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Wound Complications After Kidney Transplantation in Nondiabetic Patients

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ABSTRACT

Introduction. Impaired wound healing represents a common operative complication after kidney transplantation. This problem seems to be affected by factors related to surgical technique, drugs, and patient/graft peculiarities.

Patients and Methods. From January 2000 to December 2007, 350 consecutive kidney transplantations were performed in a population of nondiabetic patients. We evaluated the influence of various factors on impaired wound healing.

Results. Among 350 kidney transplantation patients, we observed 54 cases (15.43%) of impaired healing of the surgical incision: 36 (10.29%) with first level and 18 (5.14%) with second level wound complications. Factors related to complications were overweight and delayed graft function. Cyclosporine and tacrolimus had similar effects. However, all patients developing second level complications showed more risk factors. In our experience, postoperative lymphocele did not occur as an unique factor but became a significant risk factor when associated with another one. Patients who did not have reconstruction of the muscle layers showed a greater incidence of incisional complications.

Conclusion. Impaired healing of the surgical incision more or less seriously influenced outcomes of transplanted patients. This complication was common and usually related to the presence of more than one risk factor.

IMPAIRED wound healing represents a common surgical complication after kidney transplantation.[1–3] This problem seems to be affected by factors related to surgical technique, drugs, and patient and graft factors.[4–16] Expanding upon our recent paper,[4] we analyzed our clinical experience about impaired healing of the abdominal wall incision in kidney transplant patients.

PATIENTS AND METHODS

From January 2000 to December 2007, 369 consecutive kidney transplantations were performed in 126 females and 243 males. We evaluated the influence of the following factors on impaired wound healing: antirejection drugs, overweight and obesity, age, delayed graft function (DGF), postoperative lymphocele, and surgical technique for abdominal wall reconstruction. Among our transplanted population, there was a low incidence of diabetic patients (only 5 on insulin treatment before transplantation), so we chose to exclude them. Another 14 patients lost to follow-up were excluded from the study. The remaining 350 patients including 119 women and 231 men (age range 22 to 66 years) were divided into 2 groups based on the antirejection scheme: 218 patients were administered basiliximab, cyclosporine, and cortisone, versus 132 patients with basiliximab, tacrolimus, and cortisone. The dosages were similar for all patients. Considering patient and graft characteristics, we consider as overweight a body mass index (BMI) $\geq$28; patient ages were classified as under 50 years (n = 92), from 50 to 60 years (n = 153), and over 60 years (n = 105); DGF was assessed by the number of dialyses ($\geq$ 4) and posttransplant days necessary to observe kidney functional recovery; also we considered presence of a persistent lymphocele. Considering the surgical technique, all procedures were performed through an extraperitoneal approach to the retroperitoneal space using a pararectal incision in the abdominal wall prolonged to the pubes, with dissection of the cutaneous, subcutaneous, and muscular/fascial layers. Two hundred eighteen surgical incisions were sutured in a single layer technique: muscular fascia and muscular layer were sewn all

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together with two slowly absorbable half continuous sutures, with a suction drain in obese patients followed by a cutaneous layer with interrupted silk stitches. The other 132 surgical incisions were sutured with some changes: the muscular layer was sutured alone with two slowly absorbable continuous sutures and successively muscular fascia was sewn with interrupted stitches; the skin was sutured with interrupted absorbable introflexed stitches. We used the same suture materials in all patients. In agreement with our previous paper[4] and with other authors,[5,10] we classified the severity of wound complications. The patients with impaired healing were subdivided into two groups: partial closure of the wound, or superficial infection, or a dehiscence not surpassing the muscle fascia (first level of wound complication). The other group included patients with dehiscences involving the fascial and muscular planes and any wounds that required additional surgical closure, debridement, or repair (second level of wound complication).

RESULTS

Among 350 transplanted patients, we observed 54 (15.43%) with impaired healing of the surgical incision: namely 36 (10.29%) at the first level and 18 (5.14%) at the second level of wound complication. Considering the antirejection scheme, among 218 patients with cyclosporine therapy, 34 (9.71%) reported impaired wound healing: 22 with first level and 12 with second level complications. Among 132 patients treated with tacrolimus only 20 (5.71%) showed impaired wound healing: 14 patients with first level and 6 with second level complications.

Considering individual patient and graft peculiarities, among 54 wound complications we observed that a number of dialysis >4 and DGF were present in 17 patients (4.86%); 11 with first level and 6 with second level complications. Overweight was present in 26 patients (7.43%): 19 with first level and 7 with second level complication. Age under 50 years in 14 patients (4%), namely 11 with first level and 3 with second level complications; age between 50 and 60 years in 24 patients (6.86%), namely 15 with first level and 9 with second level complications; and age over 60 years in 16 patients (4.57%), namely 10 patients with first level and 6 with second level complications. Among 54 patients with this complication, 11 (3.14%) showed a postoperative lymphocele: 6 with the first level and 5 with the second level wound complication. Simultaneously considering more than 1 patient or graft peculiarity, among the 54 patients with wound complications, we observed DGF plus overweight in 10 patients—7 with first level complications and 3 patients with second level complications; DGF plus lymphocele in 5 patients—4 with first level and 1 with second level complications; overweight plus lymphocele in 4 patients—2 with first level and 2 with second level complications; DGF, overweight plus lymphocele in 2 patients with second level complications. Considering the surgical technique, 27/218 patients with standard suture layer reconstruction showed first level wound complications and 18 second level complications. Whereas among the last 132 patients with the modified suture layer technique, only first level complications were observed in 9 patients. Among 54 patients, only 6 patients with second level complication needed an operative procedure to resolve the problem.

DISCUSSION

Impaired healing of the surgical incision may more or less seriously influence patient outcome.[17] This complication readily arises in kidney transplanted patients, always representing a dangerous risk. In a recent paper about this subject, the attention of the authors was focalized on antirejection drugs, the reconstructive surgical technique, and some patient and graft peculiarities as factors linked to impaired healing of the abdominal wall surgical incision. In the same paper, with a larger patient population, we did not observe a statistically relevant difference in the incidence of wound complications related to cyclosporine- versus tacrolimus-based immunosuppression. Recent studies in large population have demonstrated that transplantations performed in obese or overweight patients were linked to the development of numerous complications. Considering these factors linking to surgical wounds, the experiences of the authors are consistent with the literature. DGF strongly conditions healing of the surgical incision in the posttransplant period. In fact, we observed that DGF interested 36/54 patients with impaired healing of the surgical wound. In all patients with impaired healing of surgical incision, lymphocele was always associated with other risk factors and linked to a similar incidence of first and second level complications. Also in this series, age was not an additional risk factor for complications in the healing of surgical incision, confirming that our results are in contrast with those of other reports.[5,10] When the deep layers suture technique was analyzed, muscles appeared not to be an excellent tissue to suture because they did not show good resistance. But in our opinion, muscle approximation guarantees a further protection to the transplanted kidney. In our series the approximation of muscle layers reduced the incidence and severity of wound complication: no patient with a second level wound complication underwent muscle layer approximation.

In conclusion, we considered cyclosporine and tacrolimus to have similar effects on healing of the surgical incision. By univariate analysis, the factors more related to wound complications were overweight and DGF. However, all patients developing a second level complication showed more risk factors. Patients with postoperative lymphoceles after kidney transplantation showed greater risk to develop impaired healing of the surgical incision, particularly when 2 or more risk factors were combined. In fact, in our experience postoperative lymphocele did not occur as unique risk factor but only became significant when associated with an another one. Patients who did not undergo reconstruction of the muscle layer showed a greater incidence of surgical incision complications. Although we cannot assert that reconstruction of muscle layer was a protective factor, it certainly did not impair the surgical wound healing. We are performing a prospective study to under-

stand its true role to help the healing process of abdominal incisions.

REFERENCES

1. Santangelo ML, De Rosa P: Trapianti d'organo: generalità. In Zannini (ed): Chirurgia generale. Torino, Italy; UTET; 1995, p 398
2. Santangelo M, Mazzeo M, Di Salvo E, et al: Trapianto renale. In Mazzeo F (ed): Trattato di clinica e terapia chirurgica. Vol III. Padova, Italia: Piccin; 2003, p. 4289
3. Hunt TK: Disorders of wound healing. World J Surg 4:271, 1980
4. Santangelo M, De Rosa P, et al: Healing of surgical incision in kidney transplantation: a single transplant center's experience. Transplant Proc 38:1044, 2006
5. Flechner SM, Zhou L, Derweesh I, et al: The impact of sirolimus, mycophenolate mofetil, cyclosporine, azathioprine, and steroids on wound healing in 513 kidney-transplant recipients. Transplantation 76:1729, 2003
6. Wara P: Closure of abdominal wall incision. Ugeskr Laeger 167:3056, 2005
7. O'Dwyer PJ, Courtney CA: Factors involved in abdominal wall closure and subsequent incisional hernia. Surgeon 1:17, 2003
8. Fackeldey V, Hoer J, Klinge U: Fascial healing and wound failure. Chirurg 75:477, 2004
9. Hoer J, Tons C, Schachtrupp A, et al: Quantitative evaluation of abdominal wall perfusion after different types of laparotomy closure using laser-fluorescence videography. Hernia 6:11, 2002
10. Dean PG, Lund WJ, Larson TS, et al: Wound-healing complications after kidney transplantation: a prospective, randomized comparison of sirolimus and tacrolimus. Transplantation 77:1555, 2004
11. Valente JF, Hricik D, Weigel K, et al: Comparison of sirolimus vs. mycophenolate mofetil on surgical complications and wound healing in adult kidney transplantation. Am J Transplant 3:1128, 2003
12. Johnson DW, Isbel NM, Brown AM, et al: The effect of obesity on renal transplant outcomes. Transplantation 74:675, 2002
13. Sedlarik KM, Piatek S, Reusche S, et al: Impaired wound healing as a result of systemic diseases. J Wound Care 4:119, 1995
14. Chvapil M, Koopmann CF Jr: Age and other factors regulation wound healing. Otolaryngol Clin North Am 15:259, 1982
15. Steinbrech DS, Longaker MT, Mehrara BJ, et al: Fibroblast response to hypoxia; the relationship between angiogenesis and matrix regulation. J Surg Res 84:127, 1999
16. Takahashi K, Takahara S, et al: Sonoda for the Japanese Tacrolimus Study Group: successful result after 3 years' tacrolimus immunosuppression in ABO-incompatible kidney transplantation recipients in Japan. Transplant Proc 34:1604, 2002
17. Mehrabi A, Fonouni H, Wente M, et al: Wound complications following kidney and liver transplantation. Clin Transplant 20(suppl 17):97, 2006