Preliminary Experience on Laparoscopic Abdominal Surgery in Transplant Patients

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Abstract—It is no doubt that laparoscopic surgery is at least not inferior to open surgery in most of the abdominal surgical procedures following the enthusiastic effort by many experts around the world. However, there is still very few studies of such operation in the transplant patients. Objective of this paper is to share our experience with more laparoscopic surgeons in transplant patients with good surgical outcomes. We reported a total of 6 cases who underwent laparoscopic surgery; four liver transplant cases and two for kidney transplant. Two of them received laparoscopic surgery for presumed acute appendicitis in 8 months after deceased donor liver transplant (DDLT) and 16 months after deceased donor kidney transplant (DDKT) respectively. A case of asymptomatic small right colon cancer one month after living donor liver transplant (LDLT) underwent laparoscopic right hemi-colectomy and radical lymph node dissection. The fourth patient sustained chylous ascites underwent laparoscopy for diagnosis and drainage 6 months after DDLT. A case of morbid obesity with BMI of 41 kg/m2 received laparoscopic sleeve gastrectomy three years after DDKT with good response. The last patient with incisional hernia of subcostal wound received laparoscopic hernia repair with dual mesh about three years after DDLT. All the patients had been operated without any significant morbidity and recovered uneventfully with all the benefits of MIS. We would like to emphasize that laparoscopic surgery for major operation in abdominal surgery is feasible, safe, and can also obtain excellent recovery as in non-transplant patients.

Keywords—Laparoscopic surgery, organ transplant, immunocompromised patients

I. INTRODUCTION

Generally, large laparotomy and major open surgery like pancreas transplantation, intraabdominal renal transplant, or liver transplant is considered to be relative (even absolute) contraindication to laparoscopy. These patients, due to extensive co-morbidity and immunocompromised status are also known to have higher incidence of postoperative complications. In addition, acute abdomen in patients with organ transplantation is not uncommon and usually associated with surgical and/or medical complications including death. The prompt diagnosis and management of acute surgical conditions in immuno-compromised patients are of critical importance.

On the other side, laparoscopic surgery has been adopted in many surgical procedures and is associated with less incidence of postoperative complication compare to open approach. This benefit may be more significant in transplant patient. Therefore, there is dilemma if in the case of need to remove gallbladder or any other elective or emergent surgery, laparoscopic option should be considered. Today, given organ transplant represents the standard of care in many end stage organ disease with excellent outcomes, laparoscopy and organ transplant will be one of the most continuously evolving challenges in medicine and their recent combination has represented an astonishing scientific progress. Here we report several kidney and liver transplant patients who underwent different kinds of laparoscopic surgical procedures with uneventful outcomes.

II. CASE REPORT

1) Case I
A 50 year-old lady, who underwent cadaveric renal transplantation 16 months before admission, complained of sudden onset right lower quadrant (RLQ) and vomiting for one day. The transplant kidney was implanted in right low abdomen extraperitoneally through a curvilinear incision named Gibson incision. The renal artery and vein were anastomosed to the external iliac artery and vein respectively. The ureter was implanted into the urinary bladder with anastomosis between the tip of the ureter and the bladder mucosa, then partially covering this with bladder muscularis (Lich technique). No definite history of fever nor shifting pain. No definite history of chill, frequency nor dysuria. Her renal function was quite normal with creatinine level of 1.0 mg% at the regular follow up three days before this episode. On physical examination, she was in acute ill looking with mild grade fever and marked tenderness with mild muscle guarding was detected in RLQ medial to the transplant kidney and just lower and lateral to the umbilicus with marked leukocytosis. There was moderately high white blood cell (WBC) count (50-75/cmm) and microscopic hematuria in urine analysis. Plain abdominal x-ray showed local ileus in right lower quadrant (RLQ) and urgent computed tomography (CT) scan at Emergency Room (ER) showed dilated appendix with infiltration and a fecalith inside. It located close to the mid-abdomen and pushed by the transplant kidney anteromedially (figure 1). Although urinary tract infection was considered as differential diagnosis, we arranged laparoscopy for exploration as acute appendicitis was highly suspected. We found an edematous, inflamed and enlarged appendix with tumor formation in right low abdomen (figure 2) and laparoscopic appendectomy was done smoothly. Her postoperative course...
was uneventful and was discharged on postoperative day (POD) 3.

Fig.1 The appendix with fecalith (small arrow) was pushed to medial aspect by the transplanted kidney (big arrow)

Fig.2 Tumor formation of appendicitis (2a) and enlarged appendix (2b) by laparoscopic view in a patient with deceased donor liver transplantation. 2) Case II

A 52 y/o gentleman sustained right abdominal pain radiating to right flank with nausea and vomiting several hours before arrival to emergency department, 8 months after DDLT. The cirrhotic liver was totally removed through an inverted L incision with left extension in upper abdomen and the transplant liver was implanted with piggyback technique. It meant the blood flow in the inferior vena cava (IVC) was not occluded during anhepatic state and cavocavostomy was done for outflow from liver. Then the native main portal vein (PV) was anastomosed to the donor liver portal vein and common hepatic artery (HA) was anastomosed to the donor hepatic artery with aortic Carrel patch. Finally, connection between two common bile ducts was performed without drainage. No definite history of fever, chill, shifting pain nor bowel habit change. He had hepatitis C related liver cirrhosis for more than 10 years followed by hepatocellular carcinoma before transplantation. He suffered from a vague pain and tenderness in right middle portion of abdomen and RLQ without rebound pain and knocking pain. A normal leukocyte count 5456/cmm and normal liver enzyme were noted. A diffuse ileus in right half abdomen on x-Ray study and abdominal sonography revealed dilated appendix in pelvic area. (figure 3). Urgent CT scan also showed dilated appendix and some infiltrations around the cecum (figure 4). Laparoscopy was used for the accurate diagnosis and laparoscopic appendectomy was carried out for acute appendicitis. The pathology proved acute appendicitis and the postoperative course was smooth and uneventful.

3) Case III

This 48-year-old man, a case of HBV & HCV related liver cirrhosis with end stage liver disease (ESLD) underwent living donor liver transplant on 2009/11/04 with uneventful outcome. The right lobe liver from his son with graft recipient weight ratio (GRWR) of 1.0 was implanted in orthotopic position. Right hepatic vein (HV) was anastomosed to native right hepatic vein and reconstructed middle HV PTFE graft was used for outflow of segment 5 and 8. Right PV and right HA were anastomosed to the native right PV and right HA respectively. The right hepatic duct was anastomosed to the native right hepatic duct with external stent for drainage. He suffered from vague RLQ intermittent pain without radiation about 6 months after transplant and he also denied obvious body weight loss or general malaise. The CT on urgent showed one suspected small mass in cecum at the base of appendix.(figure 4) The colonoscopy showed a polypoid small mass in cecum and biopsy proved as colon cancer. He received laparoscopic right hemicolectomy for cecal cancer presented as acute appendicitis. We also kept immunosuppressant (IMS) treatment for liver transplantation. And he had flatus passage on POD 3 followed by a good tolerance for oral intake on POD 4 As the condition improved, he was discharged one week after operation. Adjuvant chemotherapy was given for adenocarcinoma, moderately differentiated with lymphnode metastasis and neural invasion.

Fig.3 Dilated enlarged appendix was seen in sonography (arrow) in patient with deceased donor liver transplantation.
4) Case IV

This 56-year-old gentlemen, a case of HCV and alcoholic related end stage liver disease, underwent living donor liver transplant on 2012, July 31. His 27-year-old daughter donated the right lobe liver with reconstructed middle HV using autologous great saphenous vein for segment 5 and 8 weighing 615 grams and the graft-to-recipient weight ratio was 1.18%. Right HV was anastomosed to native right HV and the reconstructed middle HV was connected to IVC. Right PV, right HA, and right hepatic duct were anastomosed to native counterparts respectively. No significant dilated lymphatics or leakage of chyloous fluid due to injury of the cysterna chilii and lymphatics during operation. We used anti-CD 25 (Basiliximab) for induction therapy and calcineurin inhibitor (CNI, cyclosporine), steroid, and mycophenolate acid (myotic) as Page 5 of 22 ScholarOne, 375 Greenbrier Drive, Charlottesville, VA, 22901 Experimental and Clinical Transplantation For Peer Review maintenance IMS. Sirolimus was added to reduce cyclosporine dose early (two weeks after operation) owing to poor renal function. During the first three months, Sirolimus level remained at 8–15 ng/ml and CSA level remained low (60-100 ng/ml). The postoperative course was uneventful and the patient was discharged at POD 32 without any complication. Until the 6th postoperative month, no accumulation of free fluid was noted by routine monthly abdominal sonography. About 6 months after transplantation, his abdomen became distended and peri-umbilical pain radiating to his back associated with bilateral lower limb numbness, aggravated by lying on his back. The Sirolimus level was high with the trough level of about 22.4 ng/ml at that time. Abdominal sonography showed new-onset ascites, and laparoscopic examination showed about 1000 mili-liters of milky fluid (figure 5) and no peritoneal carcinomatosis nor enlarged lymphnodes seen. Chylous ascites was proven by elevated ascites triglyceride concentration (449 mg\%, normal <200 mg\%) in ascites fluid. No definite other finding was obtained by cytology, culture, and thoraco-abdominal computed tomography. He was then treated with total parenteral nutrition for about one month combined with sandostatin (2 weeks) following the initial failure of conservative treatment. Sirolimus dose was also reduced from 1 mg daily to 1 mg every other day to lower the serum level to 3-5 ng/ml. The chyloous ascites gradually decreased in volume and changed to serous ascites during the latter part of the clinical course and remitted uneventfully. Residual abdominal fullness especially after meals and left leg lymphedema disappeared one month after cessation of Sirolimus during follow up.

5) Case V

This 45 y/o male, a case of early right renal cell carcinoma treated by right nephrectomy in April 2010, underwent deceased donor renal transplantation about 6 months after nephrectomy (on 2010/10/24). The transplant kidney was implanted in right low abdomen extraperitoneally through a Gibson incision in right low abdomen. The renal artery and vein were anastomosed to the external iliac artery and vein respectively. The ureter was implanted into the urinary bladder by Lich method. He had past history of diabetes, hypertension, hepatitis C and gout for many years with medical treatment. He was obese (BMI >35) before transplantation and gaining weight in post transplant period without any hormonal abnormality though taking low dose (5mg/day) of steroid for several years after transplantation. His body weight increased 10 Kg within 2 months after the transplant. We applied conservative treatment including diet and increasing physical activity for him but in vain. During the 3 years follow-up, one episode of acute T-cell rejection was noted. We kept his Tacrolimus level around 8 and his creatinine was about 1.5. The patient received laparoscopic sleeve gastrectomy about 3 years after transplant (figure 6). No definite severe adhesion or abdominal visceral change though under maintenance IMS and the tissue texture and consistency were also normal except moderate to severe fatty liver seen. He was transferred to intensive care unit for immediate postoperative care and then back to ward on POD 2. The condition improved gradually without leak nor obstruction. The diet was advanced from liquid diet to soft diet smoothly and was discharged on POD 9 for OPD follow up. He was also kept on his preoperative IMS dose and no definite change in renal function. One month after operation, he lost 13 Kg and his blood sugar level back to normal range without any oral hypoglycemic agents. Also his immunosuppressant dosage could be reduced in order to obtain the same drug level before the operation. The excess body weight loss was more than 50% from 138kg to 86kg within 6 months after the surgery.
CASE VI

This 49 y/o man, a case of chronic hepatitis B with decompensation received cadaveric liver transplantation on 2012/10/09. The cirrhotic liver was removed through a bilateral subcostal incision with xiphoid extension and the new whole liver was implanted with piggyback technique. The native main PV and common HA were anastomosed to the donor main PV and aortic Carrel patch respectively with good flow. Finally, connection between two common bile ducts was performed without drainage. The postoperative course was complicated with intra-abdominal abscess and wound infection. He has abdominal protruding mass, soft and nontender, for several months and underwent laparoscopic hernia repair about half year after transplant. During laparoscopic surgery, an oval shaped hernia defect at the upper part of left wing and its junction with xiphoid extension of the Benz incision. The defect was 15x10cm size and was three times the size of preoperative evaluation due to multiple loculated fascia defects not easily palpable from outside (figure 7). The dual mesh was used for covering of the defect (figure 8). The postoperative course was smooth and he was discharged home on POD 5.

III. DISCUSSION

There is increasing number of organ transplant patients in every part of the world. In 2008, over 27,000 patients received solid-organ transplants in the United States alone. At the same time both the short term and long term survival for organ transplant are also increasing with time. The 5-year survival of living donor renal transplant and liver transplant has been reported at 91% and 79%, respectively [1].

With the increasing number with survival rate, more and more patients with surgical diseases both for acute and chronic condition, general surgeons have a greater likelihood of encountering a post-transplant patient now than ever before [2].

Additionally, abdominal surgery in transplanted patients is not infrequent, with reports of up to 10% of renal transplant patients experiencing a severe gastrointestinal (GI) complication within 10 years and 24% of liver transplant patients having another surgical procedure within 10 years [2-4]. It should be emphasized that these patients often present with surgical diseases in a manner unlike their immunocompetent
counterparts and need early diagnosis and aggressive intervention to achieve cures.[5]
As we are relatively lack of adequate knowledge for diagnosis, treatment and surgical procedures in such complicated patients together with high risk for postoperative complication in these immunocompromised patients and possible insult on the transplant organs, it is not uncommon to delay any kind of intervention leading to negative sequel with higher morbidity and mortality.

Even the most common disease in population like acute appendicitis, early diagnosis is not that easy.
According to the literature there were many reports of delayed diagnoses, misdiagnoses, operation on complicated acute appendicitis instead of early simple appendicitis with poor outcomes. [6]
On the other hand, if the surgery is strongly indicated, we usually tried to use open method rather than laparoscopic method, with the idea that such a patient might have difficult dissection due to severe adhesion, easily injured viscera, poor healing with anastomotic leak and easy bleeding.
However, laparoscopy potentially offers several advantages specific to this immunosuppressed population of patients like less wound-related problem, reducing hospitalization and earlier resumption of oral intake together with oral immunosuppression.[7]

Laparoscopic cholecystectomy was first performed in kidney transplant patient in 1991[8]. Its’ minimally invasive nature is more appropriate than the conventional method for transplant patients, because of its low morbidity rate [9]. However, laparoscopic cholecystectomy is extremely difficult to perform in transplant patients with complications like less wound-related problem, reducing hospitalization and earlier resumption of oral intake together with oral immunosuppression.[7]

Our third operation was done on a patient with cecal cancer presenting as acute appendicitis one and a half months after a living donor liver transplantation. We were worried about the severe vascular adhesion and portal hypertension in transplant patients especially in early postoperative period of liver transplantation. Surprisingly, we encountered only mild to moderate congestion with minimal bleeding tendency in the operative field and no definite engorged vessels were seen as in the patients with severe liver cirrhosis with portal hypertension. It may be due to good recovery of liver function and portal hypertension after the liver transplantation.
The operative time, blood loss for laparoscopic appendectomy and colectomy, and hospital days were comparable with non-transplant patients.
We also tried to use laparoscopic technique in a case with post liver transplant chylous ascites. Laparoscopy not just to make sure the chylous ascites but also it was helpful to rule out the common etiology of chylous ascites like intraabdominal neoplasm (lymphoma) and carcinomatosis which could not be detected in CT and /or Magnetic and Resonance Imaging.. It also let us to obtain more time and confidence to fight with aggressive medical treatment in this difficult case without any delay because of the causes rather than surgical injury or poor healing were excluded.
The fifth patient underwent laparoscopic sleeve gastrectomy about 3 years after cadaveric kidney transplant. As we all know bariatric surgery of several types was now widely substituted by laparoscopic technique in non-transplant patients due to less cardiopulmonary complication compare to upper midline incision in open method, better wound healing and very low risk of wound dehiscence. There were also several reports in literature about the laparoscopic bariatric surgery in transplant patients with good outcomes. [10-12].
No severe adhesion was seen during preparation for repair and most of them used dual mesh for repair and no significant high infection rate both for intra-abdomen and trocar wounds was seen. We also realized that laparoscopic technique detected accurate extent of the defect that might be missed in conventional open method.
Although extensive adhesion was seen in our patient with liver transplant, it was quite easy to dissect without any severe vascular adhesion, abnormal bleeding tendency, and fragile bowel wall.
In addition, we may also be worried about the change of blood flow in transplant organ due to persistently high abdominal pressure during laparoscopic surgery. The liver function and renal function in the postoperative period documented that they were not affected by laparoscopic technique. Doppler ultrasonography examined intraoperatively, on post operative day 1, and day 7 for both renal and liver transplant patients didn’t reveal any abnormal perfusion change during operation under 15mmHg of intraabdominal pressure.
We may also worried about the abnormal fluctuation of the IMS level in the postoperative period that might be associated with rejection and damage of the transplant organs. IMS dose in these patients were not necessarily changed before and after the operation and the drug levels were quite stable because we could continue or start oral IMS early on the POD day 1 even for the UGI surgery...
Transplant patients usually become stable in the late postoperative period (2 to 6 months) when immunosuppressant drugs are decreased as the allograft functions well and risk of rejection decreases after the first 6 months.. Therefore, it may make sense to delay them for up to 6 months if possible, of course, has to be balanced with the urgency or risk of delaying the surgical procedure. [1,13]

IV. CONCLUSION
The extensive medication list of transplant recipients frequently seems complicated to caregivers with limited experience, often causing hesitation in evaluating these patients as surgical candidates. Despite commonly held concerns, a large number of studies have demonstrated that immunosuppression is not a contradiction to surgery and good outcomes can be expected in the majority of patients. [2,14-
In general, as long as the surgeon adheres to basic surgical principles with frequent reevaluation and a low threshold for operative intervention, the disease processes should be manageable, with good outcomes. A skilled laparoscopic surgeon should always offer the immunocompromised patient the laparoscopic alternative when available and feasible. [2,19-22]

V. REFERENCES


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