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Surgery for chronic pancreatitis and different methods of surgeries

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Abstract---Objectives: Chronic pancreatitis, a benign inflammatory process of the pancreas resulting in exocrine and endocrine insufficiency. Pain is the most devastating symptom, for which patient seeks medical advice. Even though these problems are addressed medically, surgery is indicated in many cases of intractable pain. Methods: Thirty- patients who are managed surgically during November 2018 to October 2020 at our institute. Data is collected and analyzed. Various surgical procedures for chronic pancreatitis and their indications are noted. Pain relief, improvement of exocrine and endocrine insufficiency and improvement of quality of life are studied. Results: Various operative procedures are done including intra operative Celiac plexus block in some. Puestow's, Frey's and Whipples PD are done in these patients, which are selected according to the pathological anatomy. We observed long lasting pain relief is observed in 90% of our patients. In two of the patient's surgery was done in acute condition with edematous pancreas. In these cases, intra operative celiac plexus block was added. Conclusions: Surgery is effective in Chronic Pancreatitis with intractable pain and better results can be obtained with selection of procedure tailor made to the patient. Exocrine and endocrine functions may become better in some patients.

Keywords---chronic pancreatitis, Puestow's, Frey's, benign inflammatory process.

Introduction

Chronic pancreatitis is a progressive inflammatory disorder characterized as irreversible destruction of pancreatic parenchyma, associated with chronic pain, which is disabling and permanent loss of endocrine and exocrine function. Although the disease was first described by Friedrich in 1878, there is yet an incomplete understanding of the natural history and pathophysiology of the disease. The management of patients with chronic pancreatitis remains a challenging and difficult disease. The common cause of chronic pancreatitis is tropical chronic pancreatitis in tropical countries, as opposed to the alcohol commonest cause in the western population.

Tropical chronic pancreatitis was a unique form of chronic non-alcoholic pancreatitis, which will be limited to tropical developing countries. Patients will present at a younger age with repeated attacks of severe pain abdomen, vomiting, steatorrhea, weight loss, and type 2 diabetes requiring insulin. Recently, gene mutations associated with hereditary and idiopathic chronic pancreatitis have also been reported¹. Patients come to the doctor with clinical symptoms such as maldigestion, severe weight loss, recurrent severe upper abdominal pain. Later, in the course of the disease, endocrine, and exocrine insufficiency may also develop.

The pain in chronic pancreatitis patients may be difficult to relieve, and addiction to analgesics-opioids is common. The management for chronic pancreatitis is primarily of conservative and symptomatic treatment, but long-term follow-up studies showed demonstrated that about 50% of the patients might require surgical treatment at some time in their life.² Before 1980, pancreatic surgery had an operative mortality rate of up to 25%; the results were unpredictable, with many patients complaining of severe abdominal pain often associated with marked exocrine and endocrine insufficiency.³ Although the conservative management may have succeeded in some patients with chronic pancreatitis, if there is a spontaneous pain remission occurs, its timing is unpredictable, and also the patient may lose valuable years of life.

The main indication for surgical intervention in chronic pancreatitis is intractable abdominal pain, which will prevent the patient from leading his normal life. Moreover, surgery is indicated for the management of complications of chronic pancreatitis, including pancreatic fistula, pancreatic pseudo cyst, splenic vein thrombosis, bleeding pseudo aneurysms, and duodenal or biliary obstruction. Controversy still exists regarding the optimal timing of surgery in chronic pancreatitis patients, but at the time they came to the surgeon, patients are mostly in a state of alcohol and opiate addiction, under nutrition, sometimes diabetes or exocrine insufficiency. Recently, some studies showed that surgery has a positive impact on the course of chronic pancreatitis, in postponing the final "BURNOUT" of the pancreas and its consequent appearance of endocrine and exocrine insufficiency. Therefore, it should be of great clinical importance in the management of chronic pancreatitis to treat the above said problems surgically before the disease has progressed to an advanced stage in which the endocrine and exocrine function has lost completely.

The ideal surgery should provide the best long-term results with minimal functional impairment. Mainly two different types of surgeries have been developed based on different pathogenesis of abdominal pain. The drainage type of surgery is based on the hypothesis of parenchymal and/or ductal hypertension.⁴ There section type approach is based on the hypothesis of peri neuritis and local inflammatory. Drainage procedures include Puestow procedure, longitudinal pancreatic ojejunostomy, and pancreatico gastrostomy and, local resection procedures include central pancreatectomy, distalpancreatectomy, (DPPHR) Duodenum preserving pancreatic head resection (Begerprocedure) and proximal pancreatectomy-Whipple procedure orpylorus-preserving pancreaticoduodenectomy.

Aims & objectives

- To study the age, sex distribution, etiology and, risk factors associated with chronic pancreatitis
- To know the indication of surgery and type of surgery
- To know the outcome and response of the surgical drainage procedure and resection procedure.

Materials and Methods

The clinical study of 30 cases of chronic pancreatitis was conducted by selecting cases presenting to Government General Hospital, Department of General Surgery, Santiram Medical College, Nandyal, Andhra Pradesh during a period of 2 years from November 2018 to October 2020. All data were collected from the patients who presented with signs and symptoms of chronic pancreatitis.

Design of the study: Prospective study

Method of collection of data:

All the patients with suspected chronic pancreatitis were investigated, offered individualized treatment, and followed up.

Plan for data analysis: The clinical outcomes were documented using a standard proforma. The collected data were analyzed by comparing them with various standard studies on chronic pancreatitis.

Inclusion Criteria

- Patients with classical history and radiological characteristics of chronic calcific pancreatitis

Exclusion Criteria

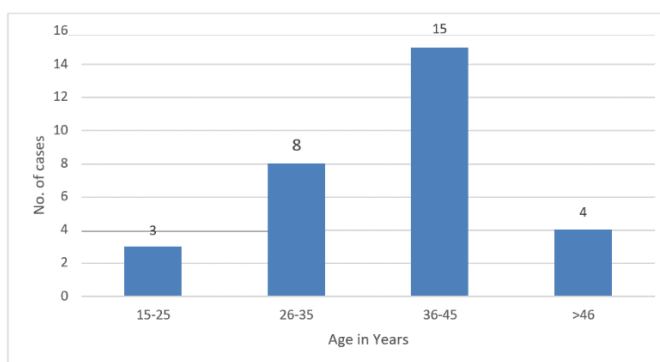
- Patients with chronic calcific pancreatitis who are not willing to abstain from alcohol.
- Patients with poor performance status.
- Patient with pancreatic malignancy.

Investigation details

- Blood investigations including CBC, Liver function tests and RFT, CA 19-9, Viral markers.
- USG abdomen – to look for pseudo cyst.
- Portal Doppler: to look for associated portal hypertension.
- UGI Scope: to look for extraneous impression and varices in cases of portal hypertension.
- CECT Abdomen & Pelvis: To look for calcification, head mass, stones in the duct and parenchyma, and diameter of the head and associated complications in the form of pseudocyst and perisplenic collaterals.

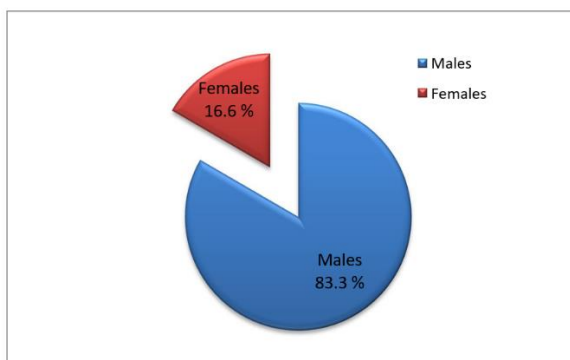
Results

Graph 1: Histogram of age distribution



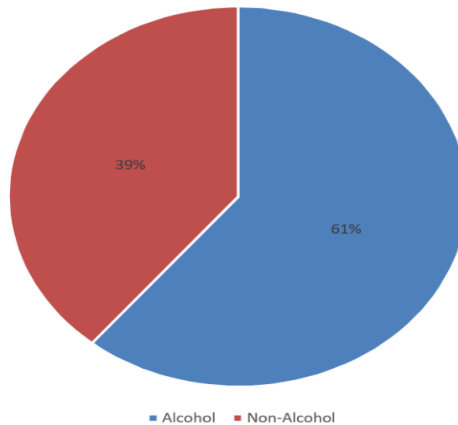
A total number of 30 patients who were diagnosed to have chronic calcific pancreatitis successfully managed were included in the study. The age of the patients varies from 15 to 58 yrs. Most of the patients were in their active earning period of life, 36 to 45 yrs.

Graph 2: Pie diagram of sex distribution



In our study, there were 25 (83.3%) male patients and 5 (16.6%) female patients out of 30, indicating that the disease is more common in males with a male to female ratio of 5:1. This is again due to a higher alcohol intake in males.

Graph3: Pie diagram showing alcohol and non-alcoholic



Regarding the aetiology of chronic calcifi pancreatitis, alcohol was associated with 19 (61%) patients, and 11 (39%) patients were considered to be tropical.

Table 1: Clinical presentation

Presentation	No. of patients	Percentage %
Exocrine insufficiency	8	25
Endocrine insufficiency	4	13
Any complications (biliary obstruction, splenic vein thrombosis, duodenal obstruction)	-	-

Among the clinical presentations, all the patients were presented with abdominal pain, and the pain score was more than 8 for 68 patients and less than 8 for 12 patients. In addition to pain, the other clinical presentation was shown in (Table 1).

Table 2: Surgical procedures

Name of the Procedure	Number
Modified Puestow method	24
Freys procedure	2
Begers procedure	2
Whipples procedure	2

The patients have been chosen according to the diameter of the duct, presence of an inflammatory mass in the head region, and associated with other complications in the form of the pseudocyst, portal hypertension, jaundice.

Coeliacplexusesblockweregivenin 5 patients



Figure 1: Head coring & opening of a duct



Figure 2: Removal of stones

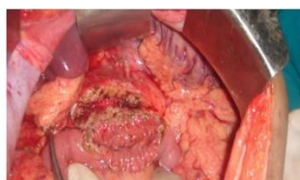


Figure 3: Creation of roux



Figure 4: Anastomosing the jejunum

Figure 1; Showing the head coring and opening of a duct, removal of stones, creation of roux and anastomosing the jejunum.



Anastomosing the jejunum with pancreas



Completed pancrteaticojejunostomy



Removed stones

Figure 2; showing the anastomosing the jejunum with pancreas, completed pancrteaticojejunostomy and the removed stones

Table 3: Post-operative complications

Complications	Number
Wound infection	5
Atelectasis	3
Hepaticojejunostomy leak	1

Pancreatic leak	1
Delayed gastric emptying	1

As like any other surgeries, the complication following the surgical procedures for chronic calcific pancreatitis is shown in table 3.

Follow-up

In the immediate follow-up period, all the patients had pain relief drastically to the pain score of one and continue to be asymptomatic for a period of six months. Three patients were re-admitted with a recurrence of pain due to the resumption of alcohol. Patients with endocrine insufficiency had good glycaemic control with a decreased dosage of insulin compared to the preoperative dose of insulin, mainly in case of drainage procedure. Patients with exocrine insufficiency had improvement in steatorrhea, and there is weight gain postoperatively.

Pain Score

The average pain score of the patient, which was 8 preoperatively, has come down to 1 in the immediate post-op period. Pain relief was more in case of inflammatory mass operated by Frey's procedure as it was believed that pain-sensitive is mostly located in the head of Pancreas. Pancreatic insufficiency was slightly improved in patients subjected to the long-loop pancreaticojejunostomy group. There is slight steatorrhea in case of resection procedures, especially in the case of Whipple's procedure and Frey's procedure.

Quality of life

Although no formal instrument measuring the quality of life was used, quality of life after surgery was inferred from the results graded both by a degree of pain relief and activity status. The median number of hospital admission fell after surgery for all procedures from 2 admissions per year to none by 12 months after surgery, which was maintained during follow-up. There was a significant increase in those in regular employment after surgery. 28 of 30 (93.3%) patients rated as in good health were employed.

Discussion

Surgical intervention for chronic pancreatitis is commonly accepted as the most effective therapeutic option for pain control and management of complications. The main indication for the surgical treatment of Chronic pancreatitis is to alleviate severe pancreatic pain and to manage pancreatitis-related local regional complications, improve the quality of life by decreasing the intensity and repeated attacks of pain, and also in improvement in the exocrine and endocrine function of the remaining Pancreas in case of chronic pancreatitis. According to the conventional wisdom, an operative procedure for chronic pancreatitis, as a palliative measure on an already functionally impaired gland, it should be as conservative as possible to limit the occurrence especially of endocrine failure. Contrary to this, an aggressive approach has been advocated by some series. Berney et al.³ reported pancreatic resection for severe chronic pancreatitis in 68

patients and shown that resection was safe and had long-term results of pain control. In our series, based on the conventional concept, to preserve as much functioning parenchyma and islet cells as possible, only six patients were subjected to resectional procedures.

Out of six, five had the most relief of pain. Longitudinal pancreaticojejunostomy (LPJ) is safe because it preserves gland there less incidence of exocrine and endocrine deficiency in patients postoperatively. We had no post operative death with LPJ (mortality 0%). Many authors have reported a low mortality rate (0%). During follow-up, no patients died at a mean of thirteen months after the operation, which is comparable with the reported rate. Pain relief was classified as good in 27 of 30 patients (90%) who underwent surgery for intractable pain.

Etiology-Alcohol

In our study, among the alcoholic chronic pancreatitis, 2 of 19 patients (20%) continued to consume alcohol. Most of these patients fell into poor or fair health categories. Despite uncertainty as to whether abstinence of alcohol truly results in diminished pain, there is little debate that abstinence should be recommended. Lankisch et al. and Layer et al. demonstrated that only 13% to 20% of deaths in patients with chronic pancreatitis are directly related to pancreatitis.⁵ The majority of deaths in these patients occur as a result of diseases that are related to tobacco or alcohol.

In our study, the type of surgery or the etiology of chronic pancreatitis did not influence the long-term outcome of a patient with chronic pancreatitis. This would be partly explained by the nature of the disease. The etiology and perception of pain in chronic pancreatitis is definitely multifactorial, and it is influenced by a variety of factors, including the social and cultural dynamics, co-morbid illnesses and continued use of alcohol.

Pain Relief

Our study showed that operative intervention (both drainage and resection) could achieve pain relief and a better quality of life in selected patients. Frey's procedure appears to achieve the highest pain relief (92.3%); careful patient selection presumably based on structural changes within the pancreas and adjacent organs, is the key factor in achieving good results. Although our group fully accepts the concept of 'burn out' of the disease leads to eventual spontaneous relief of chronic pain. In our study, operative therapy not only led to long-lasting pain relief in the majority of patients operated but also resulted in a significant increase in the proportion of patients able to work or function normally in society from 9% to 82%, according to a better quality of life.

Although a higher proportion of patients with tropical chronic pancreatitis patients had pain relief following surgery, we didn't find any correlation between pain relief in alcoholic pancreatitis and those who were not alcoholic. This result was similar to the report reported by Brinton et al.⁶ who reported results of later al pancreaticojejunostomy in 39 patients. There are only two prospective randomized studies with small patient numbers that have compared medical and

surgical approaches, and both studies show that surgical treatment is more durable and effective than endoscopic treatment for chronic pancreatitis.

This is, in contrast, to a report by Sato et al., who found that over a mean period of 9.1 years, only 50% of patients with alcoholic pancreatitis had a good result after surgery compared to 83% of those who had non-alcoholic pancreatitis.⁷ Another report by Sharma et al.⁸ found that 88% of patients with non-alcoholic chronic pancreatitis had immediate and lasting pain relief. Cahen et al. found in patients with chronic pancreatitis and pancreatic duct obstruction that surgical drainage is more effective than endoscopic treatment during a 2-year follow-up. The benefits of surgery were demonstrated by more rapid, effective and sustained pain relief, a better state of health, and few procedures. Dite et al. found complete pain relief in 37 % of patients undergoing surgery versus 14 % of patients receiving endoscopic treatment. This study did not include shock wave lithotripsy, cumulative stentings, or repeat treatments after the recurrence of symptoms in the endoscopic ally treated arm.

Endocrine and exocrine insufficiency

The operation resulted in an improvement of the patient's diabetic status, with about 3 of 4 patients (75%) who were dependent on a high dose of insulin before surgery being taking a low dose of insulin, and euglycemic status was achieved. Exocrine pancreatic dysfunction was improved in 75% of patients who had steatorrhea preoperatively. Similar experiences have been reported from India in patients with tropical calcific pancreatitis. Sidhu et al. Have shown that there was a significant improvement of endocrine insufficiency and slight improvement of exocrine insufficiency in patients with tropical chronic pancreatitis undergoing modified Puestow procedure in a long-term follow-up study.⁹ Similar experience from Western studies by Nealon et al. also showed that occurrence of endocrine and exocrine insufficiency could be delayed by longitude in a pancreaticojejunostomy.¹⁰ In our study, there was no difference in pancreatic insufficiency between and resection group, which is similar to a report from Mayo clinic study by Sakorafas et al.¹¹

Celiac plexuses lock

Coeliac plexuses block are particularly useful in case of not much dilated pancreatic duct. Adding celiac plexus neurolysis to the current standard procedure in a single sitting as a part of multimodal approach will provide additional benefit to the patient not only by improving the psychological wellbeing but also by reducing the opioid intake there by leading to a better quality of life. NCPB improves the QOL in all types of pancreatitis. Various studies and RCTs on celiac plexus block also have shown to improve QOL in both chronic pancreatitis.¹²

Quality of life after surgery in chronic pancreatitis

The EORTC-QLQ has now been applied in two prospective randomized trials comparing surgical techniques in patients with chronic pancreatitis, which stress the draining or the resectional aspects of treatment to varying degrees.^{12,13}

Statistically significant changes in symptoms and functional levels were observed. In both trials, the patient's overall quality of life improved considerably. Relief of symptoms, especially of pain, fatigue, and loss of body weight, accounted for improvement of physical status, working ability and emotional and social functioning.¹⁴ These changes correlated well with the results of the separately assessed pain score and increase of body weight. The visual analog scale, as one feature of the pain score, has been shown to be a reliable and valid tool for measuring pain intensity.¹⁵

The additional information on the frequency of pain attacks, an analgesic regimen and sick leave back up the results of the visual analog scale. In comparison with McGill's pain questionnaire, the pain score had previously been tested in 19 patients suffering from pancreatic carcinoma, proving its validity and reliability. Overall health was statistically better than a similar study by Adam D B et al.

Post operative complications

In our study, one patient who underwent Whipple's surgery for chronic pancreatitis had hepaticojejunostomy leak on POD5. We managed the patient by repeated aspiration of a collection in the peritoneal cavity by ultrasound aid. The leak came down in 5 days. Another patient who has also undergone Whipple's had a pancreatic leak from the pancreaticogastrostomy anastomosis. She was managed by strict NBM and Ryles tube aspiration. As the fistula was low output fistula, it resolved in 5 days.

Morbidity and mortality

Lateral pancreaticojejunostomy is a relatively safe procedure despite its magnitude. The postoperative morbidity rate of 13.3% was within an acceptable range¹² where it is 10% in our study.

Algorithm of different types of surgery

Drainage, resection and hybrid procedures depend on the type of pathology involved in chronic pancreatitis. Drainage procedures are done in case of dilated duct and resection in case of any inflammatory mass in the head or duodenum. Hybrid procedures are done in case of both inflammatory lesions and dilatation of pancreatic duct with calcification. Resection procedures will have high chances of exocrine or endocrine insufficiency but will have more decrease in pain.

Islet cell auto transplantation

In one study, these patients when treated with intrahepatic islet cell auto transplantation, did remarkably well (blood glucose <126 mg/dl, hemoglobin A1c 6.5%). Five of the six patients did not require insulin therapy at all.¹⁶ The results of islet cell auto transplantation in the portal vein, within the spleen and portal vein or within the spleen alone are equally good. Even though patients require insulin, the dose needed to achieve normoglycemia is low. The embolization technique has complications such as duodenal ischemia, splenic infarction, and portal or splenic vein thrombosis. Even after surgery, over 15% of

patients continue to experience pain and an end-stage fibrotic gland and those dependent on narcotics do not do well after islet cell transplantation.¹⁷

Conclusion

Operative management of CP, when indicated, can be done safely with good results in terms of relief of abdominal pain, weight gain, and quality of life. Significant improvement in pancreatic exocrine insufficiency and endocrine insufficiency after surgery can be expected. Re sectional procedures will have higher early morbidity. Unsuspected and un noticed malignancy is a common etiology for late deaths. Continued use of alcohol intake is associated with poor pain relief and quality of life. Various genetic factors and genetic mechanisms have been identified and these may lead to the development of a novel therapeutic strategy for the management of this particularly complex disease in the near future, thereby improving the overall outcome.

The lack of appropriate animal models that mimics human disease should be identified as a crucial need as well as a cell culture model to examine the complex interactions between exocrine and endocrine pancreas. Biomarkers are needed for early identification of CP and assessment of abdominal pain as well as and robust data bases and epidemiological studies to better define chronic pancreatitis and predict its outcomes. At the same time, better means are needed to measure the exocrine pancreatic function in are liable, non-invasive, and reproducible manner. Protocolsto be standardized to distinguish type 3c diabetes mellitus from other types of diabetes. Development of better strategies to treat or prevent complications of CP will depend on better understanding the intricate cross talk at a cellular level in the pancreas as well as animal model approaches, defining solid end points for clinical studies, nutritional considerations, and examining similar disease models such as cystic fibrosis-pancreatic disease and other chronic pain syndromes.

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