MINISTRY OF HEALTH OF UKRAINE

ODESA NATIONAL MEDICAL UNIVERSITY

Faculty *Medicine*
Department *Surgery, Radiological Diagnostics, Radiation Medicine, Therapy and Oncology*

APPROVED BY
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METHODOLOGICAL RECOMMENDATION FOR PRACTICAL CLASSES OF THE ACADEMIC DISCIPLINE

Faculty, course Medical 6th year

Academic discipline Surgery
(name of the discipline)

PRACTICAL CLASSES

Practical class № 11

Topic: "Mechanical jaundice. Reasons for the occurrence. Differential diagnostic tactics. Modern treatment approaches. Liver failure in surgical diseases. Prevention and treatment methods"

Approved:
At the meeting of the Department of Surgery, Radiation Diagnostics, Radiation Medicine, Therapy and Oncology of Odesa National Medical University

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PRACTICAL CLASSES

Practical class № 11

1.Topic of the practical class: **"Mechanical jaundice. Reasons for the occurrence. Differential diagnostic tactics. Modern treatment approaches. Liver failure in surgical diseases. Prevention and treatment methods". – 6 hours**

2. Relevance of the topic.

Mechanical jaundice *is a yellow colouring of the skin, sclera, and mucous membranes due to the deposition of bilirubin in the tissues.*

One of the leading places in modern abdominal surgery is occupied by the problem of mechanical jaundice, which is a serious complication of diseases of the organs of the hepatopancreatobiliary system. The prevalence of this pathology, the complexity of its diagnosis and treatment, unsatisfactory long-term results determine the high relevance of this problem. A number of issues related to the lack of a final understanding of the pathogenesis of disorders and pathological conditions against the background of biliary obstruction remain unresolved. The main reasons for the unsatisfactory results of surgical treatment of patients are inflammatory complications and the progression of acute liver failure, the frequency of which directly depends on the etiology and duration of the pathology, the method of surgical correction of the biliary block.

Late hospitalization (over 50%) due to the complexity of diagnosis is the cause of high rates of postoperative complications (10.4%-52.3%) and mortality (3.8-46.2%), which acknowledges the urgency of the problem.

The social significance of the problem is due to a large share (up to 70%) of patients of working age, significant economic costs, which require complex treatment.

3. Objectives:

3.1.Learning objectives:

A student of higher education must learn:

1. Identify anamnestic and clinical objective signs of diseases that led to the development of mechanical jaundice. II level
2. Basic principles of diagnosis of mechanical jaundice and differential diagnosis of jaundice.
3. Prescribe an examination plan using laboratory, X-ray, and endoscopic examination methods. III level
4. Determine the tactics of patient's treatment with mechanical jaundice.
5. Determine the indications for surgical intervention and theoretically know the methodology of their implementation. II level

3.2.<u>Educational objectives:</u>

1. Formation of a professionally significant personality of the doctor.
2. To emphasize the importance of the national surgical school in the development of modern methods of mechanical jaundice treatment.

4. Interdisciplinary integrations.

No	Disciplines	To know	To be able to
1	2	3	4
I. Previous disciplines			
1.	Anatomy	Lobar and segmental structure of the liver and bile ducts.	To be able to differentiate various anatomical zones of the liver and ducts during examination (ultrasound, CT) and operations.
2.	Physiology and pathophysiology	Peculiarities of cholestasis and disorders in the body during mechanical jaundice.	To be able to interpret disorders in the body in case of mechanical jaundice.
3.	Biochemistry	Know the mechanism of bilirubin metabolism. Biochemistry of liver samples and coagulogram.	To be able to interpret the data of laboratory studies.
4.	Pharmacology	The mechanism of drugs action affecting on the main disease.	
II. Intra-subject integration			
1.	Obstructive jaundice caused by benign diseases.	Signs of benign obstructive jaundice. Ultrasound, CT, X-ray and endoscopic signs of bile duct calculi, papillostenosis, tutular stenosis of the choledochus, benign strictures and injuries of the bile ducts, cysts of the head of the pancreas, foreign objects of the bile ducts, anomalies of the bile ducts.	Interpret the data of biochemical studies (liver tests), ultrasound, CT, MRI and endoscopic examination data.
2.	Obstructive jaundice caused by tumor diseases	Know benign and malignant tumors of the liver: primary, secondary (metastases of tumors of other localizations, germination of tumors localized in other organs. Know benign and malignant tumors of the bile ducts and hepatopancreatic ampulla, malignant tumors of the gallbladder, pancreas.	Purposefully collect anamnesis, be able to find signs of obstructive jaundice of various genesis. Be able to examine patients with obstructive jaundice, be able to make a diagnosis. Be able to carry out a differential diagnosis, interpret X-ray, ultrasound, CT, and endoscopic examination data, provide indications for treatment.
3.	Obstructive jaundice is caused by parasitic diseases	Know the signs of amebiasis, ascariasis, opisthorchosis, echinococcosis.	Purposefully collect anamnesis, be able to find signs obstructive jaundice of various genesis. Be able to examine patients with obstructive jaundice of various origins.

5. Content of the class.

In case of bilirubin metabolism disorders associated with a disorder in its formation or excretion, jaundice appears, which is manifested by an increase in the bilirubin content in the blood and its accumulation in tissues with the formation of jaundiced skin and mucous membranes.

Based on the mechanisms of bilirubin formation and excretion, jaundice can occur under the following conditions:

- *excessive formation of bilirubin -* ***hemolytic jaundice****;*
- *its reduced excretion by the liver -* ***parenchymal jaundice;***
- *obstruction of the bile ducts -* ***obstructive jaundice****.*

Differential diagnosis of jaundice at the prehospital stage.

Indicators	Hemolytic jaundice	Parenchymal jaundice	Obstructive jaundice
Medical history	The appearance of jaundice in childhood, similar diseases in relatives, increased jaundice after being in the cold	Contact with toxic substances, alcohol abuse, contact with a patient with jaundice or infectious diseases (mononucleosis)	Pain attacks in the right hypochondrium, often accompanied by jaundice, cholangitis clinic (Charcot's triad), biliary tract surgery, and sudden weight loss.
Skin colour	White and yellow with a lemon shade	Orange Yellow	A green tint of jaundice, yellow-gray
Jaundice intensity	Small	Moderately expressed	Moderate to severe
Skin itching	Absent	Unstable	Stable
Heaviness in the liver area	None	Often at an early stage of the disease	Rarely, except for acute cholecystitis
Liver size	Normal, may be moderately enlarged	Increased, normal, decreased	Enlarged
Pain in the liver area	None	Rarely	Often
Spleen size	Enlarged	Often enlarged	Usually not enlarged
Urine color	Usually normal	Dark (the presence of bound bilirubin)	Dark (the presence of bound bilirubin)

Feces color	Normal or dark (increased stercobilin content)	Pale (reduced stercobilin, increased amount of fat)	Pale (reduced stercobilin, increased amount of fat)

Differential diagnosis of jaundice in hospital conditions.

Indicators	Hemolytic jaundice	Parenchymal jaundice	Obstructive jaundice
Special tests	Coomb's reaction. Determination of erythrocyte resistance. Detection of heat and cold antibodies in blood serum. Determination of haptoglobin. Electrophoresis of hemoglobin.	Ultrasound, CT, MRI (MRCP), liver biopsy, radioisotope study, bromosulfate test.	Ultrasound, ERCP, PTC, PTCG, CT, MRI(MRCG), Liver biopsy
Liver function tests	Elevated free bilirubin in the blood, negative sedimentation tests, alkaline phosphatase activity not changed.	Increased content of bound and free bilirubin. The activity of alkaline phosphatase is sometimes increased, the activity of transaminases is increased. Sediment samples are positive. Increased serum iron/copper ratio	High levels of bound bilirubin in the blood. Increased activity of alkaline phosphatase and Y-lutamyl transferase
The content of urobilin in urine	Sharply elevated	May be absent for a short period, then excessively or moderately elevated.	Absent when fully clogged

Obstructive jaundice of benign genesis.

CHOLEDOCHOLITHIASIS

Bile duct calculi (choledocholithiasis) is the most common disease. In 70-80% of patients, cholesterol stones are found in the bile ducts, i.e., stones that have migrated from the gallbladder.

DIAGNOSTICS

With concretions that do not completely block the lumen of the bile ducts, laboratory data are not completely informative. An increase in the content of leukocytes in the blood, the level of bilirubin and the activity of serum transaminases can be noted. It is more informative to study the activity of cholestasis enzymes (alkaline phosphatase and Y-glutamine transferase).

Instrumental diagnostics of choledocholithiasis includes ultrasound, ERCP, CT, MRI, cholecystography, and FCG.

CLINICAL PICTURE

For many years, stones of the bile ducts may not give any clinical manifestations. The most typical clinical manifestations of calculi in the masticatory ducts are pain in the right hypochondrium or epigastric area, jaundice, symptoms of cholangitis (**Charcot's triad** - colic, abdominal pain + fever, chills + jaundice). Approximately 20-40% of patients have an enlarged gallbladder.

CHOLANGITIS

Comparative frequency of causes of cholangitis (according to U. Leishner, 2001)

Reason	Frequency	Localization and conditionality
1. Concrements of the bile ducts	60-70**%**	In 90-95% of cases in the extrahepatic bile ducts, in 5-10% - in the intrahepatic bile ducts.
2. Iatrogenic	20-40%	Extrahepatic: ERCP, operation of bile outflow disorder.
3. Parasitic invasion	Rarely	Intrahepatic and extrahepatic. Trip to other countries.
4. Cysts of the common bile duct	Hardly ever	Extrahepatic, hereditary.
5. Extraneous items	Rarely	Extrahepatic, biliodigestive anastomoses, papillotomy.
6. Carolli syndrome	Rarely	Extrahepatic, hereditary.
7. Carcinoma	Rarely	Extrahepatic localization is more common than intrahepatic.
8. Cancer of the head of the pancreas	Rarely	The distal part of the common bile duct.

For the occurrence of cholangitis, the presence of conditions is necessary:

- cholestasis, violation of bile outflow;
- increased pressure in the bile ducts;
- bacterial infection.

The most common microflora that contributes to the development of cholangitis is E.Coli (in 40-70% of cases), Klebsiella (in 10-20%), Enterococcus (in 10- 20%), P.aerugsnosa, Streptococcus, Proteus, Clostridia.

CLINICAL PICTURE

Nonspecific symptoms of cholangitis include a feeling of heaviness in the upper abdomen, nausea, and vomiting.
The pathognomonic symptom complex is the presence of ***Charcot's triad***: pain in the right hypochondrium or in the epigastric area, jaundice, chills, fever.

DIAGNOSTICS.

The diagnosis of cholangitis is based on such data:

1. Objective studies – the presence of the Charcot triad.
2. Laboratory studies - increased ESR, leukocytosis, increased bilirubin level, activity of cholestasis enzymes (alkaline phosphatase,Y-lutamyltransferase).
3. Instrumental diagnostics of choledocholithiasis includes ultrasound, ERCP, less frequently CT, MRI, cholecystography, and FCG. – detect dilated bile ducts and other signs of cholangitis.

TREATMENT

- elimination of bile duct obstruction;
- drainage of bile ducts;
- the use of antibiotics, corrective infusion-drug and detoxification therapy.

The surgery of choice for cholangitis is retrograde endoscopic papillosphincterotomy with or without extraction of calculi and nasobiliary drainage.

Surgical (open) operation on the bile ducts in the case of acute cholangitis is indicated only in cases when conservative and endoscopic methods of eliminating the blockage are ineffective.

Surgical treatment should be carried out immediately after unsuccessful endoscopic attempts to eliminate the blockage, although the mortality in such cases reaches high figures - 15-30%.

LIVER ABSCESS

The causes of liver abscess are, as a rule, neglect of the disease and inadequate treatment.
CLINICAL PICTURE of an abscess is similar to the clinic of cholangitis. In patients with cholangiogenic liver abscesses, clouding of consciousness and hypotension (Reynolds' pentad) is added to Charcot's triad, an increase in the size of the liver and tenderness of the liver during palpation may also be noted.

TREATMENT.

The method of choice for the treatment of a liver abscess along with the treatment of the underlying disease and cholangitis is percutaneous transhepatic drainage of pus under ultrasound control.

BILIARY PANCREATITIS,

REASONS:

- choledocholithiasis with the implementation of a concretion in the hepatopancreatic ampulla;
- microcholedocholithiasis;
- papillostenosis;
- stenosing papillitis (otitis).

Diagnostics.

In 90% of patients, determination of the level of lipase, a-amylase and bilirubin in the blood serum, as well as the activity of alkaline phosphatase and Y-glutamyltransferase allows establishing the correct diagnosis.

Ultrasound, CT, MRI should be considered the most informative instrumental methods of diagnosis.

Treatment of biliary pancreatitis should be complex, but the main task is to eliminate obstruction of the bile ducts.

PAPILOSTENOSIS.

All benign stenoses of the hepatopancreatic ampulla are divided into primary and secondary.

The etiology and pathogenesis of primary hepatopancreatic ampulla stenoses remain poorly understood.

The cause of secondary hepatopancreatic ampulla stenoses is most often cholelithiasis, papillitis, injuries. In particular, the cause of hepatopancreatic ampulla stenosis is inflammatory changes that begin in the pancreas or duodenum (duodenal ulcer), as well as inflammation caused by parasitic invasion. Cicatricial changes can also occur after endoscopic or surgical interventions in the hepatopancreatic ampulla area.

Approximately 0.04-0.1% of patients have benign tumours of hepatopancreatic ampulla.

CLINICAL PICTURE. Clinical manifestations of hepatopancreatic ampulla stenosis are nonspecific. These include nausea, vomiting, flatulence, moderate pain, and more often a feeling of heaviness in the upper half of the abdomen.

DIAGNOSTICS of hepatopancreatic ampulla stenoses is extremely difficult. Possible signs of hepatopancreatic ampulla stenosis include:

- enlargement of the common bile duct (ultrasound, ERCP, CT);
- slowing of the outflow of the radiopaque substance (more than 45 min.) (ERCP);
- virsungography when performing selective ERCP;
- slowed contractions of the duodenal papilla (duodenoscopy);
- increased levels of bilirubin in the blood serum and the activity of

transaminases (ALT, rarely AST), as well as cholestasis enzymes (alkaline phosphatase and gamma-glutamyltransferase);
- increased activity of amylase and lipase;
- frequent attacks of acute pancreatitis, when there is no alimentary factor for its occurrence.

TREATMENT.

The optimal method of treating hepatopancreatic ampulla stenosis is retrograde endoscopic papillosphincterotomy in cases where endoscopic manipulations are ineffective for one reason or another, it is necessary to resort to transduodenal papillosphincteroplasty.

TUBULAR PANCREATIC STENOSIS is a consequence of long-standing chronic pancreatitis, more often its inductive (pseudotumor) form.

DIAGNOSTICS. Laboratory tests indicate an increase in the activity of cholestasis enzymes (alkaline phosphatase and gamma-glutamyltransferase, ALT).

The main instrumental diagnostic methods are ultrasound and ERCP, which significantly reduce the need for CT and MRI (MRCG).

CLINICAL PICTURE of tubular stenosis of the choledochal is manifested by frequent pain in the epigastric area and obstructive jaundice.

TREATMENT. In the case of confirmation of tubular stenosis of the choledochus, surgical intervention is indicated.

SURGICAL TACTICS IN OBSTRUCTIVE JAUNDICE

The main **criteria for determining the treatment** algorithm are the following factors:

- type of gallbladder pathology (acute or chronic calculous cholecystitis) and its complications;
- a type of pathology of the extrahepatic bile ducts;
- the level of hyperbilirubinemia;
- presence of concomitant cholangitis and acute pancreatitis;
- duration of jaundice;
- the general condition of the patient and his age.

Relative to these criteria, patients with signs of **peritonitis** are a special group. This category of patients ***is indicated for emergency surgical intervention in the next 2-4 hours from the moment of hospitalization*** after short-term preoperative preparation, regardless of the degree of compensation of multiorgan dysfunction. The cause of obstructive jaundice and the method of its termination is determined during the intervention.

An obligatory method of intraoperative diagnosis is intraoperative cholangiography, choledochoscopy, and the completion of the operation is external drainage of the bile ducts and abdominal cavity.

Treatment of other patients begins with conservative measures followed by the

determination of surgical tactics.

Currently, great importance is attached to the development of patients with obstructive jaundice of **multiple organ failure.**

The pathogenesis of multiple organ failure is based on the progression of the purulent-inflammatory process in the intrahepatic and extrahepatic bile ducts with the development of cholemia, damage to the endothelium of the biliary tract and hepatocytes, which ultimately leads to bacteremia, the emergence of a systemic inflammatory response syndrome, and sepsis.

There are three stages of multiple organ dysfunction:

1. compensation;
2. sub compensation;
3. decompensation.

The degree of compensation for multiorgan failure (dysfunction) is expressed in points and **calculated by the formula:**

Index PON **= 100x + 10b + 1z, where;**

x – number of identified "uncompensated" dysfunctions;

b - number of identified "subcompensated" dysfunctions;

z - number of identified "compensated" dysfunctions;

With a score of 150 points or less – **compensation stage;**

From 151 to 250 points – **sub compensation stage;**

Over 250 points – **decompensation stage of multiple organ dysfunction.**

Conservative therapy of obstructive jaundice pursues two goals:

1. elimination of the inflammatory process in the gallbladder and near it or in the bile ducts;
2. intensive preoperative preparation.

Conservative therapy of obstructive jaundice includes **the following areas:**

1. Creation of functional peace:

- bed rest, hunger

2. ***Relief of pain syndrome:***

- Buscopan 1-2 ml (20-40 mg) up to 4 times a day IM or IV.
- Baralgin 5-10 ml (2.5-5 g) up to 4 times a day IM or IV.
- Novocaine 0.25% infusion, 50-100 ml IV.

***3. Stopping the spasm of the smooth muscles of the gastrointestinal tract and biliary tract*:**

- Platyphylline hydro tartrate 1 ml (2 mg) up to 3 times a day IM or IV;
- Papaverine hydrochloride 1-2 ml (20-40 mg) up to 3 times a day IM or IV;
- No-shpa 2-4 ml (40-80 mg) up to 3 times a day IM or IV;
- Duspatalin: 1 tablet (135 mg) 3 times a day or 1 capsule (200 mg) 2 times a day.

3. Corrective infusion and detoxification therapy:

- *to eliminate hypovolemia. The average volume of infusion therapy is 1800-2800 ml/day or 25-40 ml/kg of body weight.*
- *for the purpose of detoxification and against edematous decompression of the liver, forced diuresis is performed.*

Heptral (400-800 mg/day) helps prevent liver edema by retaining potassium intracellularly. Which has an anticholestatic and antidepressant effect.

If bilirubin rises above 43 μmol/l, patients develop toxemia, which leads to disruption of all liver functions. In these cases, it is advisable to use **Infezol, Hepasol, Hepasteril A** (which contains arginine-malic acid) and **Hepasteril B** (which contains corticosteroids, sympathomimetics, vitamin B12, electrolyte concentrates and lipotropic substances that prevent necrosis of hepatocytes), **Aminoplasmal Hepa. 5-10%** albumin is prescribed to bind bilirubin.

The binding of endogenous ammonia, which accumulates in the event of impaired detoxification function of the liver, is facilitated by the appointment of **Glutargin** 50 ml intravenous drip in a 5% glucose infusion up to 2 times a day.

Intravenous injection of 200-400 ml/day of 0.1% sodium hydrochlorite infusion allows to reduce the content of ammonia, bilirubin, and urea.

Efferent methods of detoxification can be used: plasmaphoresis, external drainage of the thoracic lymphatic duct, lymphosorption, as well as **gastroenterosorption** (Enterosgel, Enterosorb, Belosorb, Polysorb, etc.).

To increase the oxygenation of the liver, drugs are prescribed that improve the utilization of oxygen by liver cells: Lipoic acid, vitamin E (tocopherol acetate). HBO therapy can be used only after elimination of cholestasis and in the absence of widespread necrosis of hepatocytes.

To correct the blood clotting system, it is advisable to prescribe fresh-frozen plasma, protease inhibitors (hordox, contra-kal), vitamin K (Vikasol), calcium chloride.

4. Anti-inflammatory therapy

- non-steroidal anti-inflammatory drugs (Movalis, Misulid, etc.);
- proton pump blockers (Kontroloc 20-40 mg/day, Lanzap 30 mg/day), or H2-histamine receptor blockers (kvamatel - 40 mg/day;
- antacid drugs (Almagel, Maalox, etc.)

5. Antibacterial therapy.

6. Hepatoprotective therapy.

Hepatoprotectors are divided into four groups:

1. *Medications containing natural or semi-synthetic flavonoids based on milk thistle*: Hepabene, Legalone, Carsil, Hepatofalk planta, Sili boron, or other plants: Chophytol, LIV-52, Cater gen.
2. *Medicines of animal origin*: Sirepar, Hepatosan.
3. *Medications containing essential phospholipids*: Essentiale, Esliver, Phosphoglyve, Eplir.
4. *Medications of different groups*: Heptral (ademethionine), Hepa-merc (ornithine), Ursofalk (ursodeoxycholic acid), Glutargin, Lipoic acid.

For the purpose of stopping skin itching use Nalmefene (5-80 mg/day, Naloxone (0.4 mg/day, IV), Cholestyramine (4-16 mg/day), Cholestipol (5-10 mg/day), etc.

Before the final elimination of the biliary block, patients are not recommended to prescribe medications and food products that have a choleretic effect.

SURGICAL INTERVENTIONS IN OBSTRUCTIVE JAUNDICE

Endoscopic and surgical transpupillary intervention.

- Endoscopic retrograde cholangiopancreatography (ERCP)

- Endoscopic papillosphincterotomy (EPST)

Indications for EPST:

1. Stones outside the hepatic bile ducts.
2. Papillostenosis.
3. Acute and chronic miliary pancreatitis with ductal hypertension on the basis of papillitis, stenosis of the mouth of the papilla or a stone wedged in the ampoule of the hepatopancreatic ampulla.
4. "Blind sac syndrome" after choledochoduodeno- or choledochojejunostomy.
5. Tumors of the duodeno-pancreatobiliary zone with ductal obstruction.

Contraindications to EPST are divided into general and local.

General contraindications:

- Prolonged (more than 7-10 days) high hyperbilirubinemia (above 150 μmol/l), which can contribute to bleeding.
- Clinical situations in which the risk of endoscopic surgery exceeds the risk of disease progression and development of complications.
- Somatic diseases and critical conditions in the presence of which endoscopic intervention can play a fatal role.

Local contradictions:

- Long, narrow terminal section of the common bile duct, extending beyond the duodenal wall.
- Short (less than 0.5 cm) intramural part of the bile duct.
- Location of hepatopancreatic ampulla at the bottom of the parapapillary diverticulum.
- Various technical problems: lack of a papillotome of the required design, doubts about its position during cannulation, indistinctness of X-ray data, etc.

- ***Suprapapillary choledochoduodenostomy*** is performed in the presence of stenosis of the choledochal mouth. To do this, a point puncture incision is made with a needle electrode in the most protruding part of the longitudinal fold.
  - Endoscopic virsungotomy is performed in the presence of stenosis of the mouth of the main pancreatic duct.
- ***Enterograde EPST*** is performed by passing a papillotome through an external choledochostomy or choledochoduodenoanastomosis under X-ray endoscopic control. The need for an antegrade method of surgery arises in the presence of hepatopancreatic ampulla stenosis, parapapillary diverticula, peri- and intraampullary tumors.

Complications of endoscopic papillosphincterotomy:

- acute pancreatitis (2-9%);
- bleeding from a papillary wound (1-6.5%);
- retro duodenal perforation (0.5-2.1%);
- occurrence in the progression of cholangitis and cholecystitis (1-4%) is most often due to inadequate outflow of bile as a result of incomplete sanitation, wedging of a stone, non-observance of asepsis

Endoscopic balloon dilatation. The desire to preserve the integrity of the sphincter of the hepatopancreatic ampulla, as well as to reduce complications after EPST led to the introduction of the endoscopic balloon dilatation method. It is believed that it is indicated

for patients with a high risk of hemorrhagic complications, young patients.

- Mechanical lithoextraction. After performing endoscopic papillosphincterotomy in the case of choledocholithiasis, calculi are removed using a Dormia type basket or using a Fogarty type balloon catheter.
- Biliary lithotripsy.

Methods:

- mechanical;
- electrohydraulic;
- laser

Mechanical lithotriptor - Dormia reinforced basket ("Olympus" Japan, "Gip" Germany, "Wilson-Cook" USA).

Electrohydraulic and laser lithotripsy is possible only with direct visual control through a choledochoscope for percutaneous or oral access to avoid the risk of damage to the duct wall, bleeding and perforation.

Prospective use of the **baby scope** - a system of "mother" duodenoscope and "daughter" choledochoscope.

Transpapillary laser lithotripsy under x-ray control is possible without a choledochoscope thanks to the use of a piezo-acoustic and optical system for recognizing stones and biological tissues. This system automatically stops the laser immediately if contact with the stone is lost. Application is limited due to high cost and technical complexity.

Extracorporeal shock wave lithotripsy.

Shock waves can be generated in three ways:

- capacitor discharge under water (Dornier system);
- electromagnetic rotation of membranes (Siemens system);
- piezoelectric generation of high energy (Wolf);

Transpapillary non-nasobiliary drainage helps solve the issue of decompression and sanitation of the biliary tract.

Dilation of miliary strictures. Dilation is carried out under X-ray control until the "waist" of the balloon disappears in the stricture zone.

Endoprosthesis. Stents made of synthetic materials (Teflon, polyethylene, polyurethane) of caliber 8-10Fr are used.

Tumor damage to the bifurcation zone of the hepatic duct (Klatskin's tumor)

- installation of two stents is necessary. In recent years, metal mesh self-expanding and expanding stents have been used.

OPEN SURGERY ON HEPATOCHOLEDOCH AND TO THE LARGE PAPILLA OF THE DUODENUM

- **Supraduodenal choledochotomy** is indicated for choledocholithiasis.
- **Transduodenal papillosphincterotomy and papillosphincteroplasty** are indicated for stenosis of the large duodenal papilla, a wedged stone in the ampoule of the large duodenal papilla.
- **Supraduodenal choledochoduodenoanastamosis** is indicated for tubular stenosis of the choledochus, low cicatricial stricture of the choledochus, especially after resection of the stomach according to B-2. Recently, preference has been given to imposing a choledochoanastamosis on a loop of bowel excluded by Roux.

5.Plan and organizational structure of the class.

No.	The main stages of the class, their function and content	Learning objectives in mastery levels	Control and training methods	Materials of methodical support	Time min
1	2	3	4	5	6
	Preparatory stage				
1.	Class organization				**5 min**
2.	**Setting educational goals and motivation of the topic**				**10 min**
3.	**Control of the initial level of knowledge and skills**				
	1. Etiopathogenesis of jaundice	II	II level methods		
	2. Anatomy and physiology of the liver and bile ducts.	II	1. Individual oral survey. 2. Written theoretical survey.	II level tasks Tables, Slides.	
	3. Clinical picture of a patient with mechanical jaundice	II	3. Solutions to typical problems.	Video recordings	
	4. Patient examination algorithm	II			60
	5. Differential diagnosis of the cause of jaundice	II		Equipment, radiographs, medical history	
	6. Interpretation of examination data - blood tests - general and coagulogram, endoscopic, X-ray, ultrasound, CT, MRI.	III	1. Solutions to atypical situational problems		
	7. Principles of conservative therapy of jaundice	III	2. Treatment of the patient		
	8. Surgical treatment of patients with mechanical Jaundice	II			
Basic stage					
4.	**Formation of professionals abilities and skills**				
	1. Master the methods of objective examination of patients with mechanical jaundice.	III	Method of formation of practical training skills	Educational equipment - orientation maps	130 min

1	2	3	4	5	6
	2. Treat a patient with mechanical jaundice. 3. Take part in ultrasound, fibro gastroscopic examination of a patient with mechanical jaundice. 4. Cholangiography should be performed on a patient with mechanical jaundice. 5. Bandaging the patient in the postoperative period	III III III III	The method of skill formation: a) Professional training in solving non-typical problems б) solutions to laboratory-research problems	Atypical tasks in the form: patient, case histories, test situational tasks, business games, dressing ward	
Final stage					
5.	**Control and correction of the level of professional skills and abilities**	III	Control method: Individual control of practical skills	Equipment	60
6.	**Summarizing the results of the class**				3 min
7.	**Homework, educational literature on the topic**			Approximate map of independent work with literature	2 min

6.Materials for methodological support of the class.

6.1. Control for the preparatory stage of the class.

Questions

1. Classification of jaundice according to the mechanism of violation of bilirubin metabolism.
2. Differential diagnosis of jaundice.
3. The main clinical signs of mechanical jaundice.
4. Multiple organ failure with mechanical jaundice, stages.
5. Examination methods for mechanical jaundice: ultrasound, duodenoscopy, CT, MRI.
6. Tactics of the surgeon and features of examination of the patient with mechanical jaundice with multiple organ failure.
7. Indications and methods of treatment of patients with mechanical jaundice.
8. Methods of endoscopic treatment of mechanical jaundice.
9. Indications for operative interventions
10. Methods of operative interventions for mechanical jaundice depending on the origin.

Situational tasks

1. Patient S., 64 years old, hospitalized in the surgical department with complaints of yellow skin color, skin itching, pale stool color. What kind of jaundice does the patient have?

   Answer standard: Mechanical jaundice.

2. Patient N., 48 years old, complained of attacks of pain in the right hypochondrium, jaundice. The analyzes showed a high content of bound bilirubin in the blood, increased activity of alkaline phosphatase and y-glutamyl transferase. What is the most probable diagnosis?

   Answer standard: **Mechanical jaundice.**
3. What kind of jaundice occurs with reduced excretion of bilirubin by the liver?
   Answer standard: Parenchymatous.

• The patient, 55 years old, complained of jaundice, which gradually increased during the last 2 weeks, dark urine, light stool, pain in the right hypochondrium. During the examination: liver enlargement, jaundice of the skin and mucous membranes. What is the most probable diagnosis?
A. Mechanical jaundice.
B. Acute viral hepatitis.
C. Hemolytic anemia.
D. Cirrhosis.
E. Pancreatitis.

• The patient, 60 years old, complains of jaundice of the skin, pain in the right hypochondrium, nausea, vomiting. Ultrasound revealed dilated bile ducts and a stone in the common bile duct. What is the most likely cause of mechanical jaundice?
A. Common bile duct stone (choledocholithiasis).
B. Tumour of the head of the pancreas.
C. Acute pancreatitis.
D. Primary sclerosing cholangitis.
E. Hepatitis.

• The patient, 65 years old, complains of jaundiced skin, constant pain in the right hypochondrium, weight loss and itching of the skin. During the examination: dilated bile ducts on ultrasound, enlarged head of the pancreas. What is the most likely diagnosis?
A. Tumour of the head of the pancreas.
B. Chronic pancreatitis.
C. Common bile duct stone.
D. Cirrhosis.
E. Choledocholithiasis.

• The patient, 70 years old, complains of yellowing of the skin and mucous membranes, pain in the right hypochondrium and light feces. Which examination method is the most informative to confirm mechanical jaundice?
A. Ultrasonography of abdominal organs.
B. Laparoscopy.
C. MRI.
D. X-ray of abdominal organs.
E. ECG.

• What is the most common symptom of mechanical jaundice?
A. Jaundice of the skin and mucous membranes.
B. Increasing temperature.
C. Headache.
D. Bloating.
E. Diarrhea.

• **What is the most likely cause of mechanical jaundice in a patient with chronic pancreatitis?**
A. Compression of the common bile duct by the fibrous head of the pancreas.
B. Common bile duct stone.
C. Liver tumor.
D. Acute pancreatitis.
E. Viral hepatitis.

• **A 50-year-old female patient complains of prolonged jaundice, weight loss, and pain in the right hypochondrium. Which examination will best help to identify the cause of mechanical jaundice?**
A. Computed tomography (CT).
B. General blood test.
C. Laparoscopy.
D. ECG.
E. Spirometry.

• **A patient with mechanical jaundice has a significant enlargement of the common bile duct. What is the most likely cause of this condition?**
A. Biliary obstruction.
B. Acute hepatitis.
C. Hemolytic anemia.
D. Viral hepatitis.
E. Gastritis.

• **The patient complained of yellowing of the skin, pain in the right hypochondrium, and dark urine. Ultrasound revealed a stone in the common bile duct. Which treatment is most effective?**
A. Endoscopic retrograde cholangiopancreatography (ERCP) with stone removal.
B. Drug therapy.
C. Laparotomy.
D. Prescribing antibiotics.
E. Chemotherapy.

• **The patient, 48 years old, complains of itching of the skin, jaundice, dark urine and light-colored feces. During the examination, a tumor was found in the area of the head of the pancreas. What treatment is most optimal?**
A. Surgical removal of the tumor.
B. Hepatoprotectors appointment.
C. Antibacterial therapy.
D. Observation.
E. Laparoscopic biopsy.

6.2. Materials for control of the final stage of the class.

Situational tasks

3. In a 70-year-old patient with jaundice, an exploding wedged stone in the large duodenal papilla was found during endoscopic examination. What are the surgeon's actions?

Answer standard: Surgical treatment is indicated for the patient - endoscopic papillosphincterotomy

6.3. Materials for methodical support of self-training of higher education applicants.

No	Main tasks (to learn)	Instructions (to name)

1.	Anatomical and physiological structure of the liver and bile ducts	- anatomy of the liver and bile ducts
2.	Clinical signs of jaundice	- clinical picture of: a) hemolytic jaundice; b) parenchymal jaundice; c) obstructive jaundice
3.	Methodology of examination of jaundiced patients	- ultrasound; - fibro duodenoscopy; - CT; - MRI; laboratory research.
4.	Conservative therapy of jaundice	- hepatoprotectors; - H2 blockers, proton pump blockers; Anti-inflammatory therapy; antibacterial therapy.
5.	Indications for surgical intervention	- mechanical jaundice
6.	Operative methods of treatment	- endoscopic; - laparoscopic - open operations.

Literature:

1. **https://www.saudedireta.com.br/catinc/tools/e_books/Oxford%20Handbook%20of%20Clinical%20Surgery,%204th%20Edition.pdf**
2. **https://www.gutenberg.org/cache/epub/17921/pg17921-images.html**
3. **https://www.gutenberg.org/ebooks/17921**
4. **https://dal.primo.exlibrisgroup.com/discovery/fulldisplay?context=L&vid=01NOVA_DAL:DAL&search_scope=Everything&isFrbr=true&tab=Everything&docid=alma990052517440107190**
5. **https://dal.novanet.ca/discovery/fulldisplay?context=L&vid=01NOVA_DAL:DAL&search_scope=Everything&tab=Everything&docid=alma990056009660107190**
6. **https://dal.novanet.ca/discovery/fulldisplay?context=L&vid=01NOVA_DAL:DAL&search_scope=Everything&tab=Everything&docid=alma990065199090107190**