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En-Bloc Transplant of the Liver, Kidney and Pancreas: Experience from a Latin American Transplant Center

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Data Interpretation D
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Case series

Patient: Male, 38 • Male, 48
Final Diagnosis: En-bloc transplantation (liver, kidney, pancreas)
Symptoms: Encephalopathy • adynamia • ascites • asthenia
Medication: —
Clinical Procedure: En-bloc transplantation
Specialty: Transplantology

Objective: Unusual setting of medical care





Background: En-bloc transplantation is a surgical procedure in which multiple organs are transplanted simultaneously. It has some similarities with multi-organ transplantation but offers certain advantages.

This report highlights the experience of our interdisciplinary group regarding the treatment and follow-up of patients who received en-bloc transplantation, with the aim of encouraging the development of this surgical technique.

Case Report: The first case is a 38-year-old patient with type 1 diabetes mellitus, liver cirrhosis, and chronic kidney failure who received an en-bloc transplant of the liver, pancreas, and kidney with no intraoperative complications. He had a prolonged hospital stay due to anemia and systemic inflammatory response syndrome, which were resolved successfully. At follow-up, he had no requirement for insulin or for dialysis, or for new interventions. The second case describes a 48-year-old patient with type 2 diabetes mellitus, renal failure, and liver cirrhosis who received an en-bloc transplant of the liver, pancreas, and kidney with no complications. During the post-operative period, the patient suffered a possible episode of acute tubular necrosis, which evolved towards improvement, with a tendency to normal metabolic and renal functioning, with no additional events. The patient is currently in follow-up and is insulin-independent.

Conclusions: En-bloc transplantation is a safe procedure, which is technically simple and which achieves excellent results. This procedure is indicated in patients with end-stage renal disease, cirrhosis, and diabetes mellitus that is difficult to control.

MeSH Keywords: Diabetes Mellitus • Kidney Failure, Chronic • Liver Cirrhosis • Organ Transplantation
Full-text PDF: <http://www.amjcaserep.com/abstract/index/idArt/901554>

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Background

En-bloc transplantation is a surgical procedure in which multiple organs are transplanted simultaneously. The technique requires a shared vascular anastomosis and has some similarities to multi-organ transplantation [1,2]. According to the case reported by Tzakis et al. [3], the small size of the major arteries and veins in the graft during the conventional liver, kidney, or pancreas transplantation increases the technical difficulties of this procedure and the prevalence of vascular complications [3]. As such, en-bloc transplantation emerges as an alternative with many procedural advantages.

The purpose of this report is to encourage the development of this surgical technique by constructing a record of the experiences of our interdisciplinary group in the treatment and monitoring of patients who have received en-bloc transplantations.

Case Report

Case 1

In 2011, a 38-year-old male was referred to the Unit of Hepatobiliary Surgery and Transplantation at the Fundación Valle del Lili. He had been diagnosed with type 1 diabetes at the age of 17 and, since 2007 diagnosed with chronic kidney failure which was managed with peritoneal dialysis. Additionally, he was diagnosed with liver CHILD A cirrhosis secondary to non-alcoholic steatohepatitis (NASH) and hypothyroidism.

On September 22, 2011, the patient received an en-bloc liver, pancreas, and right kidney transplant. The transplanted organs were acquired from a 17-year-old Afro-Colombian male patient, of blood group B, with a height of 170 cm and a weight of 55 kg with a diagnosis of brain death due to firearm wound in the skull.

During the retrieval of the organs, 8 L of Custodiol HTK solution were used. Within the allocation criteria of the receiver, the following were taken into account: ABO blood group compatibility, size, and weight. According to PRA (panel reactive antibody) testing, anti-HLA class I of 4% and HLA class II of 13.33% were reported.

The transplantation procedure was executed with a cold ischemia of 210 minutes. The transplant bloc consisted of liver, pancreas, and right kidney with inferior vena cava and aorta tube with a right renal artery, upper mesenteric artery, and the celiac trunk. During surgery, a cholecystectomy was performed and an extension of the iliac from the donor with continuous suture and proximal closure of the aorta with 5-0 Prolene suture. Jointly, a splenectomy was performed on the bloc of the receiver.

During the surgical procedure there were no major complications. The patient was transferred to the intensive care unit (ICU) with a stay of 21 days; the patient experienced a complex evolution due to a reduction in hemoglobin, which required the transfusion of red blood cells. Additionally, during the postoperative period, the patient presented systemic inflammatory response syndrome, which was successfully resolved with antibiotic therapy. With regards to the renal transplant, there was a slow but adequate improvement; in the initial period, the patient presented metabolic acidosis and renal dysfunction, with no need for dialysis. There was also an excellent evolution of the liver graft evidenced by means of imaging findings and liver function tests that were quickly normalized. Similarly, the evolution of the pancreatic graft was good; immediately after the intervention, the tests were very close to normal, so that the insulin requirements were minimal.

In terms of immunosuppression therapy, tacrolimus 4 mg every 12 hours and mycophenolate mofetil 500 mg every 12 hours were administered. The Surgery and Transplantation Group is currently monitoring the patient; he is currently receiving the same immunosuppression medication, but is receiving 1 mg every 12 hours of tacrolimus and half of the initial dose of mycophenolate mofetil (250 mg every 12 hours). The patient has not required any further surgical interventions, nor has he shown any major alterations in his serum tests that would indicate any alteration in the functioning of the transplanted organs.

The patient currently presents insulin independence, has not required any dialysis, and has an acceptable hepatic metabolism.

Case 2

In 2014, another male patient was referred to our center. The patient was 48-years old, had lived with type 2 diabetes mellitus for over 30 years, had chronic stage renal failure, and had liver cirrhosis of unknown cause of four years' evolution.

The patient received an en-bloc transplant of the liver, pancreas, and right kidney on May 15, 2015. The donor was a 19-year-old woman, blood group O, who was 68 kg and 1.65 m tall, with a diagnosis of brain death due to a firearm wound in the skull.

The organs received Wisconsin (UW) liquid preservation with a total of 8 L performed with a cold ischemia of 480 minutes; transfusion of 5 units of red blood cells was necessary. The surgical procedure was carried out without complications and following the en-bloc transplant surgery as presented in the previous case. The receiver was assigned according to the ABO blood group compatibility, size, and weight.

The patient was taken to the ICU for 9 days; after 24 hours he was hemodynamically stable and there was a gradual

normalization of his liver tests. The patient did, however, present a torpid evolution of the renal graft with high nitrogen and oliguria. This event was related to a possible event of acute tubular necrosis due to bleeding. The patient evolved towards metabolic improvement, with a tendency to normality for his hepatic and renal profile, with adequate urinary flows.

The patient was hospitalized for eight more days, presenting a satisfactory evolution, with no additional clinical events. He was discharged with no requirement for insulin and with immunosuppression therapy of tacrolimus 3 mg every 12 hours, mycophenolate mofetil 1 g every 12 hours and prednisolone 20 mg per day.

The patient is currently under follow-up by the Surgery and Transplantation Group and has no dependence on insulin. The patient has no additional complications, is under the same immunosuppression regime, with tacrolimus 1 mg every 12 hours and half the dose of mycophenolate mofetil; the prednisolone was withdrawn.

Detailed description of the surgical procedure

Organ retrieval

“Bloc” transplantation of multiple organs can facilitate recovery in an individual that has concurrent diseases [3], in the cases presented here, diabetes, chronic renal failure, and severe hepatic dysfunction. The exact procedure followed for this type of transplantation will be described below, from retrieval of the organs to their transplantation.

In the initial stages, we started with dissection of the retroperitoneum, exposing the large vessels in the retroperitoneal space, and then lifting the mesentery of the small intestine, exposing the left renal vein and identifying and repairing the upper mesenteric artery. The arterial and venous cannulation was prepared, dissecting and repairing the right and left iliac arteries with silks. The procedure was continued by repairing the inferior mesenteric artery, and then the lower mesenteric vein was dissected (where the stent will be placed to infuse the preservation fluids toward the portal circulation). A median sternotomy was performed and the pleural was accessed, where the descending thoracic aorta was identified and dissected as the site where the clamp will be placed.

Upon completion of these steps, 25,000 IU of regular heparin was applied by the central venous catheter (CVC) into the vena cava. After three minutes, the left iliac artery was ligated and the aorta was cannulated, through the right iliac artery (after ligation of the distal part). Similarly, the lower mesenteric vein was clamped, once the cannulae were assured and the thoracic aorta was clamped in the previously established

site, infusion of the preservation liquid was initiated via the aorta and porta (4 L per aorta and 1 L per porta, respectively). The exsanguination was done in the thorax, via sectioning of the right atrium or cannulating the inferior vena cava.

Ice was placed in the abdominal cavity and the organs were harvested; in this case, in particular, the liver, pancreas, and right kidney are removed en bloc. It was necessary to cut the left renal artery and vein at their connection with the aorta and cava respectively (the left kidney would be handled as it would be in the living donor, to enable the realization of anastomosis in its respective recipient).

For the recovery of the bloc of organs, dissection of the retroperitoneum was performed, from the chest cavity, in the direction of the flow, preserving the whole segments of the aorta and cava. In the case of the cava, a section was made in the lower segment of the junction with the right renal vein; with regards to the aorta, the left renal artery was sectioned, from its point of origin.

The pancreatic resection was supported with the use of mechanical sutures in the duodenal bulb and in the fourth portion of the duodenum. Stapler lines are passed in the zone of the transverse mesocolon (middle colic vessels) and in the mesentery root (superior mesenteric artery and vein). Ligature was used in the remaining areas of retroperitoneal adhesion in order to liberate them completely. The kidney was dissected from the ureter to the most distal part and it was sectioned for removal.

The left kidney and iliac vessels were extracted from the donor.

The inferior vena cava was closed, immediately caudal to its arrival to the right renal vein, with a vascular suture 4-0; in a similar way, the hole in the left renal vein was closed. With regards to the aorta, this was closed in the cephalic portion and the ostium of the left renal artery, with a 4-0 vascular suture (Figure 1). Verification was undertaken, via the pneumatic test, to ensure that there were no leaks in the arterial and venous vascular pathways.

Description of the transplant en-bloc

As already known from conventional liver transplants, after practicing the total hepatectomy on the recipient, the structures of the hepatic porta are rounded and dissected, ready for re-anastomosis. For this type of procedure, however, only the portal vein is anastomosed to the portal vein of the donor.

The arterial irrigation of the grafts was carried out through the interposition of a graft of donor iliac vessels to the anterior infra-renal part of the aorta of the receiver. Venous drainage

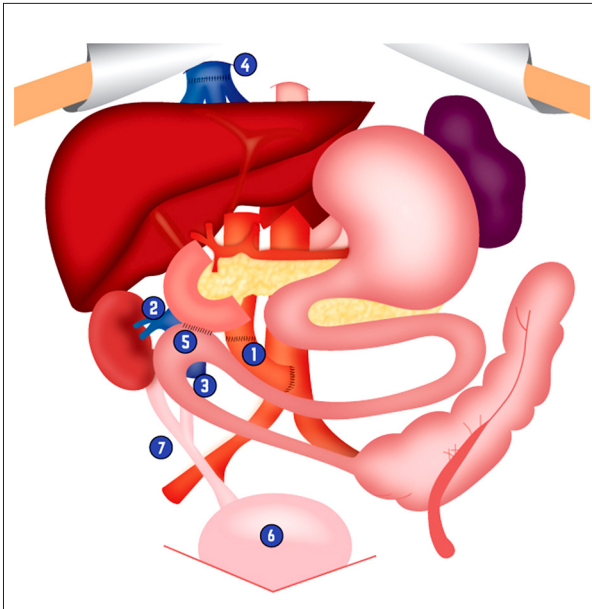


Figure 1. Scheme of the en-bloc transplant of liver, kidney, and pancreas. 1. Aortic graft to native aorta anastomosis. 2. Right kidney vein – Left renal vein ostium closed. 3. Inferior vena cava of the graft closed. 4. Graft hepatic veins ostium to native vena anastomosis. 5. Duodenal – jejunal anastomosis. 6. Bladder. 7. Uretero-Ureteral anastomosis. Detailed description in the text.

was performed with conventional anastomosis between the side of the supra-hepatic cava of the donor and the ostium of the supra-hepatic veins of the receiver. Once the components were reperfused, the donor duodenum was anastomosed, with the handle of the small intestine of the receiver in the latero-lateral position. Finally, the ureter was implanted end to side to the native ureter, leaving a double J catheter.

Finally, an in-depth review of hemostasis and perfusion of the organs and closure of the cavity was carried out, leaving Jackson Pratt surveillance drains.

Discussion

Multi-visceral transplantation [1–3] and en-bloc transplantation offers a lower level of difficulty in terms of vascular reconstruction [4]. With adequate technical and surgical expertise, the procedure should be considered a first-line treatment of choice for patients with multiple organ failure.

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These two cases are the first cases undertaken by our group at the Fundación Valle del Lili in Cali, Colombia, in which transplantation was performed en-bloc as a successful treatment for patients with the pathologies described. There is a gap between the first and second case because there were no more patients who had indication for an en bloc transplant. This treatment was shown to be an effective option for certain patients, and is expected to decrease the number and severity of complications and to increase the survival rate.

Although there are few reports in the literature of multiple cases of en-bloc transplantation [5], which makes it difficult to reach conclusions as to the long-term outcome of patients undergoing this treatment, it is possible to assume that this is a feasible treatment for patients with diabetes and advanced stage hepatic and renal failure. Not only should this technique be considered in pediatric patients with rare diseases such as Wolcott-Rallison syndrome [6], but in some other patients (both pediatric and adults). Given the aging population and the higher prevalence of chronic diseases in the elderly population, there is an increasing likelihood of patients developing organ failure [7]. Patients with catastrophic diseases of the autoimmune and genetic type should also be considered for such surgery, especially if they have an early presentation of symptoms and they meet the criteria for receiving this type of surgery; such a surgery would certainly have a large impact on their quality of life over the long term.

Conclusions

To the best of our knowledge, this is the first report regarding this type of transplantation procedure in Colombia. En-bloc transplantation of the liver, kidney, and pancreas is safe, technically feasible, and offers results that are comparable to transplantation of the different organs in isolation.

The experience of managing these patients enables the consolidation of reference centers for advanced surgery and organ transplantation that provide cutting-edge treatments to selected patients.

Statement

All authors certify that they have no conflict of interest.

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