Laparoscopic No-Touch Pancreaticoduodenectomy

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ABSTRACT

Objective One of the techniques, becoming more and more popular in open pancreatic surgery is no-touch PD. Laparoscopic access could bring some advantages to pancreatic resections. The aim of the present study was to determine possibility and safety of laparoscopic no-touch Pancreaticoduodenectomy in patients with periampullary tumors. Methods In the period 2013-2014 we performed 31 no-touch pancreaticoduodenectomy in the National Institute of surgery and transplantology NAMS of Ukraine. Of these patients 7 were selected for laparoscopic no-touch pancreaticoduodenectomy. Results Conversion rate was 42.8%. We analyzed the results of 4 successful laparoscopic pancreaticoduodenectomy. The mean duration of surgery was 443 ± 44 minutes (from 370 to 490 minutes). The mean blood loss was 650 ± 269 mL (from 300 to 1000 mL). In 3 patients (75.0%) postoperative complications were recorded in the form of pancreatic fistula grade B. Mortality was zero. After histological evaluation in all patients R0 resection was achieved. One patient died 3 months after the surgery from the reasons neither connected to the surgery, nor the disease. 1 patient has been alive for 11 months being diagnosed a metastatic disease on the 9-th month. 2 patients are alive without signs of recurrence (20 months and 14 months). Our preliminary results show, that no-touch technique could be done from laparoscopic access in a selected group of patients. Potential advantage is fast rehabilitation of patients with early start of adjuvant chemotherapy. That could be achieved in patients with uncomplicated postoperative period.

INTRODUCTION

Since Gardner did the first pancreaticoduodenectomy from laparoscopic access (LPD), much efforts have been done to implement laparoscopic techniques in to surgery of pancreatic tumors [1-3]. The main goal of the researchers was to prove the safety of the laparoscopic technique in terms of postoperative complications [4], mortality and oncological principles [5]. That's why the majority of the publications were devoted to the possibilities of LPD to do the same procedure, as the open one. That leads to some questionable assertions, coming from laparoscopic groups: while in open surgery the lymphatic dissection is more or less standard, LPD is usually done with radical lymph node dissection, just to show the possibilities of the technique [6, 7].

This situation resulted in the fact, that laparoscopic teams are repeating new or standard techniques of PD, already proposed by other researchers.

One of the techniques, becoming more and more popular in open pancreatic surgery is no-touch PD. Coming from the East to the West, it shows potential oncological benefit in selected patients. There is still no strong evidence of the benefit of the procedure, in comparison with the standard. According to our experience, no-touch procedure is preferable in a selected group of patients.

The aim of the present study was to determine possibility and safety of laparoscopic no-touch PD in patients with periampullary tumors.

PATIENTS AND METHODS

In the period 2013-2014 we performed 31 no-touch PD in the National Institute of surgery and transplantology NAMS of Ukraine. There were male 16 and 15 female patients, aged from 37 to 77 years.

There were 7 patients selected for laparoscopic no-touch PD. Inclusion criteria at the learning stage were periampullary tumors without any potential contact to the main arterial and venous vessels, no signs of lymph node enlargement, no previous surgery on the upper level of the abdomen, no history of acute pancreatitis [8, 9]. We did not use the procedure on obese patients.

In 3 patients operation was converted to the open surgery. In all cases conversion was done at the early stage of the procedure, soon after laparoscopy. In all cases the reason of conversion was perifocal inflammation (due to

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We proceeded with the transection of the gastrocolic trunk and transferring it to the supra-colic position. Then we performed transection of the small venous branches from the superior mesenteric vein. The final step was transection of the meso-pancreas and Kocher maneuver. It was done with the help of the lateral traction of the proximal jejunal loop from the left- inferior to right- superior route.

Strategy of reconstruction did not differ from the standard PD. In cases of small pancreatic duct and soft pancreas we used open reconstruction with external drainage of the main pancreatic duct.

**Statistical Methods**

Mean, SEM, 95% confidence intervals (95% CI) and frequencies were used as descriptive statistics.

**Follow Up**

In all patients following check-ups were done in our outpatient clinic every 3 months after surgery. The following check-ups included physical examination, serum tumor markers and contrast-enhanced computed tomography.

**RESULTS**

Conversion rate was 42.8%. In all patients conversion was done in the early stages of the procedure (from 23 to 34 minutes of the operation) due to the perifocal inflammation and high risk of iatrogenic trauma.

The mean duration of surgery was 443 ± 44 minutes (from 370 to 490 minutes). The mean blood loss was 650 ± 269 mL (from 300 to 1000 mL). In 3 patients (75.0%) postoperative complications were recorded in the form of pancreatic fistula grade B [13]. Mortality was zero. The results of 4 successful laparoscopic PD are summarized in the Table 1. After histological evaluation in all patients R0 resection was achieved. One patient died 3 months after the surgery from the reasons neither connected to the surgery, nor the disease. 1 patient has been alive for 13 months being diagnosed a metastatic disease on the 9-th
Table 1. The results of 4 successful laparoscopic PD.

<table>
<thead>
<tr>
<th>Number of Case</th>
<th>Sex</th>
<th>Age (y)</th>
<th>Diagnosis</th>
<th>Duration of Surgery (min)</th>
<th>Intraoperative Blood Lose (ml)</th>
<th>Type of Reconstraction</th>
<th>Type of Pancreaticojejunostomy</th>
<th>Structure of the Pancreas</th>
<th>Pancreatic Duct &lt;3 mm</th>
<th>Postoperative Complication</th>
<th>Postoperative Hospital Stay (d)</th>
<th>Chemotherapy</th>
<th>Long term Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1</td>
<td>F</td>
<td>56</td>
<td>Adenocarcinoma of distal bile duct pT2N0M0</td>
<td>370</td>
<td>800</td>
<td>Open</td>
<td>End-to-side extramucosal with external drainage of MPD</td>
<td>Soft</td>
<td>+</td>
<td>Pancreatic fistula, grade B</td>
<td>21</td>
<td>+</td>
<td>Alive without signs of recurrence (20 month)</td>
</tr>
<tr>
<td>No. 2</td>
<td>M</td>
<td>63</td>
<td>Pancreatic adenocarcinoma pT2N0M0</td>
<td>460</td>
<td>500</td>
<td>Open</td>
<td>End-to-side duct to mucosa</td>
<td>Soft</td>
<td>-</td>
<td>Pancreatic fistula, grade B</td>
<td>12</td>
<td>+</td>
<td>Died 3 months after surgery from the reasons not connected to surgery</td>
</tr>
<tr>
<td>No. 3</td>
<td>F</td>
<td>36</td>
<td>Adenocarcinoma of ampoula of Vater pT2N0M0</td>
<td>450</td>
<td>300</td>
<td>Totally laparoscopic</td>
<td>Double layer</td>
<td>Soft</td>
<td>+</td>
<td></td>
<td>8</td>
<td>+</td>
<td>Alive without signs of recurrence (14 month)</td>
</tr>
<tr>
<td>No. 4</td>
<td>M</td>
<td>57</td>
<td>Adenocarcinoma of distal bile duct pT2N0M0</td>
<td>490</td>
<td>1000</td>
<td>Totally laparoscopic</td>
<td>End-to-side extramucosal with external drainage of MPD</td>
<td>Soft</td>
<td>+</td>
<td>Pancreatic fistula, grade B</td>
<td>46</td>
<td>-</td>
<td>Metastatic disease on the 9-th month after surgery (without chemotherapy). Alive 12 months after surgery.</td>
</tr>
<tr>
<td>Averages</td>
<td>-</td>
<td>53</td>
<td>-</td>
<td>-</td>
<td>442.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>21.75</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
month. 2 patients are alive without signs of recurrence (20 months and 14 months).

**DISCUSSION**

We represent our first experience in laparoscopic no-touch pancreaticoduodenal resection. No strong evidence is available for advantages of both no-touch and laparoscopic techniques of PD. Potential benefit of the no-touch PD in selected patients was shown in some single center trials [10, 19]. In our experience no-touch technique could be done at least as good, as standard procedure. The main advantage of the procedure is the increase of the postoperative survival. In comparison with decrease of rates of intraoperative tumor dissemination that may occur during Kocher maneuver.

Our preliminary results show, that no-touch technique could be done from laparoscopic access in a selected group of patients. Potential advantage is fast rehabilitation of patients with early start of adjuvant chemotherapy. That could be achieved in patients with uncomplicated postoperative period.

In our group rate of postoperative pancreatic fistula was extremely high [14]. This was, in our opinion, due to the patients selection- they had soft pancreatic tissue and small main pancreatic duct, which are risk factors for postoperative pancreatic fistula. Rates of pancreatic fistula in patients with such risk factors may be as high as 28.3% [15].

The difference from the open procedure is the absence of closure of the main pancreatic duct during transection of the pancreas. It could be potentially done with the use of staplers, clipping the main pancreatic duct during dissection or by putting additional suture on the duct. The necessity of such procedure is questionable, so we did not pay much attention to that.

Another difference is the direction of Kocherization. In laparoscopic surgery standard reversed Kocherization was not convenient. But all venous branches could be cut before the Kocher maneuver and the meso-pancreas is also transected during the early stage of the procedure [16].

We have no experience of early clipping of the IPDA in laparoscopic surgery. In open surgery early ligation of IPDA, described by Ishizaki Y [17], isn’t done according to the standard, but to the surgeon’s preference. Probably, this technique could be worked out also for no-touch laparoscopic PD.

In this study we don’t analyze the long- term results. In our small group patients with different morphology and tumor stage are analyzed. It was proved previously that the long-term results of laparoscopic PD could be at least as good as in open surgery [18].

**CONCLUSION**

No-touch technique could be done from laparoscopic access in a selected group of patients. Potential advantage is fast rehabilitation of patients with early start of adjuvant chemotherapy.

