipient or of the hilar lymph nodes of the graft [14]. The new antiproliferative immunosuppressive drugs, organ rejection, drug therapy with diuretics, anticoagulants and high-dose steroids are also risk factors for lymphocele formation in the iliac fossa. In most cases lymphoceles do not manifest clinically and are resorbed spontaneously without any therapeutic intervenetion. Percutaneous drainage could be performed in cases of uncomplicated symptomatic lymphocele. If this treatment is unsuccessful then laparoscopic or open technique is used for peritoneal fenestration of the lymphocele. The incidence of lymphocele after kidney transplantation is in the range between 5% and 39%, according to scientific data [33]. Incidence is lower and varies between 1% and 18% when we consider only symptomatic cases [5]. The incidence of lymphocele in patients who received a transplant from a cadaveric donor is higher - 33.9%, according to the current scientific data [15] than in patients who received a transplant from a living donor (12.4% - 24 , 3%) [12]. The incidence of symptomatic lymphocele in patients, who

received a transplant from a cadaveric donor is also higher (12.9% - 15.7%), than in patients who received a transplant from a living donor (1.4% - 5%) [30, 31].

In the Clinic of Urology, University Hospital "Alexandrovska", Sofia, 35 patients underwent transplants for the period from 02.2018 to 12.2019 and 1 of them developed lymphocele, which provides an incidence of 3%. No lymphoceles were observed in the postoperative period of patients who received a transplant from a living donor. For the patients who received a transplant from a cadaveric donor, one patient developed a lymphocele. This patient remained asymptomatic during the time of observation and did not require invasive treatment. The incidence of lymphocele in this group of patients was 5%.

Surgical wound infection

Complications of the operative wound is not a small matter regarding complications after kidney transplantation. They often lead to prolonged hospital stay, frequent rehospitalizations and impaired graft function [20]. The reasons for the increased risk of infection are due to the contact of the surgical area with potentially contaminated urine during ureteroneocystostomy and subsequent immunosuppression. Risk factors for this complication are obesity, diabetes, urinoma, lymphocele, revision of the surgical wound and the use of new and stronger immunosuppressive drugs. According to available scientific data, the incidence of surgical wound infection after kidney transplantation is between 1% and 20% [7]. El Hag et al. and Kocak et al. investigated the incidence of surgical wound infections in transplanted patients from a living donor. In their group of patients the frequency of this complication was similarly between 2% and 15% [11, 22]. In the Clinic of Urology, University Hospital "Alexandrovska", Sofia, 35 patients underwent transplants for the period from 02.2018 to 12.2019, and in 1 of them a postoperative infection of the operative wound was detected. The incidence of surgical wound infection in transplanted patients during this period was therefore 3%. No wound infections were observed in the postoperative period in patients, who received a transplant from a living donor. In patients, who received a transplant from a cadaveric donor, one patient developed inflammation of the surgical wound. In this case revision of the surgical wound was not necessary. The inflammatory process was controlled conservatively with regular dressings, surgical wound cleansing

and antibiotic therapy. The incidence of surgical wound infection in this group of patients was 5%.

Thrombosis

Renal artery or vein thrombosis is an early surgical complication after a kidney transplantation. These are rare but are extremely serious complications, as they can lead to loss of the transplanted kidney, due to lack of collateral blood supply [20]. The performance of a timely thrombectomy is essential to preserve the transplanted kidney. In the case of renal vein thrombosis, an urgent revision is necessary in order to avoid rupture of the graft. Often the cause of thrombosis is a technical error with a lesion of the vascular intima, kinking or vascular torsion. Other risk factors are hemodynamic instability of the patient, multiple graft vessels and underlying coagulation disorders. Poor kidney function and arteriosclerotic changes in the recipient's vessels can also lead to venous or arterial thrombosis of the graft. A hematoma or a lymphocele in the area of the iliac fossa can compress the renal vein and also cause venous thrombosis. There is data in the literature that the incidence of venous and arterial thrombosis after kidney transplantation varies between 0.3% and 7% [34].

In the transplanted patients at our clinic there are no cases of venous or arterial thrombosis for the follow-up period.

Hernia

The incidence of hernia in the area of the surgical wound after kidney transplantation is described in the available literature with an incidence between 1% and 18% [13]. Risk factors for the occurrence of hernias are performed revisions of the operative wound, multiple transplantation procedures, obesity, aging, and the use of antiproliferative immunosuppressive drugs.

This postoperative complication was not observed in the group of patients we studied.

In our group of patients, the average hospital stay does not differ significantly for patients with or without postoperative complications. This

may be due to the fact that the average time for postoperative monitoring for all transplanted patients in our clinic depends on some features of the healthcare system in Bulgaria.

SUMMARY AND DISCUSSION

Early postoperative complications were observed in 46% of the patients who underwent transplants. Urological complications were developed in 26% of them. The incidence of urinary tract infections in patients who underwent transplants was 26%. We did not observed any urinary retention, stricture of the ureter, or urinoma during the follow-up period.

The incidence of surgical complications in patients who underwent transplants was 29%. One patient in our group developed postoperative lymphocele, showing a complication rate of 3%. Surgical wound infection was found in 3%. No cases of venous or arterial thrombosis and hernia in the area of the operative wound were observed during the follow-up period.

CONCLUSIONS

1. The frequency of individual early postoperative urological and surgical complications corresponds to the literature data from other transplant centers.

2. The average time of hospital stay for transplanted patients in our clinic could depend on some features of the healthcare system in the country.

3. Our results suggest that the Clinic of Urology, University Hospital "Alexandrovska", Sofia performs transplantation activities that are adequate to world standards in kidney transplantation.

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