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The observation and analysis of efficacy of duodenum-preserving pancreatic head resection for patients with chronic pancreatitis.

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Abstract

Objective: To investigate and analyze the efficacy of duodenum-preserving pancreatic head resection (DPPHR) for the treatment of chronic pancreatitis (CP).

Methods: A retrospective analysis was performed regarding a total of 21 patients with CP combined with intractable abdominal pain, jaundice, or pancreatic duct stones who were admitted into Hepatobiliary Pancreatic Surgery Department of Henan Province People's Hospital from February 2010 to March 2016. All patients underwent DPPHR, which included 15 males and 6 females, aged 31-48 years, mean (39.5 ± 6.7) years. Patients' 6-month postoperative fasting plasma glucose (FPB), oral glucose tolerance test (2 h-OGTr), weight, pain (VAS visual method), diarrhea symptoms, and quality of life assessment (GLQI Scale) were measured.

Results: There was no operative death in this group of patients. The major complication was postoperational pancreatic leakage, which was five cases with the incidence of 23.8% (5/21). Abdominal pain was relieved in a total of 18 patients and significantly reduce in three cases with occasional episodes of upper abdominal pain. Pain scores were decreased significantly (7.8 ± 3.6 and 58.1 ± 5.6, P<0.05). The 6-month postoperative FPB changes were not statistically significant ((5.3 ± 0.4) mmol/L and (5.4 ± 0.4) mmol/L, P> 0.05). The 2 h-OGTr changes were not statistically significant either ((8.0 ± 0.6) mmol/L and (7.9 ± 0.6) mmol/L, P> 0.05). No new diabetes case occurred during the 6-month follow-up. The body weight was increased with the average increase of (4.8 ± 0.7) kg ((58.8 ± 1.8) kg and (53.9 ± 2.0) kg, P<0.05)). In addition, the quality of life was also improved significantly (78.1 ± 7.3 and 61.0 ± 6.2, P<0.05).

Conclusion: DPPHR can relieve abdominal pain in patients with CP without compromising pancreatic functions. It also can help to improve the quality of life in patients with CP.

Keywords: Duodenum-preserving pancreatic head resection, Chronic pancreatitis, Surgery.

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Introduction

Chronic pancreatitis (CP) was a chronic inflammation lesion featuring pancreatic tissue fibrosis and irreversible damage. It was characterized by midsection pain and living quality decline. The head of pancreas lesion accounted for 30% in all CP patients [1,2].

Many clinical practice has confirmed the efficacy of DPPHR over Whipple since Bege and others first put forward the DPPHR method in CP treatment [1-3]. However, the procedure of DPPHR suffered from difficult operation. Then a modified DPPHR was proposed by Guo [4] who simplified the procedure, laying solid foundation for the popularization in clinic.

From Febrary 2010 to March 2016, Hepatobiliary Pancreatic Surgery Department of Henan Province People's Hospital adopted the modified DPPHR in 21 CP patients treatment, which resulted in favourable efficacy. It was reported as follows.

Patients and Methods

Patients

Twenty one patients were admitted to Hepatobiliary Pancreatic Surgery Department of Henan Province People's Hospital from Febrary 2010 to March 2016, including 15 males and 6 females. Their ages ranged from 31 to 48 with a median of (39.5 ± 6.7) years old. The pre-operation CP diagnose depended on typical clinical manifestation such as stomachache and pancreas exocrinosity incompetent. Besides, CT, color ultrasound, magnatic resonance cholangiopancreatography (MRCP) and endoscope retrograde cholangiopancreatography (ERCP) could also point out the pancreaticobiliary changes, pancreas profile irregularity or

pancreatic head lump. Patients suffered from repeated abdominal pain with an medical history of 6 to 36 months, and anodynes were needed to ease their pain. The average fasting plasma-glucose (FPG) on admission was (7.8 ± 0.9) mmol/L (7.2-9.6 mmol/L). There were 15 patients with FPG<7.0 mmol/L, and average value was 5.4 ± 0.4 mmol/L (3.5-6.8 mmol/L). Oral glucose tolerance test (OGTT) was performed, and one patient showed a 2 h-OGTI with 13.6 mmol/L which accorded with diagnosis criteria of diabetes. Therefore, the complicated diabetes patients accounted for 33.3% (7/21) in this group. Imagelogical examination: all of the 21 paitnes were given CT and color ultrasound examination, including 12 MRCP and 9 ERCP.

Operation methods

Multi-spot centisis was carried out on pancreatic head lump, and frozen section sample from focus was sent to pathological exmination to exclude canceration. During operation, pancreatic head was first excised partly, and fascia was reserved. Then, the expanded pancreatic duct in tail position was incised to remove the calculus. For those with string beads-shaped pancreatic duct, the full duct was excised for sufficient drainage, and pancreaticojejunostomy Roux-En-Y was pre-formed. Modified duodenum-preserving pancreatic head excision was performed for other patients. The head of pancreas was supposed to be excised as far as possible, likewise the posterior fascia were all divided for convenience. Attention should be paid to posterior superior pancreaticoduodemal artery that was important for blood supply of biliary ducts and duodenum, winding along biliary rear wall. The back wall of bile duct should be avoided from stripping when dividing pancreatic head and duodenum joint part, reserving the integrity of posterior superior pancreaticoduodemal artery. End-to-side anastomosis of caudal pancreatic broken ends and Rouxen jejunal loop was performed. Furthermore, drainage tube was installed into pancreatic duct for succus drainaging. It was worth mentioning that 2 choledochectasia patients suffered from bile duct expansion when pancreatic tissue in antetheca and parietal common bile duct was divided. To solve the problem, common bile duct was vertically cut by 1.0 cm, being side identical to Roux jejunal loop, and gallbladder was excised.

Observational index

FPB, 2 h-OGTr, body index (BW), pain score (PS), symptom of diarrheas and living quality evaluation were all included in this study. Visual analogue scale (VAS) was used in the evaluation of pain. The score 0 was equal to the no feeling of pain, while score<30 was equal to the mild pain. The higher score interval 31-69 was set as moderate pain, and score>70 referred to severe pain. Evaluation of living quality adopted mature GLQI scale that was suitable for digestive system disease. The index was evaluated on admission and 6 months postoperation.

Statistical method

Statistical analysis was performed using software IBM SPSS 17.0. Paired t-test was employed for measurement data, and ANOVA test was adopted in enumeration data. The inspection level was P=0.05.

Result

Common clinical features of patients

There were 21 CP paitnets, including 15 males and 6 females. Their ages ranged from 31 to 48 with a median of (39.5 ± 6.7) year old. 12 patients had the history of alcoholism in this group. Diarrhea occurred frequently in 10 patients, and 7 patients suffered from complicated diabetes. Imageological examination showed that 6 patients got pancreas calcification, and 12 patients with complicated pancreatic head lump. Besides, pancreatic duct expansion occurred in 9 patients (diameter>13.0 mm), and common bile duct expansion existed in 2 patients (diameter ≥ 10 mm). Moreover, there were 7 patients with complicated pancreatic duct multiple stone, and only 1 patients with obstructive jaundice. Preoperative common clinical features were sumarrized in table 1.

Table 1. *Common clinical features of enrolled CP patients (n (%)).*

Group		CP
case		21
Gender	Man	15 (71.4)
	Woman	6 (28.6)
Age		39.5 ± 6.7
alcoholism		12 (57.1)
diarrhea		10 (47.6)
diabetes		7 (33.3)
Internal pancreatic calcification		6 (28.6)
pancreatic head lump		12 (57.1)
pancreatic duct expansion		9 (42.9)
pancreatic duct multiple stone,		7 (33.3)
common bile duct expansion		2 (9.5)
obstructive jaundice		1 (4.8)

The changes of FPB, 2 h-OGTr, BW and VAS before and after operation

Body weight increased somewhat 6 months after operation, with an average of (4.8 ± 0.7) kg ((58.8 ± 1.8) kg and (53.9 ± 2.0) kg, P<0.05)). Pain score declined significantly after operation (7.8 ± 3.6 and 58.1 ± 5.6, P<0.05). There was no statistical significance between pre-operation and postoperation FPB value. ((5.3 ± 0.4) mmol/L and (5.4 ± 0.4) mmol/L, P>0.05). Similarly, the 2 h-OGTI value showed no

stastical difference between pre-operation and postoperation ((8.0 ± 0.6) mmol/L and (7.9 ± 0.6) mmol/L, P>0.05).

Table 2. BW, VAS and living quality score changes.

Group	Case	BW (Kg)	VAS	FPB (mmol/L)	2 h-OGTI (mmol/L)
Pre-operation	21	53.9 ± 2.0	58.1 ± 5.6	5.3 ± 0.4	8.0 ± 0.6
Post-operation	21	58.8 ± 1.8	7.8 ± 3.6	5.4 ± 0.4	7.9 ± 0.6
t/P value*		6.58/0.000	12.98/0.000	3.45/0.25	1.34/0.23

*Statistical value was compared between pre-operation and postoperation.

Living quality changes between pre-operation and postoperation

Subjective symptom, public activity, physiological function, mental emotion, and GLQI total score were all significatnly enhanced after operation.

Patients conditions during operation and postoperation

No death occurred after operation in this group. Common paraffin section pathological examination was equal to chronic pancreatitis, and partial sample showed focal necrosis. Average blood loss during operation was (471 ± 226) ml (200~800 ml), and average hospital stays was (18 ± 6) (13~31) d. Pancreatic leakage was the most important complication after operation. Unfortunately, 5 patients occurred pancreatic leakage after operation, all of which undergo modified DPPHR. Therefore, we drained the pancreatic juice 50~200 mL everyday. Drainage tube radiography showed that it was pure pancreatic leakage. Clear drainage was maintained for leakage patients, and it turned to be healed in 3 month for 4 cases. One patient healed after 6 months for its delayed opearation. Some complications such as bile leakage, doudenum fistula, gastrointestinal bleeding and delayed gastric emptying were not seen after operation. Jaundice was gradually faded away for patients with complicated obstructive jaundice after operation. Symptoms of stomachache relieved significantly for 18 patients, which accounted for 85.7%. There were 3 patients suffered upper abdominal pain after operation but with declined pain degree. In all the 10 diarrhea patients, 5 were controlled basically without pancreatin, while others had less frequent diarrhea with pancreatinum taking.

Table 3. Living quality score changes of preoperation and postoperation.

Group	Case	Subjective symptom	Public activity	Physiological function	Mental emotion	GLQI score
preoperation	21	26.7 ± 3.9	3.4 ± 0.8	22.6 ± 1.3	8.3 ± 1.0	61.0 ± 6.2
postoperation	21	36.4 ± 3.9	6.9 ± 1.5	24.7 ± 1.3	10.1 ± 1.4	78.1 ± 7.3
t/P value*		3.355/0.010	3.592/0.007	3.591/0.007	2.604/0.031	3.812/0.005

*Statistical value was compared between preoperation and postoperation.

Discussions

Intractable stomachache was a major clinical manifestation for CP patients, the reason of which lied in increased internal pressure of pancreatic duct and tissue [3,5-8]. Besides, another major reason in causing stomachache was peripheral neuritis in pancreatic head [9]. The diameter of sensory nerve in pancreatic head thickened, infiltrating the peripheral inflammation cells as well as destroying perineurium that was an important protective screen for nerve and ambient environment. Though it was harmful for patients, it did not occur obviously in pancreatic tail. DPPHR removed the pathological basis for stomachache by excising pancreatic head, thus unblocking the pancreatic bile tract drainage, the method of which relieved stomachache by 75-95% [10-12]. In other words, DPPHR significnatly reduced the pain score after operation, and only three patients still suffered from upper abdominal pain off and on. As the course of CP developed, the exocrinosity and endocrine function of pancreas decompensated inevitably. This pathologic was progressive and irreversible, destroying the pancreatic function totally. Zhou and others found that early anastomosis for pancreatic duct and jejunum could slow down the progress of destroying pancreatic function. Moreover, Riediger and others further studied the important role of pancreatic head in happening and developing progress for chronic pancreatitis [13,14]. In this work, the improved diarrheal symptom, unchanged FPB and 2 h-OGTr as well as non-diabtic patients appearance implied both the external and internal secretion function of pancreas reserved. The maintenance of endocrine function lied in the integrity of enteroinsular axis [15,16].

Table 4. Intraoperative and postoperative conditions for enrolled CP patients (n (%)).

Group	CP
Case	21
Intraoperative hemorrhage (x ± s, mL)	471 ± 226
Hospital stays (x ± s, D)	18 ± 6
Pancreatic leakage	5(23.8)

Significatnly relieved stomachache	18(85.7)
Alleviated stomachache	3(14.3)
Basically controlled diarrhea	5 (50.0)
Less frequent diarrhea	5(50.0)

In addition, the postoperation BW and life quality score improved significantly, indicating the good efficacy of DPPHR in improving living quality of CP patients, which benefited from relieved stomachache. Key in the DPPHR operation was ensuring blood supply of doudenum and inferior common bile duct. In most cases, posterior superior pancreaticoduodenal artery played most important role in providing enough blood supply for doudenum, commoon bile duct and pancreatic head. When dividing the joint part of doudenum and pancreatic head, much attention should be paid to retain the integrity of common bile duct back wall in order to keep away from hurting the posterior superior pancreaticoduodenal artery. When the lump was close to pancreatic head, retain for the pancreatic head fascia added to the operation difficulty. For easy operation, posterior fascia was all divided in this group, avoiding serious ischemia for doudenum. The most important complication for DPPHR was pancreatic leakage that stem from residual pancreatic tissue of doudenal papilla and bile duct at pancreatic head. However, excess separation of the pancreatic tissue may damage posterior superior pancreaticoduodenal artery, causing blood supply defect for doudenum and pancreatic head bile duct. In addition, fibrin glue could be used as better solution for pancreatic leakage when ligating residual wound surface of pancreatic tissue. Above all, the result in this research was similar to our previous result [17]. DPPHR could relieve pain for CP patients, improve life quality and maintain the pancreatic function. After 6-month follow-up visit, good clinical efficacy was envisioned. Considering the high safety of this therapy, further popularization and application was proposed in clinic.

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