DISTAL PANCREATECTOMY – OWN EXPERIENCE

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The aim of the study was the retrospective analysis of early results after distal pancreatectomy (DP).

Material and methods. During the period between January, 2000 and December, 2010 distal pancreatectomy was performed in 73 patients, including 32 (43.83%) male, and 41 (56.16%) female patients. Average patient age amounted to 53.92 ± 14.37 years. Surgery was performed by means of laparoscopy or the classical method.

Results. The mean duration of the procedure amounted to 179.79 ± 59.90 minutes. Fifty-nine (80.82%) patients were subject to splenectomy. After the resection the pancreatic stump was hand-sewn in 69 patients. Pancreatoenterostomy was performed in 4 (5.47%) patients. Early postoperative complications occurred in 11 (15%) patients. Reoperation was required in two (2.7%) patients. The postoperative mortality rate amounted to 2.7%. The average hospitalization period after surgery amounted to 12.72 ± 9.8 (1- 66) days.

Conclusions. Distal pancreatectomy performed in a center experienced in pancreatic surgery is a safe procedure characterized by a low rate of complications and mortality.

Key words: distal pancreatectomy, peripheral pancreatic resection

Distal pancreatectomy (DP) also known as peripheral pancreatic resection is a surgical procedure, which consists in the excision of the tail and body of the pancreas. The above-mentioned procedure is performed in case of chronic pancreatitis, cystic disease, benign and malignant tumors located in the peripheral part of the gland, and pancreatic injuries (1, 2). In centers specializing in pancreatic surgery, one may observe a low mortality rate (<5%) after DP, although an elevated complication rate ranging between 22.7 and 57% (3-7).

The aim of the study was the retrospective analysis of early results following distal pancreatectomy (DP), based on data obtained from the Department of Gastrointestinal Surgery, Silesian Medical University in Katowice.

MATERIAL AND METHODS

During the period between January, 2000 and December, 2010, distal pancreatectomy was performed in 73 patients. Based on available data early results after treatment were subject to retrospective analysis. Patients who underwent distal pancreatectomy (DP) as an additional procedure in case of resection of another organ were excluded from the study. The analysed group comprised 32 (43.83%) male and 41 (56.16%) female patients. Average patient age amounted to 53.92 ± 14.37 years, ranging between 26 and 95 years. The decision, as to the eligibility for surgery, and the extent of the resection, were undertaken on the basis of preoperative imaging examinations (CT,
MRI, ultrasound), and the intraoperative image.

Operative technique

The peritoneal cavity was opened by means of the median section. The gastrocolic ligament was severed and the omental sac opened. After careful intraoperative examination we proceeded with the resection of the pancreas. In doubtful cases intraoperative ultrasound examinations were performed. After the decision concerning resection the lower edge of the pancreas was mobilized by incising the parietal peritoneum followed by the presentation of the spleen. Proximally to the lesion we ligated the splenic artery and vein, severed the body of the pancreas and removed the specimen. If the pancreatic incisional line ran to the left of the superior mesenteric vessels the resection was classified as distal. If the incisional line was located to the right of the superior mesenteric vessels the resection was classified as distally extended. In selected cases, when the anatomical conditions and type of pathology were favorable, the spleen was spared. After excision of the specimen, we identified and underpinned Wirsung’s duct inside the remnant pancreatic stump. The section of the pancreatic stump was sutured in two layers using single mattress sutures. In case of obstruction in the outflow of pancreatic secretion to the duodenum the pancreatic stump was anastomosed to the jejunal loop by means of the Roux-Y method. At the end of the operation a routine probe was placed into the stomach and a drain into the left subdiaphragmatic area followed by the layered closure of the abdominal integument.

The removed sample was subject to pathomorphological evaluation at the Department of Pathomorphology, Silesian Medical University in Katowice.

After the operation patients were transferred to the department of surgery. The gastric probe was maintained for 1 to 3 days after surgery. Patients received intravenous fluids. The peritoneal drain was usually removed on the third postoperative day. After the operation prophylactic somatostatin analogues were not used. Antibiotic prophylaxis consisted in the administration of a single dose of the antibiotic (“single shot”) during surgery, and was not continued postoperatively. Standard low molecular weight heparin prophylaxis was administered. Patients were mobilized from the first day after the procedure. Three days after surgery oral nutrition was initiated.

The study analysis considered the duration of the surgical procedure, amount of blood loss, cause of pancreatic resection, early complications, cause of reoperation and mortality during the postoperative period, as well as the duration of hospitalization.

Statistical analysis was performed by means of the independent chi-square and U Mann-Whitney tests. p<0.005 was considered as statistically significant.

RESULTS

In most cases the tumor was located in the tail of the pancreas – 42 (57.53%). In the remaining cases the tumor was located as follows: body and tail – 19 (26.3%), body – 11 (15.07%), head and body – 1 (1.37%). Clinical symptoms reported by the patients’ were as follows: pain – 54 (73.97%), nausea and vomiting – 10 (13.7%), diarrhea – 4 (5.48%), and jaundice – 1 (1.37%).

The average duration of the surgical procedure amounted to 179.79 ± 59.90 minutes. Thirty-nine (53.42%) patients were subject to distal resection, while 34 (46.57%) extended distal resection. During distal pancreatectomy (DP), 59 (80.82%) patients additionally underwent splenectomy. Three (4.1%) patients required segmental colon resection, 3 – cholecystectomy, 2 – left-sided adrenalectomy, and 2 – non-anatomical liver resections. The average blood loss during the procedure amounted to 858.37ml ± 562.69ml (median – 700 ml). Significant blood loss during surgery was associated with the more frequent occurrence (p=0.02) of postoperative complications.

The risk of surgical anesthesia was evaluated, according to the ASA (American Society of Anesthesiologists) qualification: stage I – 12 patients, II – 30 patients, and III – 31 patients.

Early postoperative complications were observed in 11 (15%) patients, including the following: pancreatic fistula (stage B and C, according to the International Study Group on Pancreatic Fistula) – 6 (8.2%) patients, intra-abdominal abscess – 4 (5.5%) patients, gastrointestinal bleeding: one patient, and acute heart
failure—one patient. Two reoperations were performed during the early postoperative period (drainage of an intra-abdominal abscess, and abdominal cavity hemorrhage control). Two (2.7%) patients died during the postoperative period. The first 67-year old patient subject to surgery because of pancreatic cancer died on the 15-th postoperative day, due to multi-organ failure, while the second 65-year old patient operated because of chronic pancreatitis, died on the seventh postoperative day, due to heart failure. The average hospitalization period after surgery amounted to 12.72 ± 9.8 (1-66) days.

The most common indication to perform distal pancreatectomy was pancreatic adenocarcinoma – 31 (39%) patients and chronic pancreatitis – 25 (34.24%) patients. Other benign and malignant tumors of the pancreas were rare indications for peripheral resections (tab. 1).

Early results (hospitalization, blood loss, number of complications, and mortality) in case of patients subject to DP, due to malignant lesions were comparable to results obtained in case of benign lesions.

Statistical analysis showed no differences considering early results between patients subject to splenectomy during DP, and those in whom the spleen was spared.

DISCUSSION

Despite considerable progress in surgical techniques and postoperative care, one may continuously observe the high rate of complications after distal pancreatectomy (DP). Numerous publications concerning the issue demonstrated that the greatest occurrence of complications was associated with the technique of the procedure, supplying the pancreatic stump, and management considering the spleen (5, 9-14).

In our center, the pancreatic stump after DP was supplied by means of hand-sewn closure. Already during the preparation of the sample we tried to run the incisional line as to obtain a V line in the section of the stump. Afterwards, we searched for Wirsung’s duct, which was subject to underpinning by means of a 5-0 monofilament, absorbable suture. The section of the pancreatic stump was then sutured in two layers using mattress sutures. The above-mentioned sutures led to the “closure” of the surface of the pancreatic section. Near the pancreatic stump a PCV gravitation drain, 26-28F in diameter was also left behind. Considering our study, pancreatic fistula after surgery was diagnosed, according to the definition of the International Study Group on Pancreatic Fistula (8) in 6 patients. We almost always use the hand-sewn suture, in order to close the section of the pancreatic stump, being evidence of the low probability of pancreatic fistula development indicating that the above-mentioned method is satisfactory. Only four 4 (5.47%) patients required the anastomosis of the pancreatic stump and jejunal loop by means of the Roux-Y method, due to obstruction in the outflow of pancreatic secretion into the duodenum.

In order to reduce the incidence of pancreatic fistulas different surgical techniques were proposed, such as stapler closure, anastomosis of the pancreatic stump and jejunal loop, the use of a synthetic mesh, the patch technique and the use of fibrin glue (15-21).

A European, multi-center, randomized clinical study (22) demonstrated that there was no difference in the incidence of pancreatic fistulas and other surgical complications, con-

<table>
<thead>
<tr>
<th>Pathology</th>
<th>n = 73 (100%)</th>
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<tbody>
<tr>
<td>Adenocarcinoma of the pancreas</td>
<td>31 (39%)</td>
</tr>
<tr>
<td>Chronic pancreatitis</td>
<td>25 (34.24%)</td>
</tr>
<tr>
<td>Neuroendocrine carcinoma</td>
<td>5 (6.84%)</td>
</tr>
<tr>
<td>Insulinoma</td>
<td>3 (4.1%)</td>
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<tr>
<td>Cystadenoma</td>
<td>3 (4.1%)</td>
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<tr>
<td>Pseudopapilloma tumor</td>
<td>2 (2.7%)</td>
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<tr>
<td>Malignant insulinoma</td>
<td>1 (1.36%)</td>
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<tr>
<td>Cystic carcinoma of the pancreas</td>
<td>1 (1.36%)</td>
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<tr>
<td>Clear cell renal carcinoma metastasis</td>
<td>1 (1.36%)</td>
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<tr>
<td>Simple cyst</td>
<td>1 (1.36%)</td>
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Kleeff et al. (23) considered 302 patients subject to distal pancreatectomy and analysed four methods of supplying the pancreatic stump: end-to-side pancreatoenterostomy (n=24), the patch technique with the use of the stomach or bowel (n=36), hand-sewn closure (n=97), and stapler closure (n=145). The stenosis or obstruction of the proximal segment of Wirsung’s duct was an indication to perform pancreatoenterostomy. The choice of the remaining closure techniques depended on the structure of the pancreas and surgeons’ preferences. Pancreateoenterostomy was burdened with the lowest risk of pancreatic fistula development (0%), followed by the patch technique (8.3%), hand-sewn closure (9.3%), and stapler closure (15.9%). The significantly lower prevalence of pancreatic fistulas in case of hand-sewn closure, as compared to stapler closure was associated with the ligation of Wirsung’s duct during manual suturing.

According to Bilimoria et al. (24) and Pannegeona et al. (25), the identification and underpinning of Wirsung’s duct has significant influence on the reduction of pancreatic fistula development after surgery.

The influence of spleen preservation on DP results remains to be established.

Yamaguchi et al. (26), showed no difference in the number of complications, duration of surgery and hospitalization, as well as the process of digestion and absorption, between patients’ subject to splenectomy during distal pancreatectomy, and those in whom the spleen was spared.

Considering our material splenectomy during DP was associated with significant blood loss, prolonged hospitalization or duration of the surgical procedure, as well as greater risk of early complications and early postoperative mortality.

Many Authors (14, 23, 27-29) demonstrated that splenectomy performed during DP might influence therapeutic results.

Rodríguez et al. (27) analysed 259 cases of DP showing that the preservation of the spleen (29% of patients) was associated with lower blood loss during the procedure, and shorter surgery and hospitalization period.

Lillemoe et al. (14) analysed 235 cases of DP showing that the spleen was preserved in 37 (15.7%) patients. There were no statistically significant differences between both groups, considering the number of postoperative complications, intraoperative blood loss, and duration of surgery. The only difference was the period of hospitalization, in favor of patients with a preserved spleen (13 vs. 21 days). It is worth noting that in case of such a large group of patients’ the authors reported a very low mortality rate (1%).

Kleeff et al. (23) demonstrated that the preservation of the spleen was associated with a lower risk of pancreatic fistula development (5.1% in patients with a preserved spleen vs. 11.2% of patients subject to splenectomy, and 15.6% after multi-organ resection).

Goh et al. (29) analysed 232 cases of DP showing that spleen preservation does not decrease the risk of pancreatic fistula development, being a significant factor reducing the occurrence of infectious complications developing in the wake of the above-mentioned.

These observations support the hypothesis established by Shoup et al. (28), who demonstrated that the impairment of the immune system after splenectomy increases the risk of postoperative infectious complications.

Frozanpor et al. (30) demonstrated that an important risk factor of pancreatic fistula development after DP is the volume of the remaining pancreas.

In recent years the development of laparoscopic surgery has contributed to the increase of pancreatic operations performed by means of the above-mentioned technique.

Sandeep et al. (31) retrospectively compared results following classical and laparoscopic DP. The study groups comprised 100 patients and were similar, considering indications for surgery and demographic data. However, laparoscopic DP patients were more often diagnosed with a smaller tumor mass. The duration of the procedure, mortality and morbidity were similar in both groups. Lower blood loss and shorter hospitalization were observed in patients treated by means of the laparoscopic method.

Similar results were obtained in a retrospective analysis published by Casadei et al. (32). Laparoscopic DP was performed more often in patients with smaller tumors.

Although it may appear that laparoscopic DP might be the standard procedure in case of benign lesions, its performance in case of pancreatic adenocarcinoma remains a controversial issue. Cobby et al. (33), in 2010, presented a
retrospective analysis from nine American centers demonstrating that laparoscopic DP in case of ductal carcinoma provides similar early and distant results, being associated with a statistically significant shorter hospitalization period. It should be underlined that up-to-date there are no prospective, randomized trials evaluating laparoscopic DP results in the treatment of pancreatic adenocarcinoma.

In 2009, a study was published in which surgeons dealing with pancreatology from 23 leading European centers established the main guidelines of perioperative management in patients subject to distal pancreatectomy (34). The most important were as follows: the use of epidural anesthesia in the thoracic segment, proper analgesia during the postoperative period, transverse incision of the abdominal cavity, and drainage after surgery, as well as single shot antibiotic prophylaxis. It was also considered that the preparation of the colon, the use of a gastric probe and somatostatin analogues does not benefit the patient. However, a positive impact on treatment results might be associated with early patient mobilization and oral nutrition.

**CONCLUSION**

In conclusion, distal pancreatectomy (DP) performed in a center experienced in pancreatic surgery is a safe procedure characterized by a low rate of complications and mortality.

**REFERENCES**