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IS POLYPROPYLENE MESH SAFE AND EFFECTIVE FOR REPAIRING INFECTED INCISIONAL HERNIA IN RENAL TRANSPLANT RECIPIENTS?

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ABSTRACT

Introduction. Infected incisional hernias are common in kidney transplant patients. Treating them in immunosuppressed patients can take months, increasing costs and implying loss of working productivity. Abdominal wall prostheses have not been used in infected immunosuppressed patients because of poor infection control. We evaluated the outcome of the surgical treatment of these patients with polypropylene mesh to shorten the hospitalization time and patient recovery. The records of 462 consecutive kidney transplant patients (March 2000 to February 2004) were reviewed. Of these 462 patients, 13 (2.8%) had infected or contaminated herniations at the transplant incision. They developed between 2 and 60 days (mean 14) after transplantation. The racial distribution was not significant, but herniations were more common in patients from cadaveric donors (4.5% versus 0%, $P = 0.005$). Predisposing factors were found in 6 patients (46.2%) and included complications from transplant surgery in 2, obesity in 1, leukopenia in 3, sepsis in 1, diabetes mellitus in 1, and wall weakness in 1 patient (3 had more than one risk factor).

Technical Considerations. A prospective protocol of surgical correction with polypropylene mesh was established. After wound cleansing with normal saline, repair was done by primary fascial approximation and polypropylene mesh reinforcement. Broad-spectrum antibiotics and large-bore drains were used. Follow-up ranged from 1 to 40 months (mean 14.5). All patients did well except for one recurrence, 14 months after correction.

Conclusions. Surgical repair with polypropylene mesh is safe and effective in treating infected or contaminated herniations in kidney transplant patients, with an acceptable (9.1%) incidence of recurrence. UROLOGY **66:** 874–877, 2005. © 2005 Elsevier Inc.

The incidence of incisional hernia after abdominal surgery varies widely and can be as high as 13%.[1–4] The incidence after kidney transplantation has been rarely reported but varies between 1.1% and 3.8%.[5,6] Transplant patients are probably at greater risk of incisional hernia because of many risk factors such as a long dialysis period before transplantation, immunosuppression, and comorbidities such as obesity, diabetes, chronic pulmonary diseases, and transplant-related surgical complications. They are also at higher risk of incisional infection, which can be as high as 12.5%, particularly in obese patients.[7]

Monofilament polypropylene mesh is the most widely used material to treat incisional hernias. Despite concerns regarding the use of prosthetic materials in immunocompromised patients, it has been demonstrated that such materials can be safely used even in such cases.[5] It has been also shown that abdominal wall prostheses can be used in contaminated operations with adequate surgical technique.[8] No reports have been published about the use of polypropylene mesh to repair infected or contaminated incisional herniations in kidney transplant patients. The aim of our study was evaluate the incidence of incisional infected or contaminated hernia after kidney transplantation, predisposing factors, and the results of surgical repair using monofilament polypropylene mesh.

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TABLE I. *Demographic data*

Variable	Value
Transplants (n)	462
Patients (n)	462
Retransplants (n)	65
Transplant type (n)	
Kidney	437
Kidney-pancreas	21
Kidney-liver	4
Sex (n)	
Men	256
Women	206
Race (n)	
White	297
Black	147
Other	18
Mean age (yr)	41 (3–73)
Donor type	
Cadaveric	291
Living	163
Unknown	8
Mean dialysis time (mo) before transplantation	
Cadaveric donor	63 (0–252)
Living donor	28 (0–120)
Delayed function (n)	
Living donor graft	29
Cadaveric graft	158

Data in parentheses are ranges.

MATERIAL AND METHODS

The records of 13 of 462 patients who underwent kidney transplantation from March 2000 to February 2004 who had infected hernias or evisceration were studied. Table I lists the demographic data. Infection was defined as the presence of clinical signs, such as pain, rubor, edema, and dehiscence with purulent secretion at the incision site, with positive culture for microorganisms. Contamination was considered in cases of evisceration with peritoneal content exposure.

We analyzed probable risk factors such as wound hematoma, donor type (living or cadaver), diabetes mellitus, pretransplantation dialysis period, and delayed graft function (defined as the need for dialysis within the first week after transplantation). Statistical analysis was performed using Fisher's exact test, with $P < 0.05$ considered significant.

All grafts were positioned retroperitoneally through an extended inguinal incision. Vascular reconstruction was performed at the iliac external vessels. The urinary tract was reconstructed using the nonstented Gregoir technique. Drains were not routinely used. Fascial closure was performed with running or interrupted 0-0 polyglycolic acid sutures. All patients with infected or contaminated hernias had very weak aponeurosis, and primary closure by reapproximation was impossible. These hernias were repaired by dissection and primary approximation of the fascial borders using polyglycolic acid sutures and mesh reinforcement above the underlying fascia as an on-lay in all cases, except for one in which the mesh was placed in the preperitoneal space. The mesh was anchored over the fascia or on its borders with 2-0 polypropylene sutures. A 3.7-mm caliber closed suction drain was placed above the mesh in all patients and was withdrawn when daily drainage decreased to less than 50 mL. Ceftriaxone (2 g/day intravenously) was given to all patients with evisceration and discontinued 1 week after drain removal. In those patients with positive wound cultures, adequate antibiotics were given for 3 weeks. Of the 13 cases, 7 were of evisceration and 6 were of clinical signs of wound infection in which cultures were positive for *Staphylococcus aureus* in 2, *Enterococcus faecalis* in 2, *Acinetobacter baumannii* in 1, and *Pseudomonas aeruginosa* in 1. The first 4 cases were treated with vancomycin and the last 2 with imipenem. Immunosuppression was achieved with the triple-drug regimen of cyclosporine, azathioprine or mycophenolate mofetil, and prednisone. Patients who underwent repeat transplantation received anti-CD3 in a sequential immunosuppressive regimen. The details of immunosuppression therapy have been previously published.[9,10]

TABLE II. *Incidence of infected incisional hernia in patient groups*

Variable	Hernias/Total (%)	*P* Value
Sex		0.78
Male	8/256 (3.1)	
Female	5/206 (2.4)	
Race		0.55
White	10/297 (3.4)	
Black	3/147 (2.0)	
Donor		0.006
Living	0/163 (0)	
Cadaveric	13/291 (4.5)	

RESULTS

In 462 transplant cases, 13 (2.8%) infected or contaminated incisional hernias were identified. Table II lists the patient characteristics.

No patients had previously undergone any kind of incision at the current transplantation site. Of the 13 patients, 11 were kidney transplant patients in whom incision infection occurred with dehiscence in 5 and evisceration with omentum exposure in 6 (mean time between evisceration and operation 16 hours).

One patient underwent a simultaneous liver-kidney transplant (hepatic cirrhosis and chronic renal insufficiency of unknown cause) using the left iliac fossa to place the kidney. The patient developed sepsis after surgery, resulting in hypotension and both liver and kidney transplant malfunction. Twenty days after transplantation, another liver-kidney transplant was performed because of primary liver malfunction without removing the previous renal transplant. The new kidney was placed in the right iliac fossa. Infection, dehiscence, and hernia formation occurred on the right side 10 days after the new transplant and were associated with a large peritransplant hematoma. The hematoma was removed, and the hernia was corrected as previously described. The right renal transplant incision developed a minor subcutaneous infection that was treated with local wound care. The patient did well and was discharged 16 days later. Renography with diethylenetriamine

pentaacetic acid showed good bilateral renal transplant function.

Another patient underwent simultaneous pancreas-kidney transplantation. The renal transplant was removed because of chronic vascular rejection 10 months after the transplant, although the pancreas graft was still functioning. The renal transplantectomy incision reopened 15 days after the procedure with evisceration and omentum exposure. Evisceration was corrected with fascial reapproximation and mesh reinforcement without further complications. Delayed graft function occurred in 6 (85.7%) of 7 patients with infected or contaminated hernias and in 185 (41.2%) of 449 patients without hernias, but the difference was not statistically significant ($P = 0.78$). Predisposing factors were clearly identified in 6 patients (46.1%), including 3 with more than one factor (obesity, pancytopenia, diabetes mellitus, large hematoma, large lymphocele, and sepsis). Drains were taken out after 2 to 30 days (mean 9), as soon as the daily drainage decreased to less than 50 mL. In 1 patient, a large fluid collection (600 mL) was identified in the subcutaneous tissue after drain removal. It was treated with external drainage and resolved after 30 days. The duration of follow-up ranged from 1 to 40 months (mean 16.1). All but 1 patient did well with no signs of recurrence. In 1 patient, recurrence developed 14 months after mesh placement at the superior margin of the incision. It was corrected with new mesh placement. No recurrence had developed after 15 months of follow-up.

COMMENT

Incisional hernias are a frequent problem in the general population, and about 70% of them develop within the first year after surgery.[2] Attempts to correct these hernias by repeating the closure with suture has resulted in recurrence rates of up to 50%. This rate has been reduced to less than 10% using mesh implantation.[11] Transplant patients are at additional risk of developing incisional hernias because of factors such as the chronic use of corticosteroids, other immunosuppressive drugs, subnutrition, and prolonged uremia before transplantation.[2] A recently identified risk factor for wound-healing complications, specifically perigraft fluid collection, superficial wound infection, and incisional hernia, is the prescription of sirolimus-based immunosuppressive regimens using corticosteroids.[12] Nevertheless, in our population, no patient was placed on such an immunosuppressive regimen. The infected hernia incidence in the studied population (2.8%) did not differ from that in published studies.[5,6] Predisposing factors were clearly identified in 6 cases (46.2%). The incidence was not different among any patient group except for the type of donor, because all herniations occurred in transplants from cadaveric donors (Table II). This can probably be explained by the worse general health condition and nutrition status of these patients compared with those who received organs from living donors.

Despite concern about using prosthetic materials to correct incisional hernias in transplant patients, it has recently been demonstrated that this approach is safe and effective.[5,13] Although concern has been raised in published studies about the safety and effectiveness of using prosthetic materials in immunosuppressed patients with infected or contaminated incisions, Birolini *et al.*[8] have demonstrated that even bacterial contamination is not a contraindication for the use of prosthetic materials. However, to our knowledge the use of prosthetic materials to correct incisional infected or contaminated hernias in renal transplant patients has not been previously described.

We used large-caliber close suction drains to avoid seromas, which are known wound complications when mesh implants are used.[14] These drains were removed after 2 to 30 days (mean 9). Nevertheless, after the 2 initial cases, we noted that drainage was not needed for such long periods. In the last 10 cases, the drains were kept in place for 2 to 10 days (mean 7).

The prevalence of delayed graft function in cadaveric graft recipients was great at our institution and differed significantly from that of living donors. Delayed graft function impairs graft survival and increases the time to patient recovery, but we noted no clear influence of delayed graft function on wound outcome.

Despite wide use of meshes for hernia surgery, complications such as infection, migration to the bladder and intestine, injury to surrounding tissue such as the spermatic cord, and shrinking and folding of the mesh have been reported.[15–19] Such problems may raise concerns, especially in immunocompromised patients. In our series, despite the presence of infection or contamination, no complications occurred, except for 1 case of recurrence that developed at the superior margin of the mesh. Recurrences are usually located at mesh margins and especially involve flank incisions.[19] This case was later corrected with a new mesh placement without additional complications.

Reinforcement of the abdominal wall with biomaterial is effective because of direct mechanical sealing and the induction of connective tissue proliferation, which leads to fibrosis and scar plate formation.[17] Although major efforts have been made to optimize mesh implantation and operation techniques, the influence of mesh material and properties on clinical outcome has not been thoroughly studied. Apparently, the clinical outcome

may be influenced by mesh material (polypropylene is better than polyester) and textile properties such as weight (lighter is better than heavier), structure, type (permanent versus absorbable), and pore size (larger pores are better than smaller ones).[19,20] In our series, only one type of mesh was used, with excellent results.

CONCLUSIONS

Incisional hernias are not rare after kidney transplantation, and some may become infected. When associated with wound infection, most develop within the first 3 weeks after transplant surgery. They are significantly more common in transplants of organs from a cadaveric source. Surgical complications of transplant surgery, such as wound hematoma and lymphocele, are important predisposing factors, underscoring the need for meticulous surgical technique. Surgical repair of infected or contaminated herniations with polypropylene mesh is safe and effective and yields excellent results. The use of large-caliber drains is advisable. We had only 1 case of recurrence in our series.

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