Contents

Editorials

Measuring hepatic functional reserve using MEGX still a mirage!  
S K Sarin, Manoj Kumar  
203

Gastrointestinal stromal tumor - paradigm for successful targeted therapy  
Susy Kurian  
207

Original Articles

Impact of shorter duration of treatment on virological response rate in genotype 2 or 3 chronic hepatitis C virus infection  
Ioannis S Eleftheriotis, Konstantinos D Pantazis, Dimitrios Dimitroulosopoulos, Sotirios Koutsounas, Antonios Moumakakis, Emmanuel Paraskevas  
209

Gastrointestinal stromal tumors: a demographic, morphologic and immunohistochemical study  
F Rauf, Y Bhurgri, S Pervez  
214

Morphological and functional outcome after pancreatic necrosectomy and lesser sac lavage for necrotizing pancreatitis  
Mettu Srinivas Reddy, Sumitaj Singh, Rajinder Singh, Kartar Singh, Gurpreet Singh  
217

Analysis of Helicobacter pylori antimicrobial susceptibility and virulence genes in gastric mucosal biopsies in the United Arab Emirates  
Mubarak S Alfaresi, Abida A Elkoush, Krishna Mohan Muppavarapu, Shantveer Uppin, Raghunadharao Digumarti  
221

Review

Celiac disease in India  
Surender Kumar Yachha, Ujjal Poddar  
230

Case Series

Hydatidiarrhea  
Suyash Mohan, Ashish Verma, Sanjay Saran Bajjal  
238

Clinico-pathology conference

A treated case of follicular lymphoma presenting with fever and diarrhea  
Kim Vaiphei, Pankaj Malhotra, Nidhi Sharma, Anil Kumar Narasiyappah, Subhash Chander Varma  
240

Case Snippets

Endovascular management of hepatic hemorrhage and subcapsular hematoma in HELLP syndrome  
Chandan Jyoti Das, Deep Narayan Srivastava, Jyotindu Debnath, Vijay Ramchandran, Sujay Pal, Pehush Sahni  
244

Visceral leishmaniasis: acute liver failure in an immunocompetent Asian-Indian adult  
G Malatesha, Nishith K Singh, Vinay Gulati  
245

Endoscopic removal of chicken bone that caused gastric perforation and liver abscess  
R J Mukkada, A P Chettupuzha, V J Francis, P G Mathew, S P Chirayath, Abraham Koshy, Philip Augustine  
246

Letters

Reactogenicity of a combined hepatitis A and hepatitis B vaccine in healthy Indian children and adults  
Rakesh Aggarwal, A Balachandran, Unnikrishnan Menon, Rahul Nagpal, Girish Pokharna, Sanjay Rao, Dhananjay Shah, Karthik Srinivas, Sanjoy Datta, Hans Bock  
248

Colonoscopic and ileoscopic biopsies increase yield of diagnosis in chronic large bowel diarrhea with normal colonoscopy  
S Khanna, R Talukdar, N Saikia, S Mazumdar, S Kulkarni, J C Vij, A Kumar  
250

Delta hepatitis infection in northeast India  
Biswa Jyoti Borkakoty, Dipankar Biswas, J agadish Mahanta  
251

Thrombophilic factors in Egyptian children with portal vein thrombosis  
Khaled Salama, Nehal El-Koofi, Manal El-Hawary, Mona El-Raziky, Mona Abou-El Ela, Hala Ali, Hanaa El-Karaksy  
252

For online submission of articles and viewing full text of publications, visit the Journal website at www.indianjgastro.com

contd. on page iii ...
### Contents (contd.)

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatitis C virus infection and risk behaviors among injection drug users of Nagaland</td>
<td>Hiranya Kumar Das, Biswa Jyoti Borkakoty, Jagadish Mahanta, Gojendra Kumar Medhi, Pradeep Kumar Chelleng</td>
<td>253</td>
</tr>
<tr>
<td>Endoscopic removal of giant colonic lipomas</td>
<td>Georgia Lazaraki, Dimitrios Tragiannidis, Anestis Tarpagos, Dimitrios Tzilves, Ioannis Pilipidis, Ioannis Katsos</td>
<td>255</td>
</tr>
<tr>
<td>Rectal bleeding due to leech bite in a young child</td>
<td>Vincent Ho, Peter Boyd</td>
<td>256</td>
</tr>
<tr>
<td>Cecal web causing neonatal intestinal obstruction</td>
<td>Sushil Budhiraja</td>
<td>256</td>
</tr>
<tr>
<td>Images</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colonic leiomyoma with huge ulceration</td>
<td>Akihiko Takeda, Shinichi Ban, Akihiro Yasumoto, Keiko Ishikawa, Hiroyoshi Iseki, Hideki Takeuchi, Norio Takahashi, Isamu Koyama</td>
<td>213</td>
</tr>
<tr>
<td>Gastric cancer presenting with cutaneous metastasis</td>
<td>George Barreto, Shailesh Shrikhande, Parul Shukla</td>
<td>237</td>
</tr>
<tr>
<td>Gastroenterology Elsewhere</td>
<td></td>
<td>257</td>
</tr>
<tr>
<td>India Elsewhere</td>
<td></td>
<td>258</td>
</tr>
<tr>
<td>Announcements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indian Journal of Gastroenterology J Mitra Memorial Award</td>
<td></td>
<td>206</td>
</tr>
<tr>
<td>New and Notices</td>
<td></td>
<td>216</td>
</tr>
<tr>
<td>Index to Advertisers</td>
<td></td>
<td>220</td>
</tr>
<tr>
<td>Instructions to Contributors</td>
<td></td>
<td>259</td>
</tr>
</tbody>
</table>
Background: Immediate outcomes after pancreatic necrosectomy have improved in recent years. This study reviews our short-term to medium-term experience of structural and functional changes in the pancreas after necrosectomy. Methods: Ten patients (8 males, median age 35 years), discharged after pancreatic necrosectomy for acute necrotizing pancreatitis between 1996 and 1998 were reviewed after a median period of 22 months. Clinical evidence of pancreatic dysfunction was documented at follow-up interview. Patients underwent computed tomography of the abdomen, endoscopic retrograde pancreatography, oral glucose tolerance test, fecal fat estimation and fasting serum C-peptide estimation (CPE).

Results No patient had repeat episodes of pancreatitis during the follow-up period. Three patients developed de-novo diabetes after discharge. No patient had symptoms of steatorrhea. Five patients showed severe changes on CECT. ERCP showed marked changes in six patients, the commonest being an abrupt cut-off of the main pancreatic duct. Glucose tolerance was abnormal in three patients and impaired in two patients while fecal fat excretion was abnormal in 8 patients.

Conclusions: Severe acute pancreatitis and necrosectomy are associated with significant structural and functional changes on medium-term follow-up. [Indian J Gastroenterol 2007;26:217-220]

Acute necrotizing pancreatitis (ANP) constitutes approximately 20% of all cases of acute pancreatitis. In 40-60% of patients with ANP, the necrosis gets infected, usually after the 2nd week of illness. Infected pancreatic necrosis is a well-accepted indication for surgical intervention. Though management of infected necrosis with percutaneous methods is being reported with increasing frequency, open necrosectomy is still the most commonly used technique. Pancreatic necrosectomy (PN) involves debridement of the devitalized pancreatic and peripancreatic tissues with drainage of infected collections. It aims to preserve viable pancreatic tissue thus avoiding pancreatic insufficiency seen after resection procedures for necrotizing pancreatitis.

Mortality associated with acute pancreatitis has decreased during recent years. Stratification based on disease severity, improved organ support and a multi-disciplinary approach to its management have all led to this improvement in survival. Though acute pancreatitis has historically been considered to be devoid of long-term sequelae, pancreatic necrosectomy leads to loss of pancreatic parenchyma and scarring leading to long-term functional alterations. There is a lack of consensus regarding the extent of these changes and their clinical significance. The aim of this study was to evaluate the late morphological and functional outcome in patients who have undergone pancreatic necrosectomy and lesser sac drainage for acute necrotizing pancreatitis.

Methods

Ten consecutive patients (median [range] age: 35 [22-47]; 8 men) who had undergone PN for ANP in our unit over a two-year period (1996-1998), were included in the study.

Patients were approached regarding participation in the study during the time of follow-up and were enrolled in the research after informed consent was obtained. The plan of research was approved by the research ethics committee our institute. Patients with history of acute or chronic pancreatitis before the index episode were excluded from the study. The case records were reviewed retrospectively at follow-up to extract information regarding the cause and severity of pancreatitis, indication for surgery, intra-operative findings, post-operative course and the condition at discharge. All patients were prospectively evaluated after a minimum follow-up period of one year after discharge. The clinical assessment included history of recurrent pancreatitis, continuing alcohol consumption, ability to return to work and symptoms suggestive of diabetes and steatorrhea. The following investigations were carried out after a median follow-up of 22 months (15-36 months).

Assessment of morphology

1. Contrast enhanced computed tomography (CECT): Both oral and intravenous contrast was used.
The CT scan findings were graded as described by Jones et al.  

2. Endoscopic retrograde cholangio-pancreatography (ERCP): The ERCP findings were classified as previously reported by Axon et al.  

Assessment of endocrine function

Diabetes was diagnosed on oral glucose tolerance test (GTT) if the fasting blood glucose was greater than 126mg/dL or 2-hour blood glucose was more than 200 mg/dL. Fasting blood glucose less than 110mg/dL and 2-hour glucose less than 140 mg/dL was considered normal. All intermediate values were termed as impaired glucose tolerance. Endogenous insulin production was estimated in terms of fasting serum C-peptide levels (CPA) using a C-peptide ELISA kit (Mercodia AB, Sweden). Mean levels in healthy controls are 742 pMol/L (342-1803).  

Assessment of exocrine function

Pancreatic exocrine function was estimated over three days by the fecal fat estimation assay using the Van de Kramer method. Fecal fat of less than 7 gm per day was considered normal.

Statistical analysis

Descriptive statistics is used to present data. In view of the small number of patients, secondary statistical analysis is not reported.

Results

Six of the 10 patients had alcohol-induced pancreatitis and four had gall stone pancreatitis (Table 1). Median age at presentation was 35 years (IQR: 22-47). CECT at admission had revealed pancreatic necrosis in all cases (<50% necrosis in five, >50% necrosis in four, extent of necrosis was not specified in one patient). All patients had undergone open pancreatic necrosectomy and post-operative lesser sac irrigation. Indications for index surgery were ANP with deterioration on conservative management (n=5), ANP with infected necrosis suggested by air in the pancreas on CECT (2), ANP with aspirate proven infection (2), ANP with suggestion of peritonitis (1). Infected necrosis was confirmed by culture of necrosectomy specimens in 7 patients (bacterial 6, fungal 1). Post-operative complications included entero-cutaneous fistula (3 patients), pancreatic fistula (2), gastric outlet obstruction (1), systemic sepsis (bacterial 6, fungal 2). Six patients needed re-intervention during the index admission - ileostomy (2) and hemicolecctiontomy (1) for colonic fistula, drainage of infected collection causing gastric outlet obstruction (1), tracheal dilatation for stenosis (1) and ERCP with stenting (plastic stent) for obstructive jaundice due to common bile duct stone (1). The stent was removed prior to interval cholecystectomy. Pancreatic duct was not visualized at that time. Median duration of hospital stay was 70 days (35-105). At discharge, one patient was on insulin therapy for de novo diabetes and no patient had steatorrhea. For the purpose of this study patients were evaluated after a follow-up of median 22 months (range 15-36).

Clinical profile at follow up

Nine patients had returned to their previous occupations. One patient had changed to a different job involving less strenuous work. All six patients with alcoholic pancreatitis claimed abstinence from alcohol. No patient had recurrent episodes of pancreatitis. Four patients with gall stone pancreatitis had undergone elective cholecystectomy and two patients had closure of ileostomy. Two patients developed diabetes mellitus, 15 and 32 months after necrosectomy. No patient gave history suggestive of steatorrhea. There was a high incidence of wound-

Table 1: Baseline characteristics and investigations of patients with necrotizing pancreatitis

<table>
<thead>
<tr>
<th>No.</th>
<th>Age/ Sex</th>
<th>Cause</th>
<th>Contrast enhanced computed tomographic scan</th>
<th>Area of necrosis at surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>42/M</td>
<td>G</td>
<td>&gt;50%</td>
<td>Body, tail</td>
</tr>
<tr>
<td>2</td>
<td>22/M</td>
<td>A</td>
<td>30-50%</td>
<td>Head</td>
</tr>
<tr>
<td>3</td>
<td>47/M</td>
<td>A</td>
<td>30-50%</td>
<td>Body, tail</td>
</tr>
<tr>
<td>4</td>
<td>40/F</td>
<td>G</td>
<td>&gt;50%</td>
<td>Head, body</td>
</tr>
<tr>
<td>5</td>
<td>35/M</td>
<td>A</td>
<td>Not specified</td>
<td>Head, body</td>
</tr>
<tr>
<td>6</td>
<td>33/F</td>
<td>G</td>
<td>&lt;30%</td>
<td>Air in pancreas</td>
</tr>
<tr>
<td>7</td>
<td>40/M</td>
<td>G</td>
<td>&gt;50%</td>
<td>Limited necrosis</td>
</tr>
<tr>
<td>8</td>
<td>22/M</td>
<td>A</td>
<td>30-50%</td>
<td>Gas in pancreas</td>
</tr>
<tr>
<td>9</td>
<td>25/M</td>
<td>A</td>
<td>&gt;50%</td>
<td>Nercrosis</td>
</tr>
<tr>
<td>10</td>
<td>35/M</td>
<td>A</td>
<td>&lt; 30%</td>
<td>Positive culture of aspirate</td>
</tr>
</tbody>
</table>

G: Gall stone pancreatitis; A: Alcohol induced pancreatitis

*All patients, except patient numbers 6 and 8, had multiple fluid collections
related complications with two incisional hernias and three cases of badly scarred abdomen.

Pancreatic morphology (Table 2)

The pancreas was normal in size, shape and enhancement in three patients (30%). The pancreas showed mild changes in one patient and marked changes in six patients. ERCP was technically not possible in one patient. The pancreatic duct was normal in three while marked changes were seen in the remaining six patients.

Pancreatic endocrine and exocrine function

Three patients had clinical diabetes with abnormal GTT results. Two other patients showed impaired glucose tolerance (IGT). The mean (C) serum C-peptide level in the group was 484.7 (213.9) pmol/L. Fecal fat excretion was abnormal in eight patients. The level of fecal fat excretion was 11.9 (5.5) gm/day.

Discussion

ANP is associated with significant morbidity, prolonged hospital stay and disproportionate use of resources. Changes in morphology and function of pancreas in patients who ultimately recover are unclear. An Indian study of early changes after necrosectomy had reported high incidence of both exocrine and endocrine insufficiency in the immediate post-discharge period which improved over a median follow-up of 19 months. Our study has shown that significant morphological and functional deficits persist up to two years after the episode.

The morphological changes in the pancreas after ANP may present as changes in pancreatic parenchyma and or the ductal system and local complications such as pseudocysts. Angelini et al reported ductal changes in 47% of their patients after necrotizing pancreatitis. Our study has also revealed a high incidence of ductal and parenchymal abnormalities with the commonest being an abrupt cut-off of pancreatic duct and incomplete visualization of the pancreas.

The reported incidence of exocrine deficiency after necrotizing pancreatitis has ranged from less than 10% to over 80%. The incidence has been reported to be higher in patients with extensive necrosis, those undergoing necrosectomy and in the early recovery period. Though history suggestive of steatorrhea was not forthcoming from any of our patients, there was a high incidence of fat malabsorption on investigation.

The cause of glucose intolerance developing after ANP is uncertain. While beta cell loss is an obvious reason, studies have suggested insulin resistance as contributing to the problem. The serum C-peptide assay was used in our study as unlike blood insulin levels, peripheral C-peptide levels are unaffected by hepatic first pass metabolism. Hence it is a more accurate reflection of endogenous insulin production. The 30% and 20% incidence of overt diabetes and impaired glucose intolerance seen in our study is similar to that reported by others authors.

To conclude, patients undergoing pancreatic necrosectomy are at increased risk of morphological and functional alterations in the remnant pancreas. Only a small fraction of patients with actual morphological and functional deficits may present with
clinically manifest pancreatic dysfunction in the medium term.

References