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Percutaneous Miniinvasive Technologies: History, Traditions, Negative Trends and Perspectives

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The issue highlights the history of miniinvasive percutaneous surgery. Some negative trends and bias, though developed in the field, are discussed. Authors point out the achievements and perspectives of modern technologies, warning against the unreasonable euphoria of method’s possibilities, and call upon the use of the past experience and lessons learned by previous generation.

Key words: miniinvasive percutaneous surgery, tendency, perspective, endobiliary procedure.

References

Main Pancreatic Duct Stenting for Acute Pancreatitis Induced by Endoscopic Transpapillary Procedures*

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Aim. To assess retrospectively the clinical outcomes of retrograde endoscopic pancreatic duct stenting for acute post-procedure pancreatitis.

Materials and Methods. 2192 endoscopic retrograde procedures were performed during the period of 1st January 2009 – 1st July 2013. Acute post-procedure pancreatitis (APPP) has developed in 26 (1.33%) cases – in 24 (92.3%) females and in 2 (7.7%) males. Average age in these patients was 57.9 ± 14.8 years.

Results. Stenting of MPD was successful in 19 (90.5%) cases, resulting in full recovery. No complications of stenting procedure were observed. Average hospital stay in these patients was 11.8 ± 3.7 days. Conservative management in remaining 7 (26.9%) cases resulted in average hospital stay of 23.8 ± 7.5 days and 28.6% mortality rate.

Conclusion. Endoscopic MPD stenting for APPP was technically possible in 90.5% cases. Pancreatic stenting is an effective therapeutic modality, providing definitive cure in some patients and reduced hospital stay.

Key words: pancreas, pancreatitis, endoscopic retrograde cholangiopancreatography, stenting.

* full text in english

Introduction

Endoscopic interventions on major duodenal papilla (MDP) gained a stronghold in diagnostic elaboration and therapeutic approaches in management of various hepatopancreoduodenal conditions. However, retrograde transpapillary interventions, despite obvious benefits, are associated with a range of serious and sometimes fatal complications, with reported incidence rate of about 4.5–13.5% [1–4]. Mortality rate, according to different reports, stays within 0.4–0.5% [2–3, 6–7].

Acute post-ERCP pancreatitis (PEP) with incidence rates varying from 1.6% to 15.7% according to different authors, remains one of 1.6% to 15.7%, and unfortunately common, complications of endoscopic transpapillary interventions [2, 6, 8, 9]. Indicative, that acute pancreatitis (AP) shares more than 50% of all post-procedure complications and 40% of all lethal outcomes after endoscopic papillosphincterotomy (EPST). AP is responsible for 50 to 60% of pleas and legal claims, associated with ERCP [10–11].

Although PEP could accompany whatever extent of endoscopic retrograde manipulations on MDP for any approved indication, nevertheless in most cases it arises when MDP stenosis is present [8–9]. Swelling of surgical intervention area in the projection of pancreatic duct (PD) orifice was recognized as major triggering pathophysiological factor for PEP in all observed cases, leading to obstruction of pancreatic juice outflow, which in turn triggers a cascade of pathophysiological reactions resulting in acute pancreatitis (AP) [10–12].

The aim of the study was to evaluate the efficacy of endoscopic therapeutic interventions in management of acute PEP.

Material and Methods

2,192 retrograde endoscopic interventions on bile and pancreatic ducts were performed at the department of hospital surgery No. 2 of Russian National Research Medical University named after N.I. Pirogov, City Clinical Hospital No.31 between January 2009...
and July 2013. Total number of complications was 33 (1.5%), including 4 cases (0.18%) of postoperative bleeding in the area of EPST or main pancreatic duct (PD) surgical opening, 3 cases (0.13%) of retroduodenal perforation, and 26 cases (1.2%) of AP. Lethal outcome occurred in 3 cases (0.13%).

Preventive PD stenting was performed in 61 patients with high risk of PEP development. The potential risk of PEP was estimated subjectively, since there is no generally accepted scale for assessment of PEP-associated risk factors. However, no AP was observed after preventive pancreatic duct stenting. On the other hand, among patients who had no obvious indications for preventive pancreatic duct stenting during the intervention, PEP developed in 26 (1.2%) cases, including 24 females (92.3%) and 2 males (7.7%), aged 34–85 years (median age 57.9 ± 14.8 years).

Obstructive jaundice was the only indication for primary endoscopic interventions in all cases. The following causes of jaundice were identified: MDP stenosis — in 13 cases (50%) (with concurrent choledocholithiasis in 3 cases), isolated choledocholithiasis in 7 cases (26.9%), parapapillary diverticula in 3 cases (11.5%) (in 2 cases with concurrent choledocholithiasis and in one case with concurrent MDP stenosis). MDP neoplasm was revealed in 2 cases (7.7%), restenosis after prior EPST in 1 case (3.8%).

Acute pancreatitis after papillosphincterotomy developed in 13 cases (50%), after EPST with subsequent stone extraction — in 8 cases (30.8%), and after EPST combined with MPD incision in 3 cases (11.5%). Atypical EPST was performed in 6 cases (23.1%). In one case (3.9%) PEP developed after ineffective attempt to cannulate MDP for ERCP, and in one more case (3.9%) after MDP balloon dilation with subsequent stone extraction.

In 20 patients (76.9%) from the study group clinical manifestation of AP signs was obvious within 12 hours after the primary endoscopic retrograde intervention. In 4 cases (15.4%) AP signs emerged within 12–24 hours after the procedure, while only in 2 cases (7.7%) — 2 days after the primary ERPG procedure.

Diagnosis of acute pancreatitis was confirmed by laboratory data and instrumental investigations. All patients demonstrated raise in amylase activity from 882 to 16400 U/L, AP-specific abdominal ultrasound signs were present (Fig 1) in 19 (73.1%) patients, abdominal CT signs (Fig. 2) — in 9 (34.6%), characteristic endoscopic ultrasound (EUS) features — in 4 (15.4%) (Fig. 3).

Moderate severity PEP was predominant — i.e. 65.4% (17 patients) of all cases, mild PEP was seen in 7 patients (26.9%), and severe — only in 2 (7.7%).

For pancreatoduodenal stenting procedure 3–5 cm radio-opaque plastic stents with side holes and flaps, Olimpus, Wilson-Cook и Boston Scientific 5 and 7 Fr were used.
plastic guide wire (Fig. 5). After successful PD catheterization in a series of cases (n = 7) with evolving acute pancreatitis any use of contrast enhancement was avoided and X-ray guidance was used for instrument positioning and alignment with a guide wire. However, pancreatography was required in 12 cases for verification of the exact guide wire position, 1.5–2 ml of contrast medium, diluted with dioxidin solution 3:1, was injected. All pancreatogramm revealed moderate pancreatic hypertension (Fig. 6). Plastic stent was aligned with the guide wire with a pusher to provide adequate pancreatic juice outflow; the proximal end of the stent was positioned 20–25 mm above the PD orifice, while the distal end was advanced by 10–15 mm into duodenal lumen (Fig. 7). Correct positioning of the stent was verified by outflow of clear pancreatic juice.

Fig. 4. Endophoto. MDP swelling in the area of EPST.

Fig. 5. Retrograde cholangiopancreatogram. Stenting stage of intervention – introduction of a guide wire into PD (arrow).

Fig. 6. Retrograde pancreatogram. Pancreatic hypertension (arrow).

Fig. 7. Pancreatic stent insertion: a – pancreaticogram; b – endophoto.
Results and Discussion
It is well known that risk of PEP increases in the presence of specific factors or their combination. First group of risk factors include procedure or technique associated issues, and arise in the course of endoscopic balloon dilation MDP, atypical (noncan-nulative) EPST, MPD incision, after multiple (>5) attempts of MPD cannulation, or removal of large stones or their fragments from bile ducts [12–15]. Thorough analysis of PEP series in this study revealed presence of multiple procedure- and technique – associated risk factors.

Input of patient-associated risk factors is obvious from the fact, that MDP stenosis was established in half of all PEP (13 patients, 50%) cases, including a papapillary diverticulum in combination with MDP stenosis – in 1 patient, restenosis after prior EPST – also in 1 (i.e. 3.8% – each), and benign MDP tumor – in 2 (7.7%) patients. Data concerning PEP risk factors from this study is consistent with published data.

Patients with PEP require long-term, demanding, and very expensive treatment, thus prompting active search for novel and reliable therapeutic and endo-scopic solutions helping to prevent PEP. Current medical practice offers two groups of medicinal drugs commonly used for PEP prevention. Group with proven efficacy – NSAIDs (diclofenac and indomethacin). Rectal administration of a 100 mg dose before or after ERCP reduces PEP incidence to 4.4%, as compared with 12.5% incidence in placebo-group [18–24].

Group with unproven efficacy includes nitroglycerine, somatostatin, octreotide, protease inhibitors (gabexat, nafomastat and ulinastatin).

Endoscopic PEP prevention technique, commonly used in hospital all over the world, is a preventive pancreatic stenting. According to different authors PEP incidence after preventive stenting does not exceed 3.2%, while in the control group without preventive stenting it increases up to 13.6% [25]. In present study PEP was observed in 26 cases (1.2%), while no PEP cases were registered in the preventive stenting group (61 patients).

Thus, obtained results confirm high clinical efficacy of preventive pancreatic stenting in high risk patients, in consistency vast sound body of published data. PEP risk evaluation was somewhat subjective, as no accepted uniform evaluation scale exists to author’s knowledge. However, not a single out of all (n = 61) patients with preventive pancreatic stenting developed PEP, which, in author’s view, is a conclusive evidence of preventive stenting efficacy.

Current attitude towards emergency endoscopic procedures for early correction of altered pancreatic juice outflow and prevention of full-scale PEP, is really controversial [26]. PD stenting is not a therapeutic modality of choice for many surgeons [27–30]. This could be explained by technical challenges of a procedure to be done on increasingly swelling tissue in a complicated patient with AP already in place, this’s also a threat of significant PEP deterioration due to mechanical trauma in cases of stenting-failure [7, 9–10]. It should be noted, that many professional in Western countries refrain from repeated endoscopic manipulations in patients developing PEP, even though there’s no sufficient evidence from clinical trials.

In this study the attempt of endoscopic PD stenting at the earliest stage of PEP (i.e within 1.5–36 hours after the primary endoscopic intervention and/or the onset of clinical signs and symptoms) was made in 21 (80.8%) patients. Intervention was successful in 19 (90.5%) cases, which allowed to regain adequate pancreatic juice drainage and provided full recovery of these patients.

The duration of stent treatment varied from 5 to 12 days. There were no complications associated with stenting and stent removal.

Hospital stay after successful PD drainage varied from 6 to 21 days (in average – 11.8 ± 3.7 days). Although subsequent laparoscopic cholecystectomy in 3 patients after adequate PEP control was achieved prolonged average hospital stay for a while.

In the group without MPD stenting 5 patients (71.4%) fully recovered, and 2 patients (28.6%) died. Hospital stay varied from 15 to 33 days (in average 23.8 ± 7.5 days).

Conclusion
Endoscopic MPD stenting is an effective procedure in PEP management and prevention. The procedure was technically possible in 90.5% cases, thus it should be performed without delay whenever clinical signs and symptoms of PEP are noticed.

References


MINIINVASIVE PANCREATIC SURGERY

Innovative Instrumentation and Techniques for Pancreonecrosis and Diffuse Parapancreatitis Transcutaneous Management

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Aim. To develop a set of innovative surgical instruments for percutaneous management of pancreonecrosis and diffuse parapancreatitis and validate this instrumentation in clinical practice.

Materials and Methods. Percutaneous puncture approach was tested in 53 patients, among them alcoholic pancreatitis was diagnosed in 40 cases, alimentary — in 6, biliary — in 6 and post-traumatic — in 1. By types of cellulitis (following A.D. Tolstoy classification) all cases were distributed as follows: type D — 31 cases, type C — 11, type E — 11, 2–3 retroperitoneal cellular spaces were involved in 32 patients, 4–5 spaces — in 19, and 6&7 retroperitoneal cellular spaces — in 1 patient each. Infected pancreonecrosis was verified prior to initiation of treatment in 41 patients. Percutaneous draining of involved retroperitoneal spaces and focal accumulations of liquid, replacing initial drainage-system with larger diameter tubes and transcutaneous sequestrectomies (necrotomies) were the modalities of choice in this group of patients. All procedures were performed with invented surgical instruments.

Results. There were no failures, technical issues or complications, either during primary draining procedures or drainage-system replacements. Only 2 complicated cases due to large diameter of primary draining systems were seen. In 33 (62.3%) cases surgeries were avoided, although 2 (6.1%) of these patients died. In 20 (37.7%) cases surgical procedures were performed, 7 (35%) patients from this subgroup died. Totally 44 (83%) out of 53 patients recovered and 9 (17%) died.

Conclusion. Percutaneous puncture providing access for surgical and therapeutic management of pancreonecrosis and diffuse parapancreatitis is a promising technique. The set of innovative surgical instruments and techniques developed for this purpose allow to simplify transcutaneous procedures, making them more safe and reliable while reducing the incidence and severity of complications, and making it technically feasible to effectively remove retroperitoneal fat sequesters.

Key words: pancreas, pancreonecrosis, parapancreatitis, percutaneous draining, instruments, transcutaneous sequestrectomy.

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References


Retrograde Transpapillar Stenting of Main Pancreatic Duct in Multimodality Treatment of Chronic Pancreatitis

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Aim. To verify the role of endoscopic transpapillar procedures in management of stenotic lesions and impaired continuity of main pancreatic duct (MPD) in patients with chronic pancreatitis.

Materials and Methods. 215 endoscopic procedures for the obstruction of pancreatic ducts were performed in 95 patients with chronic pancreatitis during the period from January 1998 – December 2013. The study group included 52 (54.7%) patients with pancreatic duct strictures and 43 (45.3%) patients with pancreatic fistula. Pancreaticodudenal endoprostheses were implanted in all cases.

Results. Endoscopic prostheses were successfully implanted in 64 (67.4%) patients, and in 45 (70.3%) cases this procedure has become the definitive treatment. Temporary stenting of MPD was required in 19 (29.7%) patients as an intermediate procedure before definitive surgery. Complications of endoscopic procedures were observed in 6 (2.8%) cases, there was also 1 (0.5%) death.

Conclusion. Pancreatic stenting was technically possible in 67.4% cases, while endoscopic correction could be used as definitive surgery in the majority of patients, yielding low complication and mortality rate.

Key words: pancreas, chronic pancreatitis, main pancreatic duct stricture, pancreatic fistula, endoscopic retrograde cholangiopancreatography, stenting.

References


Irreversible Electroporation with "NanoKnife"
in Management of Pancreatic Cancer (Clinical case)


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Aim. To demonstrate the first experience in Russian Federation with new non-thermal ablation modality for management of pancreatic cancer, i.e. non-thermal irreversible electroporation (NTIRE) of pancreatic head tumor.

Materials and Methods. Pancreatic head cancer T4N0M0 was diagnosed in a 56 y.o patient “A”. Surgical revision on 24.04.2013 identified a non-resectable cancer of pancreatic head invading duodenum and v. cava inferior. NTIRE procedure, 80 pulses – 70 µsec, 30 A, 8 minutes total exposure was done via 4 mono-polar “NanoKnife” electrodes, introduced into the tumor tissue at a 1.5 cm distance.

Results. No intra-op procedural complications were observed. Acute pancreatitis was diagnosed on day 7 postop, successfully managed with conservative treatment. Control multimodal imaging in November 2013, including US, MRI, and computerized X-ray did not reveal any signs of recurrent disease. Total FU duration is 7 months, and follow up will be continued.

Conclusion. Irreversible electroporation (IRE) can be viewed as a safe and effective non-thermal ablation procedure. This particular ablation modality allows multiple use in an individual patient, therefore offers an extended capacity of medical assistance for patients with initially non-resectable pancreatic cancer. Further studies will help to outline strict indications for IRE-procedures, as well as optimize the number of required NTIREs.

Key words: irreversible electroporation, pancreatic cancer, non-thermal ablation, minimally invasive surgery.
Bio-Impedance Analysis of Liver Parenchyma after Major Liver Resection in Experimental Setting

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Aim. Assessment of liver parenchyma biophysical characteristics before and after major liver resection.

Materials and Methods. Measurements of liver parenchyma electrical impedance values before and after major liver resection were performed on 27 white Vistar rats of both genders weighing 180–230 grams.

Results. Electrical impedance values of intact liver were 3.2 ± 0.2 k Ohms at 2 kHz frequency, 2.3 ± 0.1 k Ohms at 10 kHz and 1.7 ± 0.11 k Ohms at 20 kHz. In 72 hours post the impedance value has definitely increased up to 4.0 ± 0.13 k Ohms at 2 kHz frequency. During this period consistent increase of D2kHz/20kHz coefficient value up to 2.45 ± 0.10 as compared with baseline 1.95 ± 0.12 was observed.

Conclusion. Obtained data indicate the possible use of bio-impedance tool for assessment of liver parenchyma functional activity.

Key words: liver, major liver resection, electrical impedance, bio-impedancemetry.

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References
Nonparasitic Hepatic Cysts Treatment

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Aim. To optimize indications for different miniinvasive surgical (MIS) procedures in management of nonparasitic hepatic cysts and polycystic liver disease.

Materials and Methods. 62 patients with nonparasitic hepatic cysts and 38 patients with polycystic liver disease were subjected to different types of surgery, such as laparotomic (31.7%) and MIS procedures (68.3%), including: laparoscopic, MIS-assisted cyst fenestration and liver resection, percutaneous puncture and sclerotherapy. Long-term outcomes and QOL assessment with multipurpose short-form health survey SF-36 were performed in 6–12 months postop.

Results. Laparoscopic fenestration was the modality of choice in 76.5% of all cases for cysts localized in anterior and posterior liver segments with favorable postop course, short-term hospital stay and rehabilitation period, as well as low recurrence rate (6.6%). In cases where laparoscopic procedures were contraindicated, available options for management of nonparasitic hepatic cysts included: MIS-assisted fenestrations – for management of thick-walled cysts in anterior liver segments, and percutaneous puncture and aspiration modalities – for management of thin-walled and intraparenchimal cysts. QOL has definitely improved in patients with polycystic liver disease ($p < 0.001; R^2 = -0.29$) after surgery, except for physical functioning scaled scores, which is indicative of MIS palliative procedures superiority in management of this particular type of lesions.

Conclusion. MIS procedure of choice for nonparasitic hepatic cysts and polycystic liver disease management would depend on localization of a particular lesion, comorbid status of a patient and types of surgeries performed prior to planned intervention. Laparoscopic and MIS-assisted fenestration is associated with recurrence rate of 0–10%, which is comparable with that after open surgeries.

Key words: nonparasitic hepatic cysts, polycystic liver disease, laparoscopic and MIS-assisted fenestration, percutaneous puncture and sclerotherapy.

References


Minilaparotomic Cholecystostomy in Eldery Patients with Acute Cholecystitis

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Aim. To optimize short-term outcomes in management of acute cholecystitis in elderly patients.

Materials and Methods. Mini-incision cholecystostomy was performed in 53 patients aged over 75 y.o. Charlson comorbidity index in all patients varied within 6–9, attributing all cases to high and extremely high lethal outcome risk.

In all cases destructive cholecystitis was verified, accompanied by jaundice in 40% of patients.

Results. Gallbladder draining period varied from 13 to 16 days. 8 (15%) patients were subjected to 2-stage surgical procedure, i.e. cholecystostomy at the first stage to achieve full control of inflammation with a mini-incision cholecystectomy at the second stage. Nine (17.1%) patients were discharged with functional cholecystostoma. Seven (13.2%) patients died after surgery, although immediate post-op mortality in extremely high risk patients with acute cholecystitis did not exceed 1.2%.

Conclusion. Our results allow us to recommend the wide use of two-stage procedure in patients with destructive cholecystitis and very high surgical and anaesthesiological risk – as a good alternative for decreasing post-op mortality.

Key words: acute cholecystitis, elderly age, comorbidity, high surgical risk, cholecystostomy.

References


Surgical Management of "Fresh" Extrahepatic Bile Duct Injuries

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Aim. To improve surgical outcomes in management of iatrogenic extrahepatic bile duct injuries (IBDI).

Materials and Methods. The authors share their experience in management of 107 cases of inadvertent iatrogenic extrahepatic bile duct injuries during the period 1989–2011. In 96 (89.7%) patients this iatrogenic injury occurred during cholecystectomy procedure. For early diagnosis of iatrogenic trauma the following diagnostic modalities were helpful: US, ERCPG, PTHC, CT, MR-cholangiography and re-laparoscopy.

Results. Proximal IBDI were diagnosed in more than 57% of cases. Delayed (in respect to timing of injury) surgical treatment was performed in 65.4% of all patients. Location of injury, time of diagnosis and associated complications pre-defined surgical tactics of choice in each case. Two-step strategy was used in patients who developed peritonitis. In 65.5% of all cases biliary-digestive anastomosis with replaceable percutaneous transhepatic drainages was the preferred procedure.

Conclusion. Longterm carcass bile ducts drainage prevents formation of recurrent anastomosis strictures. Surgery without drainages is possible only when fresh injuries of CBD or hepatic duct are identified.

Key words: extrahepatic bile ducts, iatrogenic injury, bile duct stricture, cholecystectomy, cholelithiasis, results.

References
Pancreatodigestive Anastomosis in Radical Operations of Periampullar Tumors

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**Aim.** To evaluate the impact of various types of pancreatodigestive anastomoses on early postop course after pancreatoduodenal resection.

**Materials and Methods.** Radical surgeries for periampullar tumors were performed in 106 patients during the period 1983–2013, among them 100 procedures were pancreatoduodenal resections (PDRs), and 6 — pancreatodudenectomies (PDEs). One-stage surgery was possible in 38 patients, biliary decompression procedures were necessary in 68 cases before going for radical surgery. Blind closure of pancreatic stump was carried in 15 cases, pancreatocoenteroanastomosis — in 23, pancreatogastroanastomosis — in 32, pancreatogastroanastomosis — in 30 patients.

**Results.** Adherence to two-step surgery in patients with severe cholestasis and to differentiated approach in formation of pancreatodigestive Anastomosis while securing pancreatic Anastomosis with external drainage to maintain external diversion of bile in early postoperative period allowed to reduce postoperative complication and mortality rates to 10.8%.

**Conclusion.** The most common complications of PDR are associated with pancreatic stump closure and formation of pancreatodigestive Anastomosis. Pancreatogastroanastomosis seems to have a number of sound advantages. External diversion of pancreatic juice through MPD drainage system and simultaneous maintenance of percutaneous transhepatic cholangiostomy for partial external biliary diversion (PEBD) in early postop period significantly reduces the risk of specific PDR- and PDE-associated postop complications.

**Key words:** periampullary tumor, pancreas, pancreatoduodenal resection, pancreatodigestive anastomosis, pankreatogastroanastomosis, pancreatic necrosis, anastomotic failure, two-stage operation.

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**References**


Acute Pancreatitis: Morphological Issues in Development of the Disease

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Aim. To study ultrastructural pancreatic parenchyma changes in different types of acute pancreatitis.

Materials and Methods. Morphological including histological and ultrastructural examination of pancreas was performed in 11 patients with severe acute pancreatitis. Intraop biopsy samples at different disease stages, as well as autopsy material were used in this study.

Results. Different mechanisms of pancreatic cells death are involved at the initial stage of the disease, i.e. necrosis and apoptosis. Predominant necrosis is usually associated with extremely severe course of the disease and rapid multiorgan failure progression. Apoptosis can alternate into necrosis in the natural course of acute pancreatitis, manifesting clinically in aggravation of systemic inflammation and severity of symptoms. Destructive process in the pancreas is sustained for a long period of time. After 2.5 months from the onset of the disease the majority of acinar cells still demonstrate substantial signs of damage, which should be taken into account in treatment plans.

Conclusion. Presented findings are indicative of morphological heterogenicity in acute pancreatitis, encompassing both — volume of tissue destruction and different types of cell death involved. Further studies are required to elucidate particular roles of necrosis and apoptosis in destructive pancreatitis, their input into severity of the disease, development of complications and clinical outcomes.

Key words: acute pancreatitis, destructive pancreatitis, pancreonecrosis, necrosis, apoptosis.


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References
Radical Pancreatic Resections for Periampullary Carcinoma in Eldery Patients

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**Aim.** To assess surgical outcomes after radical surgical procedures for periampullary tumors in elderly patients (aged 75 and more).

**Materials and Methods.** 56 radical surgeries for periampullary carcinomas, including 13 procedures in elderly patients aged ≥75 y.o. were performed during 2010–2012. Short- and long-term surgical outcomes were compared between the groups of elderly and younger patients. Clinical and demographic characteristics were comparable in both groups except for age.

**Results.** There were no statistically significant differences between the two groups in terms of surgery duration, intraop blood loss, mortality and complications rates, as well as postop hospital stay. The mortality was 2 out of 13 in the elderly group and 4 out of 43 patients in the control group. Lower median survival and one-year survival rates were observed among the elderly, although 3 patients continue to demonstrate relapse-free survival.

**Conclusion.** Surgical outcomes after radical periampullary carcinoma resections in the elderly are comparable with the results in younger patients, thus justifying wider indications for such procedures in tertiary clinical centers.

**Key words:** pancreatic cancer, periampullary carcinomas, old age, pancreatoduodenal resection.

**References**


Experimental Model of Pancreonecrosis


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Key words: pancreas, pancreonecrosis, experimental model, cytokines, cerulean.

Aim. To develop a model of pancreonecrosis with increased release of cytokines into peripheral circulation.

Materials and Methods. Sixty (60) 12–14 weeks old outbred SD male rats of SPF category were used in this experiment. Levels of pro-inflammatory IL-6, TNF-α and anti-inflammatory IL-10 cytokines were monitored, and the results were compared with respective values in the control group of intact rats. To create the cerulean-induced pancreonecrosis (PN) model a single or triple intraperitoneal administration of 20, 40, 50, 60, and 80 µg/kg cerulean solution was used. To induce alcoholic PN all animals were wartered with 10% ethanol solution for a long period of time (from 14 days to 2.5 months). In 9 rats from this group alcohol was additionally potentiated with 40 µg/kg of cerulean. The mechanical model of PN encountered partial CBD occlusion enhanced by single intraperitoneal administration of 40 µg/kg cerulean.

Results. PN has not been achieved in a single animal after intraperitoneal cerulean administration in a range of indicated experimental dosages. This model was not associated with statistically significant increase of circulating cytokines. Alcohol model also failed to achieve PN and was not associated with increase of cytokine levels. Increase of IL-6 was noticed only in the subgroup with combined use of alcohol and cerulean (224.24 ± 5 pg/ml), while TNF-α did not show any increase (16.66 ± 7 pg/ml). Pronounced inflammation and necrosis of pancreatic parenchyma were predominant morphological characteristics of mechanical PN model. Additional cerulean resulted in total PN. Moreover, the mechanical PN model was associated with considerable increase in cytokine secretion as compared with cerulean and alcohol PN models.

Conclusion. Mechanical PN model with partial CBD occlusion can be recommended for evaluation of cytokine-inhibiting potential in medicinal drugs.

References


Noninvasive Ultrasound Ablation of Liver Tumours

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The review elucidates advanced approaches to local treatment of hepatic tumors. Such modalities as super-selective intra-arterial chemoembolization, cryoablation, laser and radio-frequency ablation, as well as most modern technique based on high intensity focused ultrasound (HIFU) for distant local tumor destruction are presented in a comparative format. A classification of local ablation techniques based on degree of invasiveness (factor of local tumor destruction) is proposed. The authors present through analysis of published data, describing benefits and disadvantages of all local ablation techniques, indications and contraindications, associated complications and long-term clinical outcomes.

**Key words:** liver, metastases, minimally invasive technologies, chemoembolization, cryoablation, ultrasound ablation, HIFU.

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**References**


Multimodal Management of Hepatocellular Carcinoma in Liver Cirrhosis Patients

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A clinical case of hepatocellular carcinoma in cirrhosis with massive bilobar tumor involvement is presented. Intra-arterial chemoembolization and following left lobectomy with simultaneous SI and atypical SVI resections were performed. Chemoembolization yielded partial tumor response, but at the same time triggered intensive tumor neoangiogenesis. Limited capacity of hepatic artery chemoembolization predetermined the necessity of major surgical interventions, allowing to achieve favorable outcome with multimodality approach in management of a complicated clinical case.

Key words: hepatocellular carcinoma, chemoembolization, hepasphere, liver cirrhosis, tumor neoangiogenesis, BCLC classification.

References

Liver Transplantation in Androgen-Induced Hepatocellular Carcinoma: a Report of Two Clinical Cases

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Hepatocellular carcinoma (HCC) is a relatively common case of cancer, which occurs mainly in patients with liver cirrhosis and chronic viral hepatitis. About 10% of HCC occurs in normal liver among young and healthy patients. Anabolic and other sex steroids have been known to induce hepatic lesions in some cases, including HCC. Liver transplantation (LT) can be performed to patients with unresectable tumors in non-cirrhotic liver. Large size of the tumor should not to be seen as a contraindication for LT for the patients with non-cirrhotic liver in contrast to HCC for liver cirrhosis (Milan criteria). In this study we will show two our own cases of successful treatment of unresectable HCC via liver transplant with good follow-up and tumor-free survival.

Key words: hepatocellular carcinoma, anabolic steroids, liver transplantation.


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