Transplantologiya - 2016. - № 1. - P. 6-12.

Endoscopic techniques for diagnosis and correction of complications after retroperitoneal pancreas transplantation

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Relevance. *Timely diagnosis and treatment of postoperative complications after pancreas transplantation is an actual problem of modern clinical transplantation.*

Purpose. *The assessment of the endoscopy potential for the diagnosis and management of postoperative complications after pancreas transplantation.*

Materials and methods. *Since October 2011, simultaneous retroperitoneal pancreas-kidney transplantation has been performed in 27 patients. In 8 cases, the use of endoscopic techniques allowed a timely identification and treatment of the complications occurred.*

Conclusions. *Endoscopic techniques proved to be highly efficient in the diagnosis and treatment of surgical complications and immunological impairments after retroperitoneal pancreas transplantation.*

Keywords: pancreas transplantation, esophagogastroduodenoscopy, surgical complications, endoscopic hemostasis, rejection.

Introduction

Pancreas transplantation is reasonably considered the treatment of choice for patients suffering from type I diabetes complicated by end-stage diabetic nephropathy [1-6]. A retroperitoneal pancreas transplantation with a duodeno-duodenal anastomosis is considered by some authors as one of the most physiological methods [7-10]. The main advantage of the pancreas graft (PG) retroperitoneal localization is the delimitation of the pathological process off the peritoneal cavity in case any postoperative complications occur. Moreover, the dudenoduodenal anastomozing makes it possible to evaluate endoscopically the mucosa of the transplanted duodenal segment, to perform necessary diagnostic (endoscopic retrograde pancreatography) and therapeutic manipulations (endoscopic hemostasis in case of ulcerative anastomositis, stenting of the main pancreatic duct (MPD) of donor's duodenum) [11-14]. In the article, the authors have discussed the endoscopic methods to diagnose and treat complications occurring after pancreas transplantation and reviewed their own experience of 27 procedures.

Material and Methods

Since October 2011, a simultaneous retroperitoneal pancreas-kidney transplantation (SRPKT) has been performed in 27 patients with type I diabetes mellitus complicated by end-stage diabetic nephropathy. There were 14 women (51.9%), and 13 (48.1%) men among them, their age ranging from 25 to 51 years old, the mean age was 34 (30; 39) years. Two patients (7.4%) had an overweight, and another one (3.7%) suffered from the 2^{nd} degree obesity; the mean body mass index for all the patients was 21.7 ± 3.8. Blood grouping among the recipients was as follows: O (blood group I) in 12 recipients (44.4%), A (blood group II) in 10 (37%), and B (blood

group III) in 5 (18.5%) patients. The onset of the disease was observed at the age from 4 to 24 years old, mean at the age of 10 (8; 13) years. By the time of transplantation, the disease duration had ranged from 34 to 468 months, the mean duration being 264 (228; 348) months. The period of patient's receiving the renal replacement therapy ranged from 11 to 99 months, the mean being 24.5 (16; 50) months. A long-term hemodialysis had been performed in 15 patients (55.5%), a continuous ambulatory peritoneal dialysis had been made in 7 (25.9%), and 5 recipients underwent a preemptive transplantation. Kidney cold ischemia time ranged from 5 to 13.5 hours (mean 7.5 [7; 8.5] hours). Duodenum preservation period ranged from 7.5 to 12.5 hours, the mean being 10.5 (9; 11) hours. Organ donors were 23 men (85.2%) and 4 women (14.8%), their age ranged from 18 to 41 years, the mean age being 26 (23; 32) years. The histocompatibility index averaged 3 (1; 6). The primary renal graft function with azotemia improvement to normal was observed at day 2 (2; 3) in 25 patients (92.6%), the delayed graft function was noted in 1 (3.7%) patient with azotemia improved to normal at day 8. In 1 patient (3.7%), the early postoperative period was complicated by the development of the humoral rejection refractory to anti-crisis therapy with anti-thymocyte polyclonal antibodies. A pancreatico-renal transplantectomy was performed as a life-saving procedure for that patient. All patients had the primary PG function characterized by euglycemia in the first hours after organ reperfusion.

Surgical technique

The PG was a pancreatoduodenal complex (PDC) including the pancreas and duodenum with stumps closed at both sides. At the stage of pre-transplant treatment, the arterial reconstruction was performed using Y-

conduit (the site of donor common iliac artery bifurcation into the internal and external iliac arteries) to create a common arterial ostium for the PDC. The parts of internal and external iliac arteries of donor Y-conduit were anastomozed to PG superior mesenteric and splenic arteries. The resulting PG common arterial vessel was anastomozed to the recipient's common iliac artery during the surgery. To divert the exocrine secretions, an interintestinal (duodeno-duodenal) "end-to-side" anastomosis of 4 cm in diameter was manually placed suturing the duodenal segment of the transplanted PDC and the lower horizontal part of the recipient's duodenum, using a double-row continuous suture [9].

Diagnostic endoscopy technique and treatment of early postoperative complications

The diagnostic esophagogastroduodenoscopy (EGDS) with a mandatory, per protocol, biopsy of the recipient's duodenal mucosa and the mucosa of the transplanted donor duodenum were performed in all patients at day 5-10. We used GIFQ160, GIFQ180 endoscopes (Olympus, Japan) and EXERA II, III video-endoscopic systems. An endoscopic retrograde pancreaticography was performed to assess the relationship between the MPD system and parapanceratinc fluid collections (leakage). Transpapillary interventions on the major duodenal papilla (MDP) of donor's duodenum were made using Olympus video-gastroscopes (Japan). In case of contrast extravasation out of the MPD system, its decompression was performed by stenting the MPD or MDP with plastic 7F stents. Endoscopic hemostasis was achieved in three steps that included a submucosal infiltration with 0.01% adrenaline solution, a paravasal injection of 25% ethanol solution, and an application of an adhesive film on the bottom of the ulcer defect.

Statistical data processing

Statistical processing of the data obtained in the study was performed using STATISTICA 10.0 software package (StatSoft Inc., USA). In data processing, the mean values (M) and standard deviations (SD) were calculated for variables with a normal distribution. For variables with the distribution different from normal, the medians, and upper and lower quartiles (ME [25-75%]) were calculated. The significant differences of quantitative parameters were estimated using a nonparametric Wilcoxon test, Pearson's goodness of fit chi-square test with Yates correction to evaluate the statistically significant differences of qualitative phenomena. In all kinds of statistical analysis, the differences were considered statistically significant at $p < 0.05$.

Obtained results and discussion

The endoscopic image of duodeno-duodenal anastomosis is shown in Fig. 1 a, b.

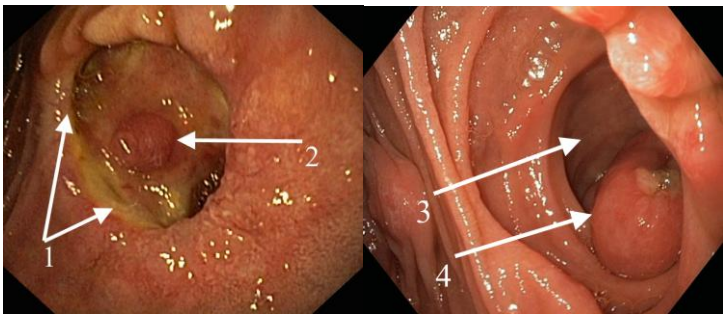

Fig. 1 a, b. Endoscopic image of duodeno-duodenal anastomosis: 1, the intestinal suture line; 2, donor's MDP; 3, donor's duodenum lumen; 4, the invaginated stump of donor's duodenum.

The early postoperative period in 2 patients (7.4%) was complicated by bleeding, its source being a severe ulcer in duodeno-duodenal anastomosis caused by ulcerative anastomositis (Fig. 2).

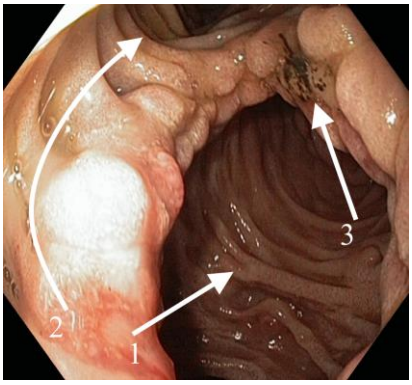

Fig. 2. Endoscopic image of acute ulcer in duodeno-duodenal anastomosis: 1, donor's duodenum lumen; 2, recipient's duodenum lumen; 3, acute ulcer in the duodeno-duodenal anastomosis line.

In both cases, the bleeding was controlled in accordance with a combined endoscopic hemostasis protocol (Fig. 3).

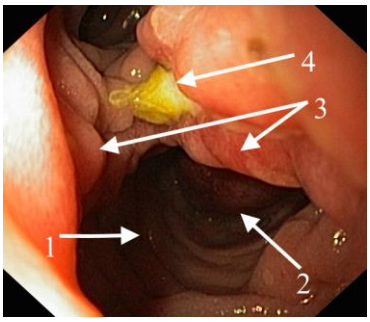

Fig. 3. Endoscopic image of duodeno-duodenal anastomosis ulcer on the 3rd day after endoscopic hemostasis: 1, donor's duodenum lumen; 2, the invaginated stump of the donor duodenum; 3, the duodeno-duodenal anastomosis line; 4, a fibrin-covered anastomotic ulcer.

Another patient (3.7%) experienced an episode of gastrointestinal bleeding from multiple duodenal ulcers in the early postoperative period. At day 15, the endoscopic evaluation demonstrated a marked deterioration revealing necrotizing ulcerative esophagitis with the signs of ongoing low intensity diffuse capillary bleeding (Fig. 4 a), the ulcer of the gastric fundus, partly involving the forestomach, with the signs of sustained hemorrhage (Fig. 4 b.).

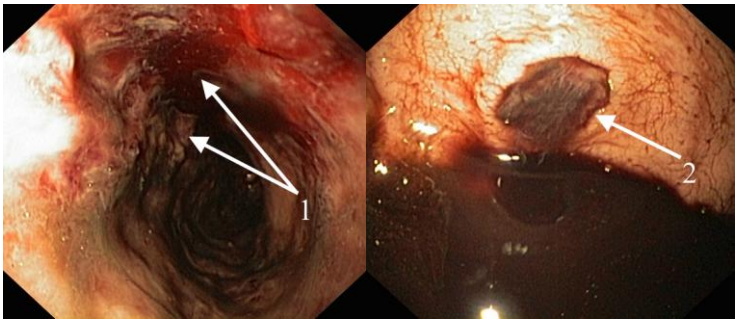

Fig. 4, a, b. Endoscopic image of necrotizing esophagitis, and the ulcer of the gastric fundus: 1, ulcerative necrotic lesions of the esophagus with ongoing low intensity capillary bleeding; 2, an acute ulcer of the gastric fundus.

In 1 patient, a follow-up EGDS examination at 2 years after pancreas transplantation revealed a decompensated cicatrical stenosis of duodeno-duodenal anastomosis, and ulcerative anastomositis (Fig. 5 a, b). The results of a fine-needle biopsy of donor duodenum suggested the diagnosis of ongoing cellular rejection episode from mild to severe. An anti-crisis therapy was conducted with a positive effect. The attempts of MPD stenting aimed at its decompression appeared ineffective.

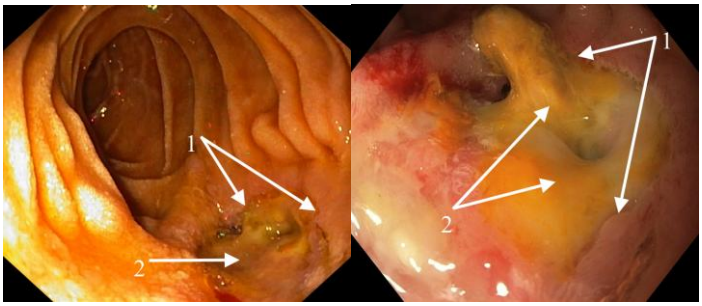

Fig. 5 a, b. Endoscopic image of cicatricial stenosis of duodeno-duodenal anastomosis in a patient with progressive cellular rejection: 1, the duodeno-duodenal anastomosis line; 2, a fibrous tissue covered with fibrin.

On the 5th postoperative day, one of the patients developed an acute humoral rejection refractory to anti-crisis combination therapy with polyclonal anti-thymocyte antibodies (ATGAM), and plasmapheresis sessions. Timely endoscopic monitoring contributed to diagnosing the necrosis of donor duodenum (Fig. 6 a, b), and both grafts were urgently removed that helped to avoid further complications.

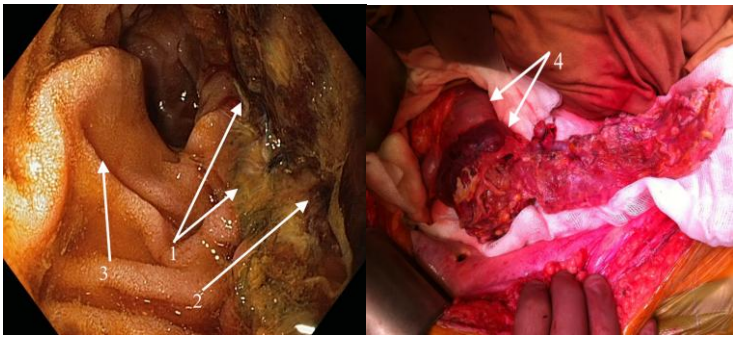

Fig. 6 a, b. Endoscopic image of donor duodenum necrosis: 1, the duodeno-duodenal anastomosis line; 2, donor's duodenum mucosa; 3, recipient's duodenum mucosa; 4, the appearance of recipient's own duodenum (top) and the donor's duodenum (bottom).

In 3 patients, the postoperative period was complicated by clinically significant parapancreatic fluid collections that tended to increase. Endoscopic retrograde pancreaticography revealed a relationship between the MPD system and fluid collections (Fig. 7).

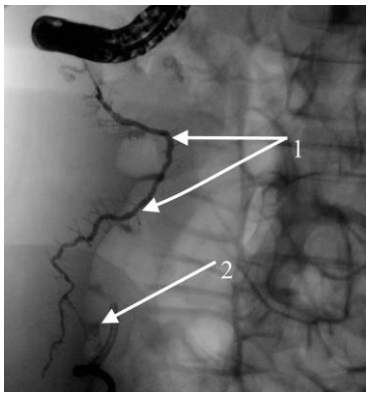

Fig. 7. Endoscopic retrograde pancreaticography: 1, MPD; 2, the contrast leakage beyond the MPD pool.

The endoscopic stenting was performed aiming at the decompression of pancreas graft MPD system (Fig. 8).

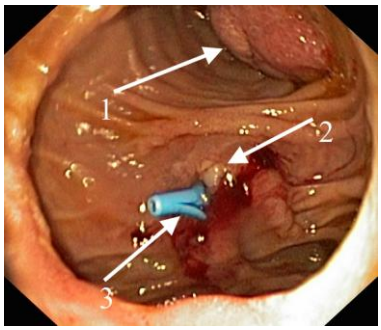

Fig. 8. MPD endoprosthetics: 1, the invaginated stump of donor duodenum; 2, donor MDP area; 3, the stent.

Conclusion

In retroperitoneal pancreas transplantation with duodeno-duodenal anastomosis, the access to donor duodenum stump for endoscopic visualization considerably enhances the diagnosis and treatment of postoperative complications. The use of endoscopic techniques has demonstrated their high efficacy in the detection of gastrointestinal bleeding and ulcerative anastomositis, and also in their treatment with achieving an endoscopic hemostasis. The endoscopic biopsy per protocol during the diagnostic EGDS can detect early signs of pancreatic rejection visualized in the duodenal mucosa at the earliest stages of developing an immune conflict. Simultaneous therapeutic manipulations allow a timely cure of identified surgical complications.

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