

# Laparoscopy and laparoscopic ultrasonography in judging the resectability of pancreatic head cancer

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**OBJECTIVE:** To explore the clinical value of laparoscopy and laparoscopic ultrasonography (LUS) in judging the resectability of pancreatic head cancer.

**METHODS:** LUS was employed as a prospective diagnosis of tumor staging before exploratory laparotomy in 22 patients diagnosed with pancreatic head cancer to identify whether the liver and peritoneum had small metastases or local invasion to the portal vein, superior mesenteric vessel, aorta, inferior vena cava.

**RESULTS:** In the 22 patients receiving laparoscopy and LUS, we found peritoneal or surface liver metastases (3 patients), hepatic parenchyma metastases (1), and pancreatitis proved by biopsy under ultrasound guidance (1). Laparotomy was avoided in these 5 patients. Of the remaining 17 patients, 8 patients, including 2 patients with portal vein emboli due to tumor metastases had hypertrophic lymph nodes or tumor invasion of local vessels in the peritoneal cavity, retroperitoneum, and omentum and the other 9 patients had resectable tumors shown by LUS. The 17 patients were subjected to exploratory laparotomy, and pancreaticoduodenectomy was successful in 8 patients.

**CONCLUSIONS:** Laparoscopy and LUS can be used to precisely estimate the possibility of resection of pancreatic head cancer, and prevent unnecessary exploratory laparotomy and its complications. It can be used as a routine examination before exploratory laparotomy.

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**Key words:** laparoscopy; laparoscopic ultrasonography; pancreatic head cancer; resectability

## Introduction

In recent years epidemiological data have shown an increasing incidence of pancreatic head cancer. It has been raised from rank 20 to 8 among malignant tumors in China in the past 30 years. This malignancy can not be radically resected in most cases.<sup>[1]</sup> At present, exploratory laparotomy is aimed to judge whether the tumor is resectable. This is likely to increase the postoperative compli-

cations including infection, pancreatitis, and pancreatic fistula in unresectable patients even increase the opportunity of dissemination and metastasis of the tumor. As a result, the quality of life and survival time are reduced. In this article we reported the clinical application of laparoscopy and laparoscopic ultrasonography (LUS) and their comparative results.

## Methods

### Patients

Twenty-two patients (14 men and 8 women) aged from 34 to 76 years (55 years) were diagnosed preoperatively as having pancreatic head cancer by ultrasound, computed tomography (CT), magnetic resonance cholangiopancreatography (MRCP), and

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other examinations.

### **Instruments for laparoscopy and LUS**

A set of AESCULAP laparoscopic instruments (AESCULAP Inc., Germany) and a Sharplan laparoscopic ultrasonic imaging system (Sharplan Inc., Israel) were used. The laparoscopic ultrasonic detector was 31 cm long and 10 mm in diameter with a frequency of 8 MHz, and a scanning depth of 6 cm, which can scan 90° sector along the axis.

### **Staging**

Under general anesthesia all patients were subjected to an umbilical incision to place a trocar through which to create a open or close pneumoperitoneum, while maintaining a CO<sub>2</sub> insufflation pressure of 14–16 mmHg. Endoscopically, a 30-degree laparoscope was inserted through the trocar. Other two ports were located in the right upper quadrant and the right middle quadrant of the abdomen, if necessary an assisted port was added below the xiphoid. Laparoscopy combined with LUS was used in tumor staging based on tumor location, local vascular invasion, regional metastasis of the lymph node, liver and peritoneum or distant metastases after division of hepatogastric and gastrocolic ligament.<sup>[2]</sup> Biopsy was performed under ultrasound guidance to assess the resectability of suspected lesions.

### **Results**

#### **Laparoscopy and LUS for detection of tumor staging**

Among the 22 patients, laparoscopy and LUS detected surface liver or peritoneal metastases as white lesser tubercles (6 mm in diameter) in 3 patients. One patient was found to have micro-metastasis of hepatic parenchyma which was confirmed by two biopsy under ultrasound guidance. Another patient with no specific clinical manifestations, normal tumor indicators and normal laboratory findings was found to have chronic pancreatitis, which was confirmed by two biopsies in the suspected region of the pancreatic head. Stage and diagnosis

were identified definitely in the 5 patients to avoid laparotomy. Hypertrophic lymph nodes or tumor invasion of local vessels was discovered in the peritoneal cavity, retroperitoneum, omentum in 8 of the remaining 17 patients, including 2 patients with portal vein emboli formed by tumor metastasis. The 8 patients were suggested to have unresectable tumor according to the findings of laparoscopy and LUS. To avoid false negative and positive results and ensure better contrast study, exploratory laparotomy was carried out in all 17 patients.

### **Exploratory laparotomy**

Pancreaticoduodenectomy was successfully performed in 8 patients, and 9 patients received no resection because of tumor or regional lymph node invasion of vessels.

### **Discussion**

LUS as a new ultrasonic examination combined with laparoscopy can scan suspected lesions directly with less trauma and high accuracy. Being more sensitive than out-body ultrasound, CT, computed tomography angiography (CTAP), MRI and other imaging examinations,<sup>[3]</sup> it is able to provide precise images through directly touching with organic tissues by a high-frequency detector, even find out micro-lesions of less than 5 mm in diameter in deep liver. It is of clinical value in assessing therapy and prognosis based on tumor size, the depth of local invasion and regional invasion of lymph node and adjacent vessels. Pancreatic head cancer characterized by severe malignancy, rapid progression, and low resectability and survival rate comprises 90% of duct cell carcinomas. Although advanced or moderately differentiated adenocarcinoma is frequently seen with common symptoms of abdominal pain and jaundice because the tumor may penetrate into the wall of the pancreatic duct, invade adjacent organs and tissues as well as nerves, lymph nodes, local vessels, and metastasize to the distant sites in early stage. As a result, the radical resectability is poor. Most patients are subjected to

exploratory laparotomy to see whether the tumor is resectable, but the opportunity of complications is increased. Laparoscopy and LUS<sup>[4]</sup> can decide whether there are distant micro-metastases of the liver and peritoneum and invasion of local vessels (portal vein, superior mesenteric vessel, aorta, inferior vena cava), which help to avoid unnecessary exploratory laparotomy. In the 22 patients, 9 were found to have resection by laparoscopy and LUS, finally 8 of the patients underwent pancreaticoduodenectomy successfully after laparotomy, with a positive rate of 88.9% in contrast to 80%–100% reported elsewhere.<sup>[5]</sup>

In summary, the occurrence of pancreatic head cancer is growing year by year. The general condition of such patients is poor. The low resectability and many complications after exploratory laparotomy are hard to deal with. LUS may be a potential rational method for evaluating the stage of the tumor with the development of mini-invasive surgery. In the assessment of cancer patients, which is not confined to mortality, disability and curability, but more importantly to the living standard of the patients, LUS can avoid unnecessary laparotomy and its resulting sufferings in patients.<sup>[6]</sup> Additionally, the operator of LUS must be specially trained in ultrasound examination for minimizing false negative or positive rates.

## Competing interest

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

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