Surgical complications subsequent to the kidney transplantation are not infrequent and they are characterized by the high percentage of graft loss (59%-18% in standard surgical procedures and up to 37% in atypically performed transplantations). The study included 311 transplanted patients (206 (66.2%) living donors and 105 (33.8%) cadaver donors). Surgical complications developing during the immediate posttransplantation period as well as during the late period (after a year and a half) were classified as: I urinary complications; II vascular complications; III other complications. In majority of the cases urinary complications (urinary fistulas, ureteral obstructions, vesico-ureteral reflux) as well as other complications (cholecystopancreatitis and lymphoceles) did not necessitate urgent treatment, unlike most of the vascular complications. All the vascular complications (29/311) developed during the immediate postoperative period, except for occurrence of arterial stenoses which ensued later on, while the development of symptoms was rapid. Severity of both symptoms and clinical picture necessitated urgent surgical re-intervention in order to preserve the graft and patient’s life. Vascular complications were classified as: true vascular complications, hemorrhages and kidney ruptures in order to distinguish technical and other factors contributing to development of the complications. Onset of the true vascular complications related to the graft and recipient blood vessel changes was evidenced in 20 patients (69%/29 patients) while the incidence of hemorrhages and ruptures was considerably lower (14%/29 patients and 17%/29 patients). As for the true vascular complications, vascular stem thrombosis subsequent to cadaveric transplantations was the most frequent, and transplantectomy was performed in all the cases in absence of any lethal outcomes. Two cases with iliac artery rupture resulted in graft loss subsequent to urgent exploration. In all cases with hemorrhages the applied therapy resulted in positive responses, except in one case in which massive gastrointestinal hemorrhage led to lethal outcome. The response to the urgent surgical treatment of spontaneous kidney graft ruptures was positive in 60% of the cases, while in the remaining 40% transplantectomy was necessitated due to the extensiveness of the lesion in order to preserve patient’s life.

Key words: renal transplantation, surgical complications, urgent treatment.

INTRODUCTION

Surgical complications subsequent to kidney transplantation are not infrequent and they are characterized by the high incidence of graft loss and high mortality rate. Thier distribution ranging from 5%-18% confirms the severity of the problem (Botto, 1993; Boskovic, 1985; Markovic 1992; Sutherland, 1993; Brayman, 1992) when standard surgical procedure is in question, while the incidence of complications is increased up to 37% in atypical transplantations (Lechevallier, 1993).

Since the act of transplantation may be divided in three phases (phase I - donor nephrectomy, regardless whether the donor is living or cadaveric; Phase II period of the kidney preservation; and phase III the act of transplantation itself) the complications must also be considered accordingly.

The most important surgical complications affect the urinary tract (about 4.5%), blood vessels (about 5%), surgical wound and its surrounding structures in the form of infections (2%), while spontaneous ruptures of the graft account for approximately 1.4%. The prevalence of other surgical complication is significantly lower.

Immediate occlusion of the renal artery is unusual and its incidence is less than 1%, however it may be a cause of reduction or complete absence of diuresis immediately after the transplantation. In the kidneys with diuresis, acute cessation of urine elimination during the immediate postoperative course necessitated urgent re-exploration, if the
occlusions induced by Foley’s catheter has been previous ruled out as a cause. Prompt recognition of the condition is the only chance for the graft salvage.

Surgical complications characterized by spontaneous ruptures of the transplanted kidney, ruptures of the renal artery of the graft or iliac artery of the recipient, perirenal hematomas, and wound dehiscence are managed using generally accepted procedures applied in resolution of such complications in urgent surgery, i.e. urology.

**MATERIAL AND METHODS**

The study included the total of 311 patients treated at the Transplantation Center of the Institute of Urology and Nephrology in Belgrade who underwent kidney transplantations. In 206 patients living donor transplantations were performed while 105 patients underwent cadaveric transplantations.

All the patients had terminal renal insufficiency and we re on the chronic dialysis program and permanent nephrological monitoring. Surgical act of transplantation in our series included implantation of the kidney into the iliac fossa, contralateral to the side from which the kidney was removed. Pararectal arcuate incision was made according to Alexander’s technique along with fine muscle preparation and minute release of iliac blood vessels.

In most of the cases arterial anastomosis was termino-terminal anastomosis of the renal artery and internal iliac artery using continuous slip suture with pooling of the suture material, while venous anastomosis was mostly termino-lateral anastomosis of the renal vein and internal iliac vein and it was performed using the same slip suture.

Ureterocystoneostomy was performed using extravesical technique with anti-reflux mechanism according to Gregoir. Ureteral stent was placed in all the cases, and it was removed during the postoperative period. In addition to the urinary bladder catheterization, by adequate drainage of the new renal bed and subcutaneous region, and restitution of the surgical wound layer by layer, surgical act was completed. In certain cases, the above described standard surgical technique must have been abandoned, i.e. the urological anastomoses were performed atypically.

Continuous monitoring during the postoperative period enabled detection and follow-up of all surgical and other complications with an aim to provide timely and adequate managing thus enabling survival of the graft and the patient him/herself. Surgical complications were diagnosed according to the subjective status of the patient, objective visualization and general status, as well as using ultrasound, x-ray diagnostic procedures and in certain cases computerized tomography of the abdomen and other diagnostic procedures. The management was either urgent or delayed, surgical or conservative, depending on the degree of endangerment of both graft and patient.

**RESULTS**

Onset of the true vascular complications, associated with changes affecting blood vessels of the graft and recipient was evidenced in 20 patients (69%) while hemorrhages and ruptures were considerably less frequent (14% and 17%).

True vascular complications included thrombosis (16 cases, 80%), stenosis (2 cases, 10%) and ruptures of the iliac artery (2 cases, 10%). These complications were evidenced in 6.5% of the patients who underwent kidney transplantation.

In all cases, vascular stem thrombosis developed subsequent to cadaveric transplantations (5.1% when compared to the total number of transplantations), and exceptionally nephrectomy was the only therapeutic choice, i.e. graft loss ensued however in absence of the lethal outcome.

Arterial stenosis evidenced in two patients was located at the site of the anastomosis in one case, while in the second one it was segmental stenosis. In one of the cases, the therapeutic approach was conservative with well regulated hypertension, while in the other one transluminal balloon catheter dilatation was performed and satisfactory results were confirmed by angiography, Doppler echosonography and based on the adequate creatinine clearance values. Graft loss ensued in none of the cases. Rupture of the iliac artery with the consequential profuse bleeding was evidenced in 2 patients (0.6% of the total number of the transplanted patients) and in both cases it was the result of the combination of infection and loosening of the suture at the site of anastomosis of the renal artery and iliac artery. Urgent intervention comprising transplantectomy and arterial suture was indicated, and since it was performed in time lethal outcome was prevented.

Hemorrhages were recorded in 4 patients (accounting for 14% off all vascular complications, i.e., 1.3% of all transplantations) and included perirenal hematoma (2 cases, 50%) and one case of each vesical and gastrointestinal bleedings (50). In both cases of development of perirenal hematoma surgical procedure was performed (75%), as well as in case of the vesical hemorrhage (25%) in order to evacuate the hematoma, enable hemostasis and drainage, while conservative and expectant treatment were applied in case of the gastrointestinal hemorrhage. The success rate of the applied re-exploration with evacuation of the hematoma, adequate hemostasis and prolonged drainage was 100%, while in case of GIT hemorrhage lethal outcome ensued.

In our series, spontaneous ruptures of the transplanted kidney were recorded in 5 patients (1.6%), 80% after cadaveric transplantation and only in one case after living donor transplantation. Due to the massive rupture and impossibility of adequate hemostasis transplantectomy was performed in two cases (40%), while in 3 cases (60%) conservative procedure, i.e., application of the fibrin glue enabled preservation of the graft with its consequential functionality.

**DISCUSSION**

Vascular complications developing during the immediate postoperative course are characterized by rapid onset of symptoms and necessity of urgent re-intervention intended for preservation of the graft and patient’s life.
Fine dissection, required for identification and isolation of the renal artery and vein, performed subsequent to the removal of the kidney, regardless whether the nephrectomy is living donor or cadaveric one, reduces the risk from damaging of the accessory blood vessels and unpredictable hemorrhages at the sites of non-ligated small blood vessels subsequent to the removal of small vascular clamps.

As for the true vascular complications, vascular stem thrombosis, evidenced in 6.5% of all transplanted cases has proved to be the most frequent. In all the cases it developed subsequent to the cadaveric transplantation. Due to the diagnostic difficulties and unpecific symptoms transplanteectomy was performed in all the cases in absence of lethal outcomes. In our series, arterial stenosis was recorded only in two patients which may be attributed to inadequate diagnostic procedures, since angiography is not routinely used in our Transplantation Center as a standard post-transplantation follow-up procedure.

Introduction of angioscopy in the preoperative protocol would reduce the chances for development of the post-transplantation stenoses. In both cases, therapeutic procedure produced the satisfactory response.

Both cases of the iliac artery ruptures resulted in graft loss. Hemorrhages are most frequently causally related with the accompanying infections, since the incidence of wound infections and other infections in transplanted patients widely ranges from 2% to 56% (Organgem 1993; Milutinovic, 1995). In all the cases with hemorrhages, the applied therapy resulted in the expected response, except in a case with massive gastrointestinal hemorrhage in whom lethal outcome ensued. Other authors reported the incidence of the ruptures of 4%, with graft loss of and lethal outcome incidences of 16% and about 4.7%, respectively (Gomez-Veiga, 1993). In our series, the incidences were much lower. The response to the applied therapy was positive in 60% of the cases, while in 40% transplanteectomy was necessitated due to the extensiveness of the lesion and profuse bleeding without any possibility of adequate hemostasis.

**REZIME**

Hirurške komplikacije nisu retke nakon transplantacije bubrega i karakterišu ih visok procenat gubitka grafra (5%-18% kod standardnih hirurških procedura, do 37% kod atipično učinjenih transplantacija).

Ispitivanje je sprovedeno kod 311 transplantiranih bolesnika. Chir Urg, 1995;12:52-54

Hirurške komplikacije u periodu neposredne posttransplantacione hospitalizacije, kao i u kasnijem periodu (nakon 1.5 god.) klasifikovali smo na:

I urinarno komplikacije
II vaskularne komplikacije
III ostale komplikacije

Urinarno komplikacije (urinarno fistule, opstrukcija uretera, veziko-ureteralni refluks) kao i ostale komplikacije (holecistopandreatitis i limfocoele) u najvećem broju slučajeva nisu zahtevale urgentni tretman, dok se to za većinu vaskularnih komplikacija ne može reći. Sve vaskularne komplikacije (29/311) nastale su u neposrednom postoperativnom periodu, izuzimajući pojavu arterijskih stenoza koje su se razvile kasnije i simptomatološki ih je karakterisao brz razvoj. Ozbiljnost simptomatologie i kliničke slike iziskivala je hitnu hiruršku intervenciju radi očuvanja grafra i života bolesnika.

Podела vaskуlарних компликаціја је извршена на: прве vaskularne komplikacije, hemoragije i rupture bubrega, а се sa ciljem raščlanjivanjem tehničkih faktora od drugih koji su doprineli pojavu ovih komplikacija.

Pojava pravih vaskularних komplikacija, vezana za promene na krvnim sudovima grafra i recipijenta, zabeležena je kod 20 bolesnika (69%%29 bolesnika) dok je zastupljenost hemoragija i rupture bila znatno redjda (14%/29 bolesnika i 17%29 bolesnika).

Unutar pravih vaskularних komplikacija najzastupljenije su tromboze vaskularne peteljke nakon kadaverične transplantacije i u svim slučajevima je uradjena transplantektomija, bez letalnog ishoda.

Dva slučaja ruputra A. iliacae okončani su nakon hitne eksplozicije gubitkom grafra. U svim slučajevima hemoragija na preduzetu terapiju došlo je do očekivanog pozitivnog odgovora, sem kod jednog slučaja masivnog gastroteštanog krvavljenja gde je došlo do letalnog ishoda. Na preduzetu ugentnu hiruršku terapiju kod spolanih ruputra bubrenog grafra, pizitivan odgovor dobijen je u 60% slučajeva, dok se kod 40% morala sprovesti transplantektomija zbog masivnosti lezije, a u cilju očuvanja života bolesnika.

**Ključne reči:** transplantacija bubrega, hirurške komplikacije, urentni tretman

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