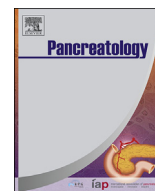




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Patients with pancreatic cystic neoplasms can benefit from management of multidisciplinary team: Experience from a Chinese academic center

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ABSTRACT

Background: Pancreatic cystic neoplasms (PCNs) are a spectrum of neoplasms that can be benign or malignant. The accuracy of diagnosis is critical for this disease since different types of PCNs are treated differently using various modalities. The use of a multidisciplinary team (MDT) has been shown to improve the management and outcomes of various diseases. We aimed to determine the performance of MDT in the management of PCNs.

Methods: We retrospectively reviewed 167 pathologically-proven PCN patients and divided them among three groups according to their surgical data and treatment modalities: 1) historical control group (HC group); 2) concurrent control group (CC group); and 3) MDT group. The composition of subtypes of PCNs, preoperative diagnostic accuracy, postoperative complications, and postoperative hospital stay were compared among the three groups.

Results: The incidence of SCN reduced in the MDT group, while the incidence of IPMN was much higher ($P < 0.05$). MDT management significantly improved the accuracy of preoperative diagnosis (71.7%) and also increased the individual diagnostic accuracies of ultrasound, CT, and MRI/MRCP. Postoperative pancreatic fistula was significantly reduced in the MDT group (28.3%; $P < 0.001$). Furthermore, the mean hospital stay after surgery in the MDT group (10.37 days) was shorter than those of the other two groups (27.35 days in HC group, and 19.28 days in CC group; $P < 0.05$).

Conclusion: For patients with PCN, MDT management was associated with an improvement in the overall accuracy of preoperative diagnosis, a lower incidence postoperative morbidity, and decreased length of hospital stay.

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1. Introduction

Pancreatic cystic neoplasms (PCNs) are common clinical entities with an increasing incidence likely due to advances in imaging techniques and the increasing usage of imaging modalities for other health issues. Previous studies have suggested that the prevalence of pancreatic cysts was 1–3% using computer tomography (CT) and ultrasound; however, this prevalence has increased to 10–20% with

the use of magnetic resonance imaging (MRI) [1,2]. Taken together, PCNs represent approximately 15–20% of all pancreatic cysts [3–5].

PCNs are a spectrum of neoplasms that can be benign or malignant [5]. The accuracy of diagnosis is critical for this disease since different types of PCNs are treated differently using various modalities [6–8]. Currently, preoperative diagnosis is often based on clinical presentation and symptomatology, imaging, and pathology and cytology from endoscopic ultrasound and fine needle aspiration (EUS/FNA). Unfortunately, an accurate preoperative diagnosis of PCNs remains challenging. Previous studies have reported diagnostic accuracies of 20%–93%, depending on the type of PCN [9–11]. Even among high-volume centers in the United States, the rate of misdiagnosis can be as high as 11% [6].

In recent years, the use of a multidisciplinary team (MDT) has

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been proposed in the management of various diseases, particularly for patients with cancer [12,13]. MDT has been proved to be able to improve diagnosis, treatment, and prognosis of patients with cancers [14,15]. In our center, a MDT was formed in January 2013 for the management of hepatobiliary and pancreatic diseases. Our group has performed weekly MDT meeting and it has been effective in improving the accuracy of diagnosis, optimizing multidisciplinary treatment, and improving the overall short- and long-term outcomes of patients with cancer in our center. Our department has since expanded the use of MDT to include patients with PCNs. We hypothesized that MDT may also be beneficial in increasing the accuracy of diagnosis and improving the overall treatment of patients with PCNs. As such, we aimed to evaluate the role of MDT in the management of patients with PCNs.

2. Methods

2.1. Study design and patients

Patients who underwent surgical resection for suspected PCN between July 2014 and October 2017 were included. A MDT has been established by our team since January 2013. The MDT deals with several aspects of patient care from the onset of presentation, including the initial evaluation of the patients' condition, diagnosis, treatment plans, and the implementation of enhanced recovery after surgery (ERAS). However, due to different practice patterns and preferences amongst our group, the MDT was not utilized for all patients with suspected PCN. For patients that were included in the MDT management, a group of experienced surgeons, oncologists, radiologists, gastroenterologists, and pathologists evaluated and discussed all management and treatment options. Treatment for patients with suspected PCN who were not evaluated by the MDT were often left to the sole discretion of the treating surgeon. Based on these practice patterns, three groups were assigned for the cohort. The historical control group (HC group) included patients treated between July 2004 and December 2012, prior to when a MDT was established. The concurrent control group (CC group) included patients who underwent an operation for suspected PCN between January 2013 and October 2017 but were not evaluated by the MDT. The MDT group included patients admitted between January 2013 and October 2017 and were managed by the MDT. This study was approved by the Ethics Committee of the Second Affiliated Hospital, Zhejiang University School of Medicine, and was performed according to the Declaration of Helsinki.

2.2. Indications of PCN resection

Surgery was recommended for patients as followed: 1. Patients with symptoms caused by the lesion including pancreatitis, jaundice, abdominal pain or abdominal distension; 2. Patients with an uncertainty in diagnosis and an inability to exclude malignancy; 3. Patients with a diagnosis of main duct intraductal papillary mucinous neoplasm (IPMN), mixed type IPMN, mucinous cystic neoplasm (MCN) or solid pseudopapillary neoplasm (SPN) due to the increased risk of malignancy found in these neoplasms; 4. Patients with suspected serous cystic neoplasm with a size greater than 4 cm or those with a rapid growth of >2 cm/year; 5. Patients with suspected BD-IPMN and meeting resection criteria based on international guidelines. Between 2004 and 2012, surgery was recommended for patients with cytological evidence of malignancy or high-risk stigmas: (i) cyst diameter greater than 3 cm, (ii) the presence of a mural nodule as defined by the Sendai criteria [16]. Between 2012 and 2017, the indication for surgery was modified based on the 2012 international guidelines. Surgery was recommended for patients with the high-risk stigmas (i) obstructive

jaundice in a patient with a cystic lesion of the head of the pancreas, (ii) enhancing solid component within the cyst, (iii) main pancreatic duct >10 mm in size), or patients with evidence of malignancy or those with worrisome features i) cyst >3 cm, ii) thickened/enhancing cyst walls, iii) main duct size 5–9 mm, iii) non-enhancing mural nodule, iv) abrupt change in caliber of pancreatic duct with distal pancreatic atrophy. Evidence of malignancy included: i) Definite enhancing mural nodule, ii) main duct features suspicious for involvement, iii) Cytology: suspicious or positive for malignancy.

2.3. Definition of diagnostic accuracy

The diagnosis of PCNs including IPMN, MCN, SCN, and SPN was determined preoperatively and was confirmed by postoperative pathologic assessment. An accurate preoperative diagnosis indicates a concordance between preoperative diagnosis and postoperative pathology. An ambiguous diagnosis indicates that PCN were confirmed but the exact type of PCN failed to be determined preoperatively. A misdiagnosis indicates that PCNs were excluded or the type of PCN was not supported by postoperative pathology. Additionally, diagnoses for some patients were failed since the nature of pancreatic lesions were indefinite before surgery. For pathological diagnosis, IPMN and MCN were further graded based on the degrees of dysplasia: low grade, intermediate grade, high grade (carcinoma *in situ*), and invasive. Serous cyst adenocarcinoma was defined by the presence of an invasive malignancy [5,17].

2.4. Statistical analysis

Statistical analysis was performed using SPSS (version 19.0, Chicago, IL, USA). Continuous variables were expressed as median and range, and were compared using the Mann-Whitney *U* test. Categorical variables were compared using a *chi*-squared test or Fisher's exact test, as appropriate. Univariate analysis was conducted using a *chi*-square or the Mann-Whitney *U* tests, as appropriate. One-way ANOVA was used in multi-group analysis. $P < 0.05$ was considered to be statistically significant.

3. Results

3.1. Demographic characteristics and clinical features

A total of 167 patients with PCN (SCN: $n = 50$, 29.9%; IPMN: $n = 39$, 23.4%; MCN: $n = 32$, 19.2%; SPN: $n = 46$, 27.5%) and underwent surgical resection were included in this study (Table 1). Patients with SCN (48.0%), IPMN (48.7%), and MCN (59.4%) more commonly presented with symptoms related to their PCN as compared to patients with SPN (28.3%; $P = 0.04$). Of these symptomatic patients, abdominal pain and distention, weight loss, nausea and jaundice were the most common presenting symptoms.

The majority of SCNs and MCNs occurred in the body and tail of the pancreas whereas IPMNs were more likely to locate in the head of the pancreas. SPNs were more evenly divided between the head and body/tail of the pancreas. The size of IPMN was smaller than those of other types of PCNs, however, statistical significance was only obtained when compared with that of MCN ($P < 0.05$). Additionally, patients with different types of PCNs showed a comparable level of serum cancer antigen 19-9 (CA19-9).

3.2. Impact of MDT on preoperative diagnosis

To investigate whether MDT management influenced the preoperative diagnosis of PCNs, the compositions of different types of PCNs were compared among the three groups. Of the 54 patients

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