Clinics in Surgery

Case Report
Published: 27 Jun, 2019

Exposed Kidney Transplant Salvage by the Use of Allogeneic Human Acellular Dermal Matrix Graft for Disrupted Abdominal Wall Reconstruction

*Sarkozyova N[1], Breza J[2], Zilinska Z[2], Sersenova M[2] and Koller J[1]**

[1]Department of Burns and Reconstructive Surgery, Ruzinov Hospital, Slovakia

[2]Department of Urology, Renal Transplantation Center, Derer's Hospital, Slovakia

Abstract

This article deals with a case of kidney transplant salvage following repeated post-operative wound dehiscence with extrusion and exposure of the transplanted kidney in 54 years old polymorbid patient. The surgical strategy, aiming to cover the exposed kidney transplant and to close the abdominal cavity, required two surgical interventions. The first one included thorough surgical debridement of the open abdominal wound along with the undermined wound edges followed by temporary coverage of the exposed kidney by human skin allograft. Negative Pressure Wound Therapy (NPWT) system was applied in order to remove the excess discharge from peri-renal space and to enhance granulation tissue formation for wound preparation to final closure. The debrided and prepared wound was closed in the second surgical intervention. It included skin allograft removal and replacement by Allogeneic Acellular Dermal Matrix Graft (ACDG) used for both transplanted kidney protection and replacement/reinforcement of peritoneal and abdominal fascia defects. Following peri-renal and subcutaneous space drainage the abdominal wound was closed and healed within 22 days. At 6 months follow up persisting complete wound closure with firm scar and no abdominal herniation along with good transplanted kidney function have been found.

Introduction

Each year there are many thousands of successful kidney transplantations worldwide. In spite of recent advances in surgical techniques and immunosuppressive therapy, acute post-operative complications can occur. The incidence of such complications varies between 10.5% and 15.4% [1]. The most frequent acute surgical complications include wound infection and dehiscence, lymphocele, perirenal abscesses, and peritonitis. There are many factors which can contribute to occurrence of these complications, such as age of both the donor and recipient of the organ, obesity (BMI>32), co- morbidities (diabetes, cardiovascular, etc.), serum albumin levels, necessity of post-transplant dialysis, type and dosage of anti-rejection medications [2,3].

Materials and Methods

Patient history

The patient was a 54 years old man with several co-morbidities such as type one diabetes with CKD G5D A3 KDIGO nephropathy. His hemodialysis program included 3 sessions per week since the year 2016. Other co-morbidities included generalized atherosclerosis including also his coronary arteries (which required triple coronary artery bypass surgery), secondary Reno parenchymal hypertension, secondary hyperuricemia, severe vitamin D deficiency, diabetic retinopathy and cerebral ischemic events. He was hospitalized from June 29th until October 10th 2018 at the Transplantation Department of the Teaching Department of Urology of the Comenius University Medical Faculty and University Hospital Bratislava, Slovakia (Head Dr. HC, prof. Jan Breza MD, Dr. Sc.). The cadaveric allogeneic kidney transplantation procedure was provided on June 30th 2018. The kidney was placed retroperitoneally in the right iliac fossa. Immunosuppressive medications included basiliximab (IK 13, ALPL 0/0) administered during operation, followed by a combination of 2 immunosuppressive drugs (tacrolimus, mycofenolate mofetil) and supplemental corticosteroids. The renal transplant started to be functional 15 days post-surgery requiring post-operative haemodialyses. On July 2nd 2018, due to persisting poor function of the graft a renal graft biopsy was performed. The histology result was TCMR IIA, C4d negat, IFTA I, transfer from the

OPEN ACCESS

Correspondence:
Koller J, Department of Burns and Reconstructive Surgery, Ruzinov Hospital, Slovakia, E-mail: koller.jan@gmail.com

Received Date: *14 May 2019*
Accepted Date: *19 Jun 2019*
Published Date: *27 Jun 2019*

Citation:
Sarkozyova N, Breza J, Zilinska Z, Sersenova M, Koller J. Exposed Kidney Transplant Salvage by the Use of Allogeneic Human Acellular Dermal Matrix Graft for Disrupted Abdominal Wall Reconstruction. Clin Surg. 2019; 4: 2488.

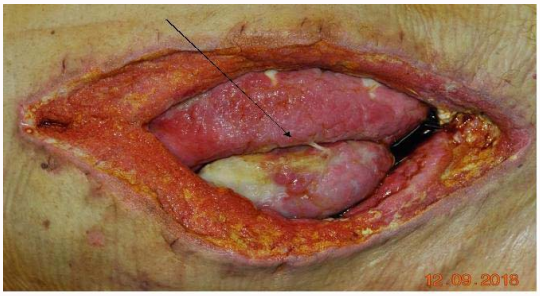

Figure 1: The disrupted abdominal wound with exposed kidney (arrow) before the first operation.

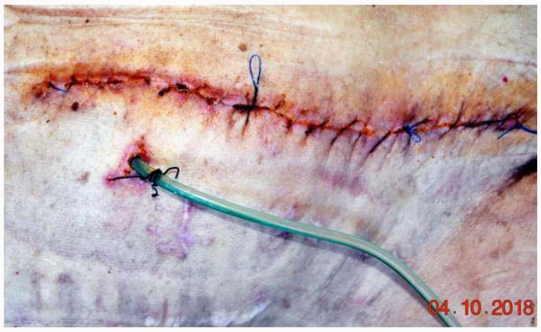

Figure 2: The reconstructed wound with good healing 5 days post the second operation.

donor was suspected. Anti-rejection medications have been indicated including Solumedrol 2 g per day. Ultrasonography confirmed good blood supply of the renal graft. However, macroscopic hematuria persisting since transplantation required hemosubstitution. On July 13th, 2018 cystoscopy was provided and revealed diffuse bleeding. The next day the bleeding still did not stop. CT scans showed perirenal hematoma which was fixed to the kidney graft. Revision operation was indicated. The current situation was evaluated as corticosteroid resistant rejection requiring anti-rejection therapy by anti-thymocyte globulin (Thymoglobulin 400 mg). In order to prevent CMV infection systemic administration of ganciclovir was started, followed by ganciclovir. The complex treatment proved to be successful and the graft function started to recover. Both the diuresis and the renal parameters improved gradually. On august 1st 2018 urinic fistula was diagnosed requiring re-implantation of the transplanted ureter along with new introduction of urethral endoprostheses. The post-operative course was complicated by laparotomy wound disruption and dehiscence. On August 14th 2018 surgical debridement of the disrupted wound was provided followed by NPWT device application. Altogether 11 NPWT system changes have been done. In spite of this treatment no wound healing progression could be observed. The abdominal wound remained open with exposed protruded transplanted kidney and purulent discharge from the open abdominal wound. The results of wound cultures confirmed the presence of 3 pathogenic bacterial strains-Pseudomonas aeruginosa, Klebsiella pneumoniae and Enterococcus faecium. There were clinical signs of urinary tract infection along with two attacks of acute pyelonephritis in the transplanted kidney as well. A complex anti-infective therapy by intravenous administration of vancomycin, ceftazidime, meropenem, linezolid, colimycine and phosphomycine was initiated. As, due to immunosuppressive therapy, the patient´s immunity was severely compromised, intravenous immunoglobulin

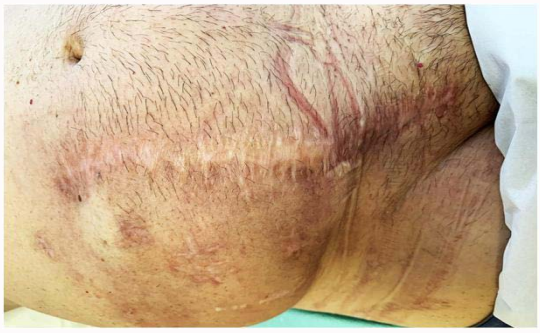

Figure 3: The healed reconstructed abdominal wound 6 months post the second operation.

(Phlebogamma 2 g × 2 g IV (Intravenous)) was administered.

ACDG preparation

Both the cadaveric allogeneic skin grafts and the Acellular Dermis Grafts (ACDG) were prepared in the Central Tissue Bank (CTB) of the Burn Department. The decellularization of ACDG was provided by a new method developed in the CTB by Dragunova et al., [4] briefly the skin grafts procured from cadaver donors under aseptic conditions were transported to the CTB and processed in aseptic class 100 laminar air flow cabinets. Tissue saving processing by novel decellularization methods using initial rinsing of the grafts in a mixture of trypsin and Ethylendiamine Tetraacetic Acid (EDTA) solution for detachment of graft epidermis from its dermis was provided. The processed grafts were decontaminated in a mixture of antibiotics solution, then they were sealed in pre-labelled sterile cryoconservation bags, finally they were placed and stored in deep freezers at 70°C. Before clinical use the grafts were removed from the freezing boxes and were subjected to rapid thawing in a sterile 37°C saline bath.

Kidney salvage and abdominal wound reconstruction

The surgical treatment was scheduled as follows. The first operation in general anesthesia took place on September 12th, 2018 (Figure 1). It was focused on surgical debridement of the open abdominal wound removing all the devitalized tissues, cleansing and decontamination of both the kidney surfaces and the entire abdominal wound area. Protection of the exposed kidney surface has been provided by its coverage using allogeneic skin sheet grafts. Thereafter NPWT system was applied in order to derive the massive wound discharge and stimulate neovascular proliferation in the entire wound area. Five days later the second operation in general anesthesia aiming to reconstruct and close the abdominal cavity was provided. The NPWT system was removed; the exposed kidney was replaced in its original position and covered with ACD sheet grafts, which were fixed by sutures to healthy retroperitoneal structures. The missing areas of peritoneum were replaced by ACD sheet grafts enabling closure of the peritoneal cavity. Large bore abdominal drain was introduced enabling derivation of the excess discharge and topical application of selected antibacterial agents. The healthy remnants of the surrounding abdominal muscles were mobilized and sutured together to prevent herniation. The suture lines were reinforced by ACD sheet grafts sutured to the muscles fascia. The lax peri-wound subcutaneous tissue was mobilized together with the abdominal skin and sutured together in 2 layers. A suction (Redon) drain was placed subcutaneously. Both the abdominal and subcutaneous drains were attached to the NPWT sponge which was placed along the skin suture

line as part of the NPWT system applied. The patient received guided systemic antibiotic therapy according to sensitivity of the bacteria present in the wound. According to the character of the discharge from the abdominal cavity, topical antibiotics were administered at regular (every 3rd day) NPWT system changes until the wound healed and the patient recovered.

Results

The post-operative course of the patient following the second operation was uneventful. The NPWT system was removed as soon as the discharge form the abdominal cavity and inflammatory parameters resolved and the cutaneous wound healed within 22 days. The patient was discharged from the hospital 23 days following the second operation on October 10th, 2018. The patient was on November 14th, 2018 (34 days following dismission) readmitted to the hospital due to acute pyelonephritis of the graft with perirenal lymphocele. He was treated successfully by puncture and drainage of the perirenal collection and systemic antibacterial therapy. The abdomen remained closed and the wound healed. At follow-up visit at 6 months since final wound closure the abdominal scar was found firm, without signs of dehiscence or herniation. The function of the transplanted kidney was good.

Discussion

Post abdominal surgery interventions, in cases where complications occur, are generally very time consuming and costly. In repeated wound dehiscence followed by infection and tissue loss the reconstructive procedures are problematic and require a team approach including not only experienced both abdominal surgery and plastic and reconstructive surgery specialists, but also other specialists such as nephrologists, transplantation, infectology, clinical pharmacology and other experts as well. In our case this was much more difficult because of coincidence of wound problems, tissue loss, graft exposure, infection, and threat of the graft rejection. We could not find any similar case reports or guidelines in the literature. The major problems to solve in our patient represented treatment of the wound and the exposed graft infection, graft protection by temporary/later permanent coverage, open abdomen closure, achievement of good infected wound and abdominal cavity healing in an immunosuppressed patient without compromising the take of the transplanted organ. Nowadays, a gold standard for abdominal wall fascia reconstruction is to use synthetic meshes [5]. However, their use is contraindicated in cases of infection. In order to avoid this problem, we decided to use human Allogeneic Acellular Dermis (ACD) grafts as an alternative to synthetic materials. The ACD grafts´ mechanical strength is comparable to synthetic materials. They can be fixed in place by absorbable antibacterial sutures. Due to lack of immunogenicity they incorporate rapidly in the wound area, they serve as biological scaffolds for autologous cells and vessels ingrowth, and they are finally replaced by autologous tissue by time [4,6-8]. Positive effects of NPWT have been reported in similar cases of wound problems following renal transplantation [6]. Our philosophy in using NPWT in wound problems is that NPWT is an excellent tool which can reduce the healing time, remove the excess wound discharge along with reducing bacterial colonization and stimulation of angiogenesis in the wound area. However, before application of NPWT, thorough surgical debridement and cleansing of the wound area is of utmost importance in order to achieve the full desirable effects of NPWT and to reduce the time for wound preparation for final closure.

Conclusion

Relatively rapid and uneventful final permanent abdominal wound closure along with salvage of the exposed and infected renal transplant with good final function did prove the rationale of our novel problem solving complex therapeutic modality in treatment of abdominal wall disruption resulting in wound infection and exposure of the renal transplant.

Funding

The research was supported by the Slovakian Ministry of Education grant VEGA 1/0398/17.

References

1. Lau NS, Ahmadi N, Verran D. Abdominal wall complications following renal transplantation in adult recipients - factors associated with interventional management in one unit. BMC Surgery. 2019;19:10.
2. Dean PG, Lund WJ, Larson TS, Prieto M, Nyberg SL, Ishitani MB, et al. Wound-healing complications after kidney transplantation: a prospective, randomized comparison of sirolimus and tacrolimus. Transplantation. 2004;77(10):1555-61.
3. Hernández D, Rufino M, Armas S, González A, Gutiérrez P, Barbero P, et al. Retrospective analysis of surgical complications following cadaveric kidney transplantation in the modern transplant era. Nephrol Dial Transplant. 2006;21(10):2908-15.
4. Dragúňová J, Kabát P, Babál P, Mrázová H, Boháč M, Krajčíová Ľ, et al. Development of a new method for the preparation of an acellular allodermis, quality control and cytotoxicity testing. Cell Tissue Bank. 2017;18(2):153-166.
5. Piccoli M, Agresta F, Attinà GM, Amabile D, Marchi D; "Complex abdominal wall study" Italian Collaborative Group. "Complex abdominal wall" management: evidence - based guidelines of the Italian Consensus Conference. Updates Surg. 2018;577-6.
6. Shrestha BM, Nathan VC, Delbridge MC, Parker K, Throssell D, McKane WS, et al. Vacuum-assisted closure (VAC) therapy in the management of wound infection following renal transplantation. Kathmandu Univ Med J (KUMJ). 2007;5(1):4-7.
7. Carlsson AH, Gronet EM, Rose LF, Chan R. Clinical Applications of Acellular Dermal Matrices. In Reconstructive Surgery. 2016;978.
8. Daar DA, Gandy JR, Clark EG, Mowlds DS, Paydar KZ, Wirth GA. Plastic Surgery and Acellular Dermal Matrix: Highlighting Trends from 1999 to 2013. World J Plast Surg. 2016;5(2):97-108.