



Histopathological evaluation after pancreatic surgery: Comparison of the results of HPB-specific pathologists and non-specific pathologists

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ABSTRACT

Objective: The aim of this study was to compare the results of the evaluation of HPB-specific pathologists and general pathologists on the specimens of patients who underwent pancreaticoduodenectomy by the same surgical team.

Material and Methods: The pathological results of 159 patients who underwent pancreaticoduodenectomy (PD) in the periampullary region was retrospectively examined. Histopathological evaluation results of HPB-specific pathologist (S group) and other pathologists (NS group) were compared. Tumor size (mm), total lymph nodes, metastatic lymph nodes, surgical margin positive/negative (RO/R1/R2 resection) and data of patients who underwent vascular resection were evaluated.

Results: The specimens of 91 patients were examined by a HPB-specific pathologist (S group), and the specimens of 68 patients were examined by non-specific pathologists (NS group). When compared in terms of the average total number of lymph nodes and metastatic lymph nodes dissected, a statistically significant result was observed ($p=0.04$, $p<0.01$ respectively). Additionally, surgical margin positivity (R1) was found to be statistically higher in the S group ($p=0.02$).

Conclusion: In order for the success of HPB surgery to be reflected in the clinic, it is of great importance that the specimens are examined by HPB-specific pathologists.

Keywords: Pathology, pancreaticoduodenectomy, lymph nodes, surgical margin

INTRODUCTION

The periampullary region includes the head of the pancreas, the distal part of the common bile duct, papilla of Vater, and the duodenum. Pancreatoduodenectomy (PD) is the procedure for tumors originating from this region. Surgical resection is the only curative therapy for these tumors. Fewer than 30% of pancreatic cancers are resectable at the time of diagnosis (1). Advances in diagnostic methods, standardization in surgical techniques and development of neoadjuvant/adjuvant therapy have enabled the perioperative mortality rate in pancreatic cancers decrease to 2% and increase five-year survival rates to 27% (2-4). Even patients who receive adjuvant therapy after PD develop recurrence in up to 80% (5).

The difficulty to identify pancreatic cancer at an early stage and the tumor's poor response to chemotherapy and radiation therapy are the main causes of the disease's poor prognosis. One of the most frequently mentioned prognostic markers linked to long-term survival after pancreatic cancer resection is undoubtedly achieving negative surgical margins (R0). Median survival after R0 resection in patients with pancreatic adenocarcinoma is 22 months, decreasing to 6 to 11 months for patients with locally advanced disease and 3 to 6 months for patients with metastatic disease (6,7). In addition to negative surgical margins, survival has been observed to be higher in the patient group with well-differentiation histology, lymph node negativity and tumor size <3 cm (8).

Both HPB-specific and non-specific pathologists can gather and assess the histopathological specimens of malignant pancreatic tissues. The aim of this study was to compare the results of the evaluation of HPB-specific pathologists and general pathologists on the specimens of patients who underwent pancreaticoduodenectomy by the same surgical team.

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MATERIAL and METHODS

Pathological results of 203 patients who underwent pancreaticoduodenectomy (PD) due to a mass in the periampullary region between 2020 and 2023 by the same surgeon (M.K.) were retrospectively examined. Patients with metastatic disease (M1), extra-organ invasion, pathological specimens other than adenocarcinoma, and those who underwent distal pancreatectomy or total pancreatectomy were excluded from the study. A total of 159 patients who underwent PD due to periampullary adenocarcinoma (including subtypes) were included in the study. In all surgeries, frozen sections of the pancreatic neck and distal part of the common bile duct surgical margins were routinely performed. R0 resection is defined as complete resection with microscopically negative margins. R1 resection is defined as a macroscopically complete resection with microscopically positive margins (1 mm or more cancer cells at any surface or margin). R2 resection is defined as macroscopically incomplete resection.

Specimens' margins were assessed:

- Anterior surface
- Medial
- Posterior surface
- Pancreatic neck
- Bile duct
- Duodenal/gastric margin

The circumferential resection margin (CRM) in PD specimens consists of the anterior surface, the medial surface facing the superior mesenteric vein (SMV), the surface flanking the superior mesenteric artery (SMA) and the posterior surface (9).

Tumor size (mm), total lymph nodes, metastatic lymph nodes, surgical margin positive/negative (RO/R1/R2 resection) and data of patients who underwent vascular resection were evaluated. Histopathological evaluation results of HPB-specific pathologist (S group) and other pathologists (NS group) were compared.

Statistical Analysis

All data were transferred to a computer environment, and SPSS 20.0 software (SPSS Inc., Chicago, IL, USA) was used for statistical

analysis. In all statistical analyses, $p < 0.05$ value was accepted statistically significant. Independent-samples t-test was used to compare the means of one variable for two groups of cases, and the paired-samples t-test was used to compare the means of two variables for a single group.

This study was approved by Atılım University Medica International Ankara Hospital Ethics Committee (Decision no: 26 Date: 26.10.2023).

RESULTS

The specimens of 91 patients were examined by an HPB-specific pathologist (S group), and the specimens of 68 patients were examined by non-specific pathologists (NS group). There was no statistically significant difference between both groups in terms of tumor size and location. Information on tumor locations and sizes is shown in Table 1.

When compared in terms of the average total number of lymph nodes dissected, it was reported that an average of 23.8 LNs were dissected in the S group and 16.3 LNs were dissected in the NS group, and a statistically significant result was observed ($p = 0.04$). An average of 3.2 metastatic LNs were observed in the S group and 1.1 metastatic LNs in the NS group, and the result was statistically significant ($p < 0.01$).

No patient underwent R2 resection. R1 resection was observed in 14 patients in the S group and three patients in the NS group. Surgical margin positivity (R1) was found to be statistically significantly higher in the S group ($p = 0.02$). Information on the average total number of lymph nodes, average metastatic lymph nodes and surgical margins of the patients is given in Table 2.

Vascular resection was observed in 17 patients in the S group and 14 patients in the NS group. In the S group, 11 patients underwent portal vein resection, and six patients underwent SMV resection. In the NS group, nine patients underwent portal vein resection, and five patients underwent SMV resection. R1 resection was observed at the vascular resection margin in five patients in the S group and in two patients in the NS group. In the S group, after vascular resection, primary repair was performed in 11 patients, peritoneal patch was performed in four patients, and graft repair was performed in two patients. In the NS group, primary repair was performed in 10 patients

Table 1. Tumor size and location of the patients

| | S group (%) | NS group (%) | p |
|-------------------------------------|-------------|--------------|-------|
| Head of pancreas, uncinata process | 58 (63.7%) | 44 (64.7%) | >0.05 |
| Distal part of the common bile duct | 15 (16.5%) | 11 (16.2%) | >0.05 |
| Ampullary | 18 (19.8%) | 13 (19.1) | >0.05 |
| Average tumor size (mm) | 30.7 ± 14.8 | 26.5 ± 11.4 | >0.05 |
| Total number of patients | 91 | 68 | |

Table 2. Average total number of lymph nodes, average metastatic lymph nodes and surgical margins of the patients

| | S group (%) | NS group (%) | p |
|-------------------------------------|-------------|--------------|---------|
| Average total number of lymph nodes | 23.8 ± 7.6 | 16.3 ± 5.3 | p= 0.04 |
| Average metastatic lymph nodes | 3.2 ± 3.3 | 1.1 ± 1.8 | p< 0.01 |
| Surgical margins | | | |
| R0 | 77 (84.6%) | 65 (95.6%) | p= 0.02 |
| R1 | 14 (15.4%) | 3 (4.4%) | |
| R2 | 0 (0%) | 0 | |
| Patient number | 91 | 68 | |

Table 3. Vascular (vein) resection of the patients

| | S group | NS group | p |
|----------------|---------|----------|-------|
| R0 | 12 | 8 | >0.05 |
| R1 | 5 | 2 | |
| Unspecified | 0 | 4 | |
| Patient number | 17 | 14 | |

after vascular resection, and peritoneal patch repair was performed in four patients. In the S group, four of the five patients with R1 margin as a result of vascular resection underwent primary repair and one patient underwent repair with a peritoneal patch. In the NS group, among the patients with R1 margin as a result of vascular resection, one patient underwent peritoneal patching, and one patient underwent primary repair. Although the patients' specimens were marked postoperatively, no information was given regarding the vascular invasion of four patients in the NS group. When the groups were compared, no statistically significant results were found in patients with R1 margin in terms of vascular resection. Information on patients who underwent vascular resection is given in Table 3.

DISCUSSION

When evaluating periampullary region cancers, the location of the cancer's origin is important in terms of patient management, prognosis, survival, tumor staging and accurate evaluation of cancer data records (10,11). In tumors of the periampullary region, histopathological evaluation is difficult in terms of tumor origin due to large tumor size and anatomical proximity of the structures to each other (11). When tumor size and location were compared, it was seen that there was no statistically significant difference between the two groups. This is because the evaluation of tumor size and tumor localization (in line with the clinical information given to the pathologist) can be easily performed by all pathologists.

There is no evidence that extended lymph node resection in pancreatic cancer surgery influences survival, thus in patients undergoing extended lymphadenectomy, morbidity and

mortality rates have appeared to be higher (1,12). However regional lymphadenectomy and removal of at least 16 lymph nodes are necessary for optimal long-term outcomes (13). In our surgical practice, we do not perform extended lymphadenectomy, but we routinely perform regional lymph node dissection. In our study, it was observed that a sufficient number of lymph node dissections were performed on average in both groups. However, it was observed that more lymph node dissections were counted on average in the S group than in the NS group (S group= 23.8 vs NS group= 16.3, p= 0.04). In addition, in terms of metastatic lymph nodes, it was observed that on average more metastatic lymph nodes were counted in the S group than in the NS group (S group= 3.2 vs NS group= 1.1, p< 0.01). The presence of metastatic lymph nodes is important for pancreatic cancer staging and prognosis. A study by Benassai et al. has revealed that the survival of patients with negative lymph nodes was significantly higher than those with lymph node positivity (8). However, studies have shown that metastatic lymph nodes have a negative effect on survival (14,15). Considering that the patients were operated on by the same surgeon and with the same standard surgical technique, it can be seen that the number of total and metastatic lymph nodes dissected was higher in the S group. These findings suggest that HPB specific pathologists perform a more detailed evaluation of lymph nodes compared to general pathologists.

Numerous factors affect survival in pancreatic cancer patients who undergo pancreatoduodenectomy as part of their treatment course. Achieving negative surgical margins (R0) is one of the most consistently reported prognostic factors associated with long-term survival following resection of pancreatic adenocarcinoma. Resection margin (RM)

involvement is an independent prognostic factor in pancreatic cancer. R1 rates are reported between 16% and 75% in the literature (1,9,16). Although R2 resection is not seen in any patient in our study, the number of patients who underwent R1 resection is statistically significantly higher in the S group than in the NS group (S group= 14 vs NS group= 3, p= 0.02). Additionally, 15.4% of R1 resections were performed in the S group and 4.4% in the NS group. Although frozen sections of the pancreatic neck and the distal part of the common bile duct surgical margins are routinely performed in our surgical practice, it was observed that very few R1 resections were performed in the NS group, incompatible with the literature. Pathological evaluation is limited to the SMA or 'uncinate' margin, resulting in low R1 rates at some high-volume pancreatic cancer centers (17). In our study, we found that all surgical margins were examined in all patients in the S group, but no information was given about the medial and posterior parts of the CRM in the NS group. We think that the reason why R1 resection was very low in the NS group was because the CRM was not evaluated well.

In the literature, the risk of positive surgical margins appears to be increased in cases of large tumor size and periampullary region cancers that undergo vascular resection (17,18). When the groups were compared, it was observed that there was no statistically significant difference in terms of surgical margin positivity in patients who underwent vascular resection. It appears that the likelihood of a positive surgical margin in patients who underwent vascular resection is higher than in those who did not undergo vascular resection. From this perspective, it is necessary to prevent positive surgical margins by using patches or grafts, if necessary, in patients with vascular invasion. It should not be forgotten that the important thing is to ensure negativity of surgical margins.

CONCLUSION

The information pathologists provide about the specimen is of vital importance in terms of treatment for postoperative disease and survival. Just as hepatobiliary surgery requires specialization, pancreatic pathology also requires specialization. In order for the success of HPB surgery to be reflected in the clinic, it is of great importance that the specimens are examined by HPB-specific pathologists.

Ethics Committee Approval: This study was approved by Atilim University Medicana International Ankara Hospital Ethics Committee (Decision no: 26 Date: 26.10.2023).

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ORJİNAL ÇALIŞMA-ÖZET

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Pankreas cerrahisi sonrası histopatolojik değerlendirme: HPB'ye özgü patolojiler ile spesifik olmayan patolojilerin sonuçlarının karşılaştırılması

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ÖZET

Giriş ve Amaç: Bu çalışmanın amacı, aynı cerrahi ekip tarafından pankreatikoduodenektomi yapılan hastaların spesmenlerinin HPB-spesifik patolojiler ve genel patolojilerin değerlendirme sonuçlarını karşılaştırmaktır.

Gereç ve Yöntem: Periapüller bölgede pankreatikoduodenektomi (PD) uygulanan 159 hastanın patoloji sonuçları retrospektif olarak incelendi. HPB-spesifik patolojiler (S grubu) ve diğer patolojilerin (NS grubu) histopatolojik değerlendirme sonuçları karşılaştırıldı. Patoloji spesmenleri değerlendirilerek, tümör boyutu (mm), total lenf nodu, metastatik lenf nodu, cerrahi sınır pozitif/negatifliği (RO/R1/R2 rezeksiyonu) ve vasküler rezeksiyon yapılan hastaların verileri gruplar karşılaştırılarak değerlendirildi.

Bulgular: HPB-spesifik patolojiler (S grubu) tarafından 91 hastanın, non-spesifik grupta (NS grubu) ise 68 hastanın spesmen sonuçları incelendi. Ortalama toplam lenf nodu sayısı ve diseke edilen metastatik lenf nodu sayısı açısından karşılaştırıldığında istatistiksel olarak anlamlı sonuç gözlemlendi (sırasıyla p= 0,04, p< 0,01). Ayrıca cerrahi sınır pozitifliği (R1) S grubunda istatistiksel olarak daha yüksek bulundu (p= 0,02).

Sonuç: HPB ameliyatlarının başarısının kliniğe yansiyabilmesi için patoloji spesmenlerinin HPB-spesifik patolojiler tarafından incelenmesi önem taşımaktadır.

Anahtar Kelimeler: Patoloji, pankreatikoduodenektomi, lenf nodları, cerrahi sınır

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