

**MEDICAL UNIVERSITY  
„PROF. DR P. STOYANOV” – VARNA  
DEPARTMENT OF SURGICAL DISEASES**

Assoc. Prof. Dr. VASIL MARKOV BOZHKOV PhD.

**POSTCHOLECYSTECTOMY SYNDROME-AN UPDATE  
OF AN "OLD" PROBLEM.**

**DIAGNOSTIC AND ADVANCED THERAPEUTIC  
STRATEGY.**

**ABSTRACT**

of

dissertation for the award of a scientific degree

„Doctor of Science“

Varna 2023

The dissertation contains 250 typewritten pages and is illustrated with 45 figures, 28 images and 12 tables. The list of cited literature includes 510 titles, of which 17 in Cyrillic and 493 in Latin.

The dissertation was presented and directed for public defense by the Department Council of the Department of Surgical Diseases at the Medical University "Professor Dr. Paraskev Stoyanov" - Varna.

The dissertant works as a surgeon – Associate Professor at the Second Clinic of Surgery at the University Hospital "St. Marina" EAD – Varna and Head of ES of Abdominal Surgery at the Department of Surgical Diseases Medical University – Varna.

The public defense of the dissertation will take place on 12.01.2024. from the University Hospital "St. Marina" – Varna in front of a scientific jury.

## CONTENTS

ABBREVIATIONS USED.....	4
PREFACE.....	6
AIM.....	9
TASKS.....	10
MATERIAL.....	11
METHODS.....	22
1. Diagnostic methods.....	22
2. Paraclinical studies - (haematological and biochemical).....	23
3. Microbiological methods.....	23
4. Imaging methods.....	24
5. Operative methods.....	29
RESULTS.....	39

1. Type of hospitalization.....	39
2. Symptoms.....	40
3. Вид оперативно лечение.....	50
4. Микробиологични изследвания на билиарни култури.....	54
CONCLUSIONS.....	51
STATEMENT OF CONTRIBUTIONS TO THE DISSERTATION.....	52
LIST OF PUBLICATIONS RELATED TO THE DISSERTATION.....	53

## **ABBREVIATIONS USED:**

BDA – biliodigestive anastomosis

BDI – bile duct injuries

CBD – common bile duct

CFU - colonii – forming units

ChDA – choledochoduodenoanastomosis

CHD – common hepatic duct

CT – computer tomography

DCS – ductus cysticus syndrome

EHBD – extrahepatic bile ducts

ERCP – endoscopic retrograde cholangiopancreatography

FGID – functional gastrointestinal disorders

GB – gall bladder

BD – biliary ducts

IBS – inflammatory bowel syndrome

IHBD – intrahepatic bile ducts

LC – laparoscopic cholecystectomy

MRCP– magnetic resonance cholangiopancreatography

MRI – magnetic resonance imaging

MS – Mirizzi syndrome

NOTES - natural orifice transluminal endoscopic surgery

PCS – postcholecystectomy syndrome

SILS -single incision laparoscopic surgery

SOS – sphincter of Oddi dysfunction

USD – ultrasound diagnostics

## PREFACE

Since the 1990s, laparoscopic cholecystectomy/LC/ has replaced open cholecystectomy /OC/ and its frequency has increased, probably due to its relatively timely performance. Despite the large number of cholecystectomies performed worldwide, a 100% curative effect is not recorded in patients, as it is possible persistence of the same symptoms before surgery or the appearance of new symptoms after cholecystectomy.

The invention of laparoscopic cholecystectomy by Muhe in 1986 quickly became the treatment of choice for symptomatic gallbladder disease. Advantages claimed over open cholecystectomy are: shorter hospital stay, less pain, better cosmetic effect and less financial cost. Minimally invasive procedures have revolutionized the treatment of patients with gallbladder disease and changed the profile of cholecystectomy. Thanks to increasingly available information worldwide, more patients at a young age with GI are undergoing laparoscopic cholecystectomy. The procedure itself also continues to evolve, allowing surgeons to apply SILS, NOTES and robotic surgery.

The indications for cholecystectomy are also expanding, as shown by the significant increase in the number of operations performed for acalculous cholecystitis.

Since the beginning of the 21st century, LC and its complications are the most common cause of hospitalization in developed countries. It affects between 10-20% of the adult population, and in about 80% of cases it is asymptomatic.

About 700 000 cholecystectomies are performed annually in the USA and about 60 000 in the UK. The cholecystectomy is considered a successful operation when complete relief of preoperative symptoms is achieved in more than 90% of patients. However, over 15-20% of cholecystectomized patients report various GIT complaints such as intolerance to fatty foods; nausea and/or vomiting;

pyrosis; flutulence; not good digestion; diarrhoea; intermittent abdominal pain to acute in the right upper quadrant.

The lowered criteria for cholecystectomy in the laparoscopic era has led to an increase in the number of rare and forgotten complications, such as BDI, scattered gallstones in the abdominal cavity, residual choledocholithiasis, cholangitis, etc. Furthermore, just as with open cholecystectomy, patients with abdominal pain of uncertain etiology who undergo laparoscopic cholecystectomy often continue to have symptoms afterward.

Postcholecystectomic syndrome (PCS) was first described by Womack and Crider in 1947. In 1950, Pribram was the first who proposed the name postcholecystectomy syndrome (PCS), which includes symptoms of biliary colic and/or persistent right upper quadrant pain with or without dyspeptic symptoms that are the same before cholecystectomy. Although a great deal of clinical experience and a large body of medical information has been accumulated since then, PCS remains a diagnostic and therapeutic challenge. Our knowledge of the pathophysiology of this syndrome has greatly improved since the introduction of ERCP, MRCP, and sphincter of Oddi manometry.

According to different literature sources, the incidence of PCS varies widely reaching up to 50%. Recent studies have tracked the effect on symptoms that develop after cholecystectomy, but the results have been uninformative because of their design and because of ambiguities in the literature regarding a clear definition of the terms dyspepsia and biliary pain. The incidence of biliary pain after cholecystectomy ranged from 14% to 34%, whereas postoperative dyspepsia reached over 54%. In a retrospective study, Burnett reported a 75% complete absence of symptoms, in patients one year after cholecystectomy. In a large study by Bodwall, two thousand patients were followed for 2 to 5 years after cholecystectomy and the results were evaluated by analyzing multiple variables such as: gender, age, preoperative complaints, and intraoperative characteristics of biliary pathology. They have shown that female sex, younger age, prolonged



preoperative period with marked symptomatology, absence of inflammatory process in the gallbladder and acalculous cholecystitis are associated with a higher incidence of PCS. Exact interpretation of 351 cholangiographs found that patients with more severe symptoms of PCS had a larger common bile duct diameter. According to Gunn, 88% to 69% of patients with dyspeptic complaints before cholecystectomy improve symptomatically postoperatively.

## AIM

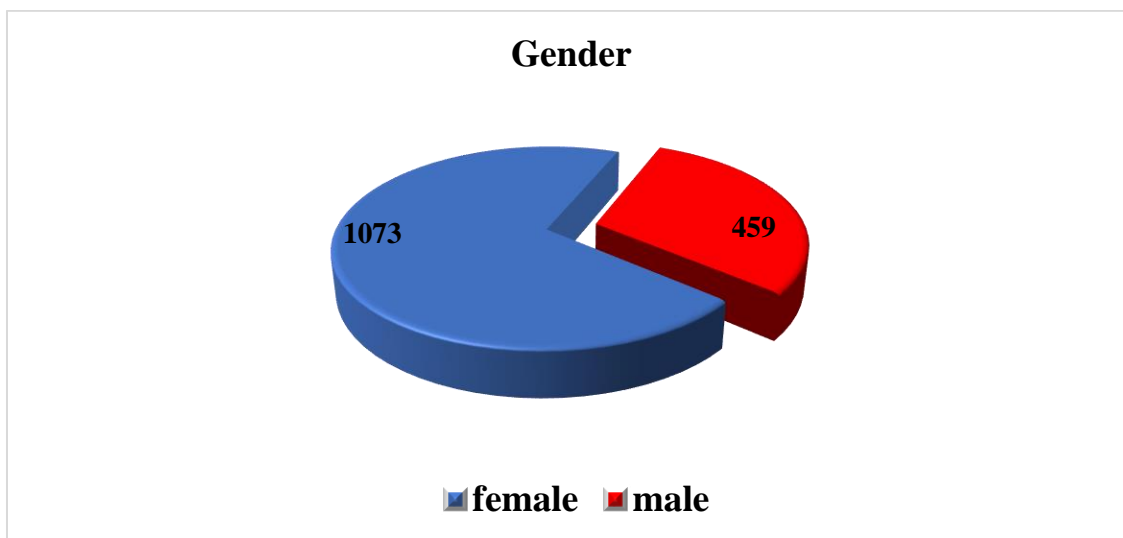
To survey, analyze and apply in clinical practice modern diagnostic and therapeutic strategy and treatment methods in patients with PCS in order to optimize outcomes, reduce complications and mortality in operated patients.

## TASKS

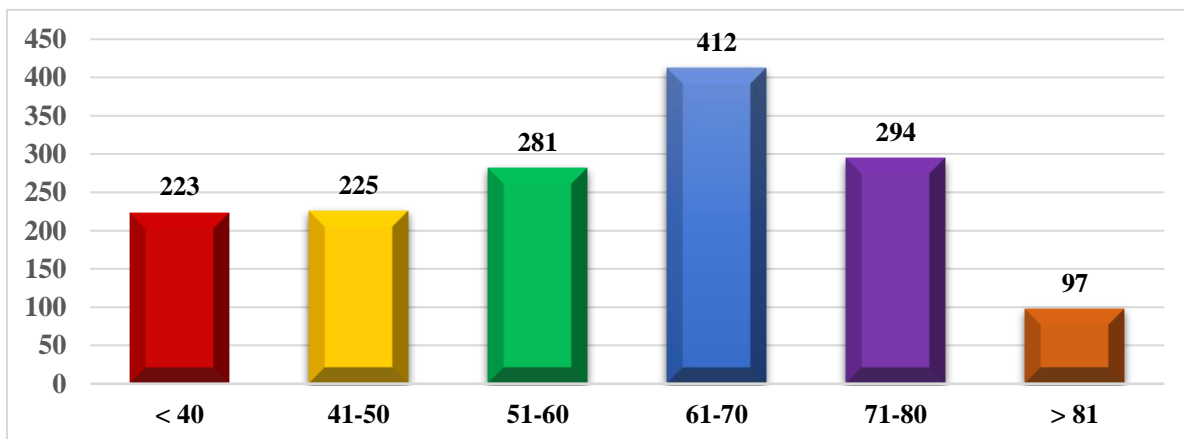
1. Retrospective and prospective analysis of patients with postcholecystectomy syndrome for the period 2011-2022 of patients treated at the Second Department of Surgery.
2. To analyze the current causes for appearance of postcholecystectomy syndrome.
3. To define the indications for surgical treatment.
4. To evaluate the applied endoscopic, interventional surgical treatment of postcholecystectomy syndrome.
5. Based on the accumulated experience we propose and implement a diagnostic and therapeutic algorithm for the treatment of postcholecystectomy syndrome.

## MATERIAL

We performed a retrospective analysis of 1532 patients with GBD and its complications for the period 2011 - 2022, operated in the Second department of Abdominal Surgery of St. Marina hospital Varna. For the purpose, we used the database, medical history of the patients available in the hospital archive, as well as the operative journals of the Second department of Surgery. Demographic characteristics of patients with GBD and its complications. The gender distribution is presented in Figure 1.



The age distribution of the number of GBD patients is presented in Figure 2



Patients aged to 40 years accounted for 14.6% of cases, those aged 41 to 50 years - 14.7%, 51 to 60 years - 18.3%, 61 to 70 years - 26.9%, 71 to 80 years - 19.2% and over 80 years - 6.3%. It is evident from the data presented that patients in the two age groups 61-70 and 71-80 years are the two most affected by GBD

and its complications, while the disease has a relatively lower incidence in the young under 40 and many elderly patients over 81.

1532 surgical interventions were performed for GBD and its complications presented in Figure 3.

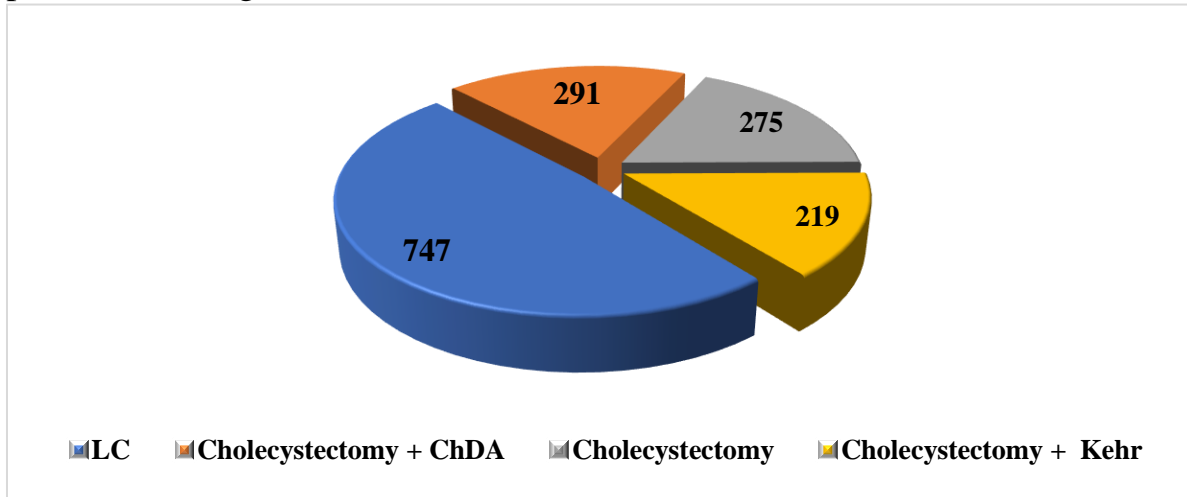
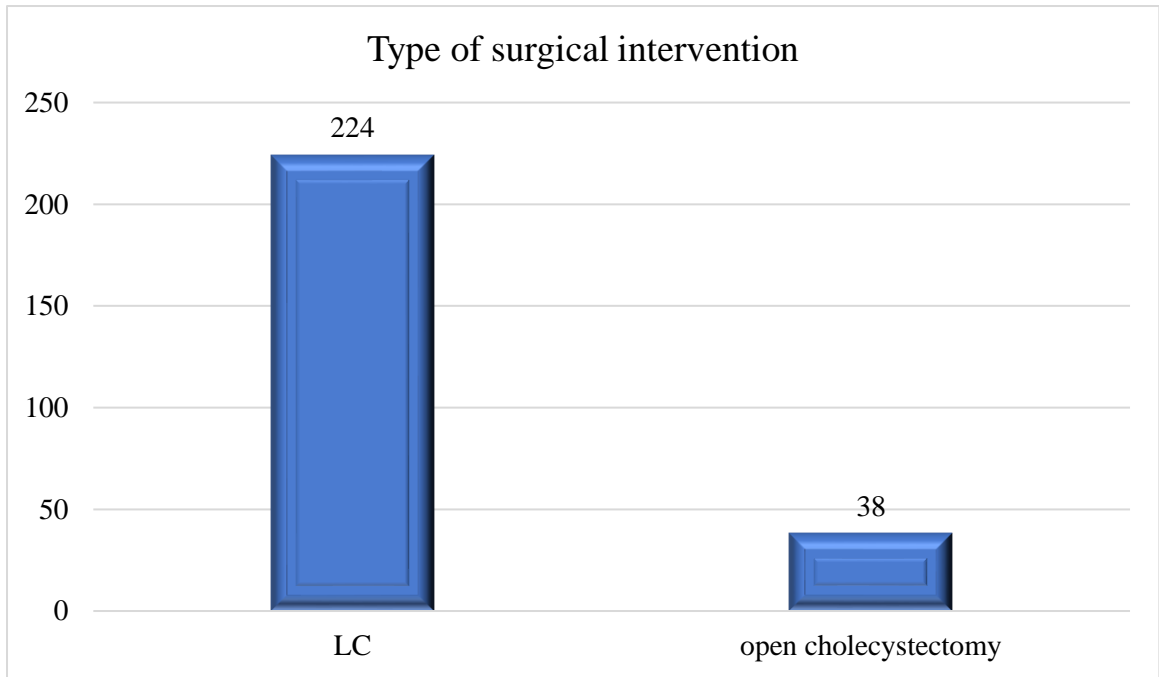


Fig. 3 Types of surgical interventions.

Laparoscopic cholecystectomy represents the highest percentage of all interventions- 48.8%, followed by cholecystectomy + ChDA- 19%, conventional cholecystectomy- 18% and least cholecystectomy + Kehr drainage- 14.2%. През проучения период пациентите с ПСХ са 262. The type of previous surgical intervention (laparoscopic or open cholecystectomy is presented in Figure 4 in issue.

Fig. 4 Distribution of PCS patients according to type of cholecystectomy.



The age distribution of PCS patients is presented in Figure 5

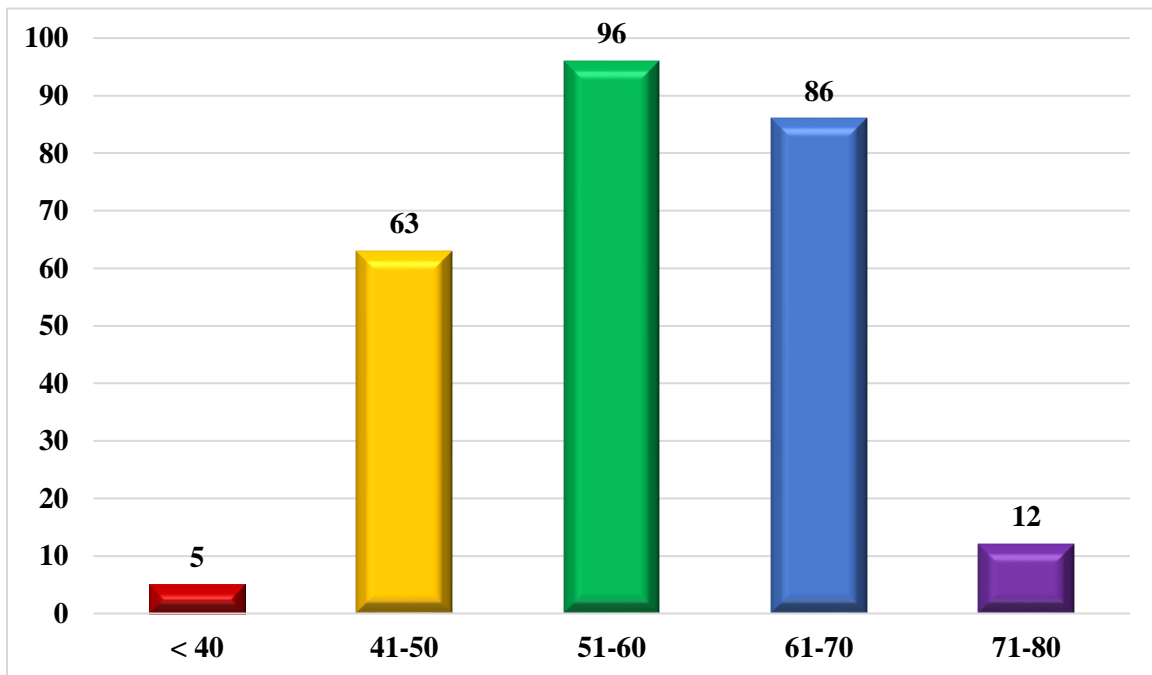
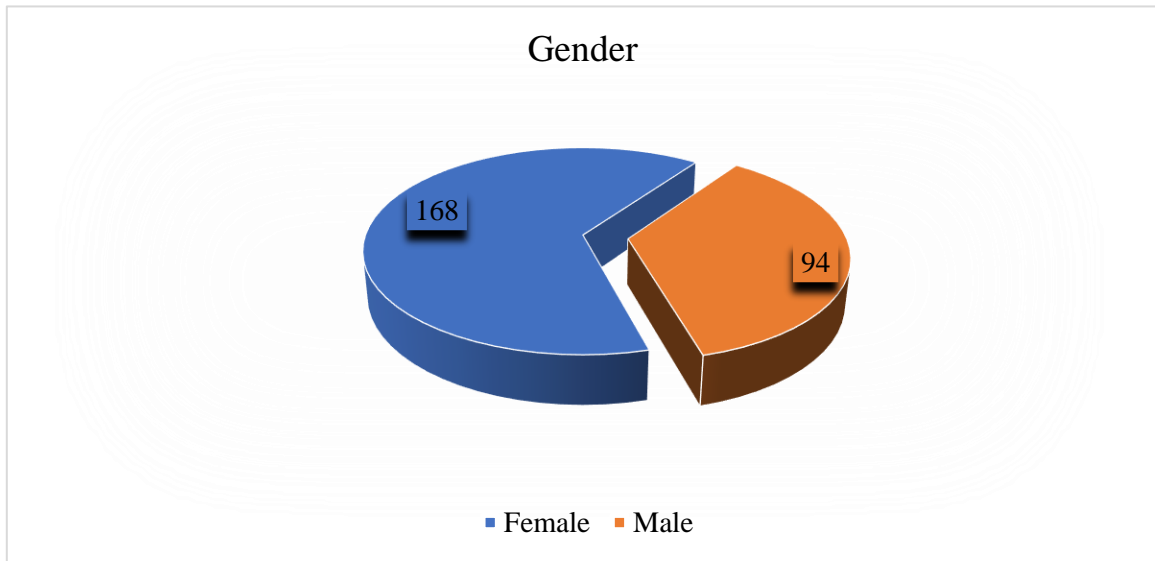


Fig. 5 Age distribution of patients with PCS.

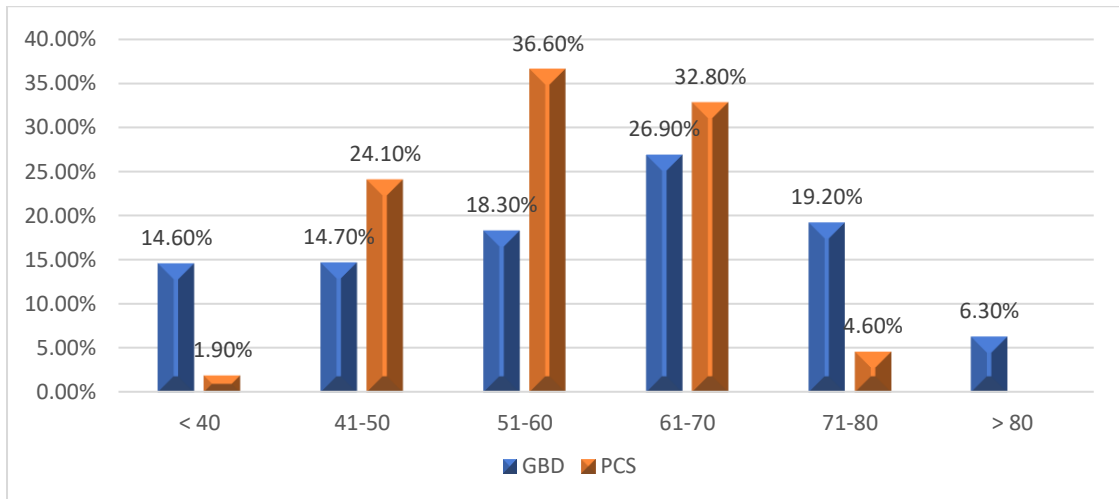
Demographic characteristics of patients with PCS.

The gender distribution is presented in Figure 6.



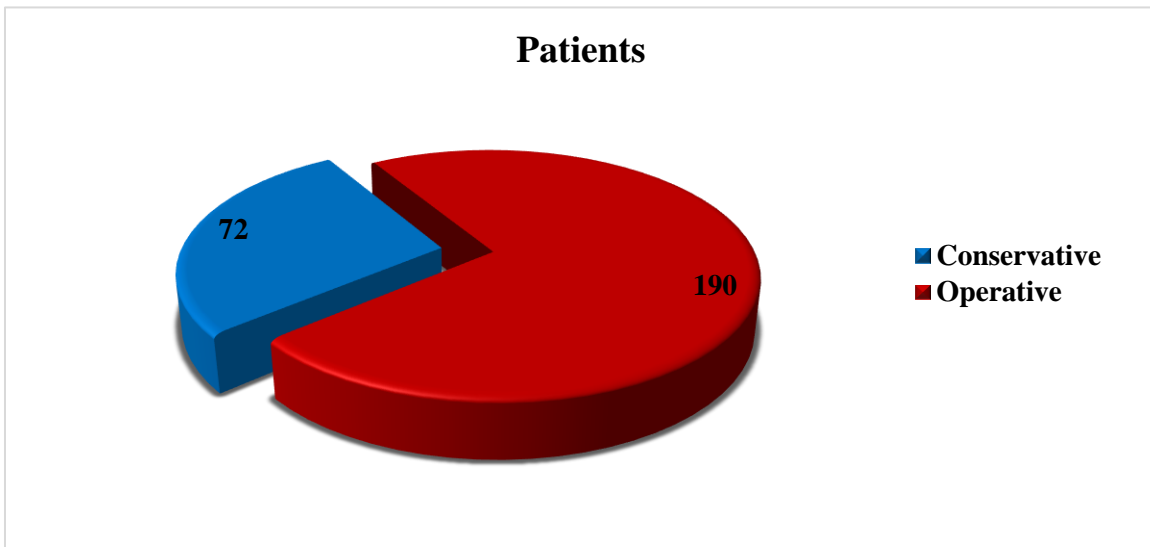
Compared to patients operated on for GBD and its complications, patients with PCS aged less than 40 years represented 1.9% of cases, those aged 41 to 50 years - 24.1%, 51 to 60 years - 36.6%, 61 to 70 years - 32.8%, and 71 to 80 years - 4.6%. Comparison by age group in percentage of patients with GBD and PCS.

Fig.7

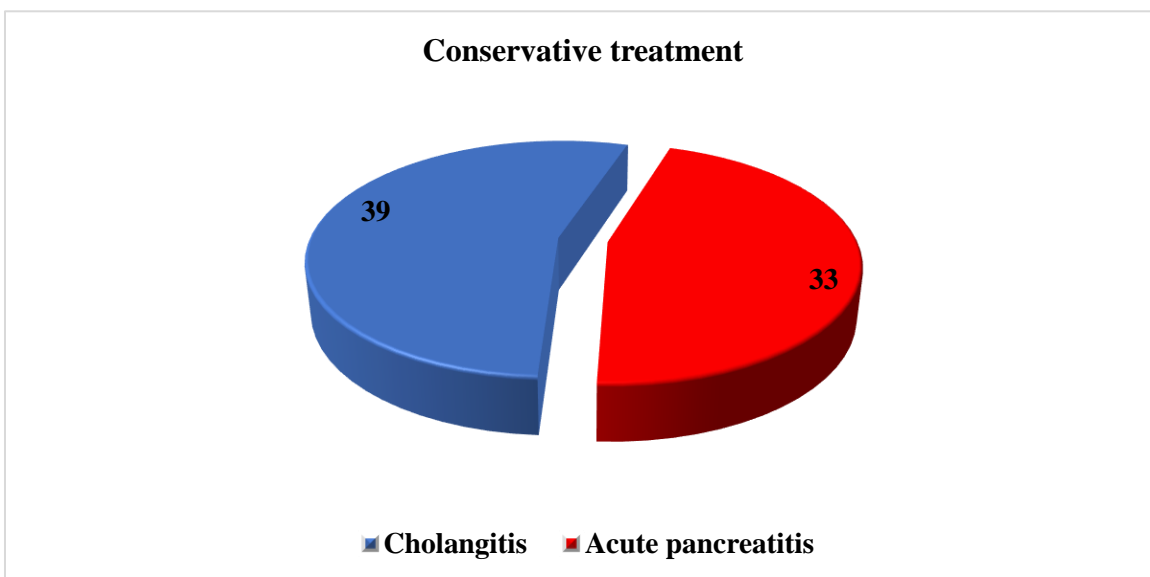


Of these, 190 (72.5%) or 12.4% of the total number of surgical procedures on the biliary system were operated, and 72 (27.5%) with PCS were treated conservatively. These data are presented in Figure 8.

Fig. 8. Number of patients treated conservatively and surgically in number.

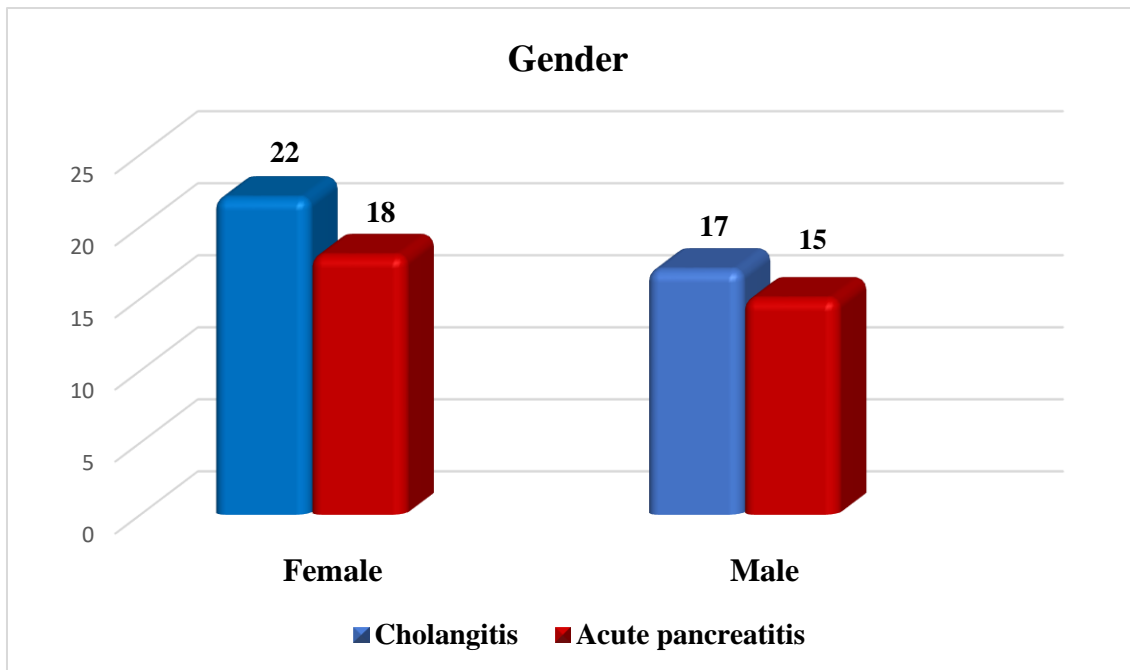


The leading reason for hospitalization of conservatively treated patients was clinical presentation of cholangitis and/or pancreatitis. All patients were hospitalized as an emergency. Fig. 9

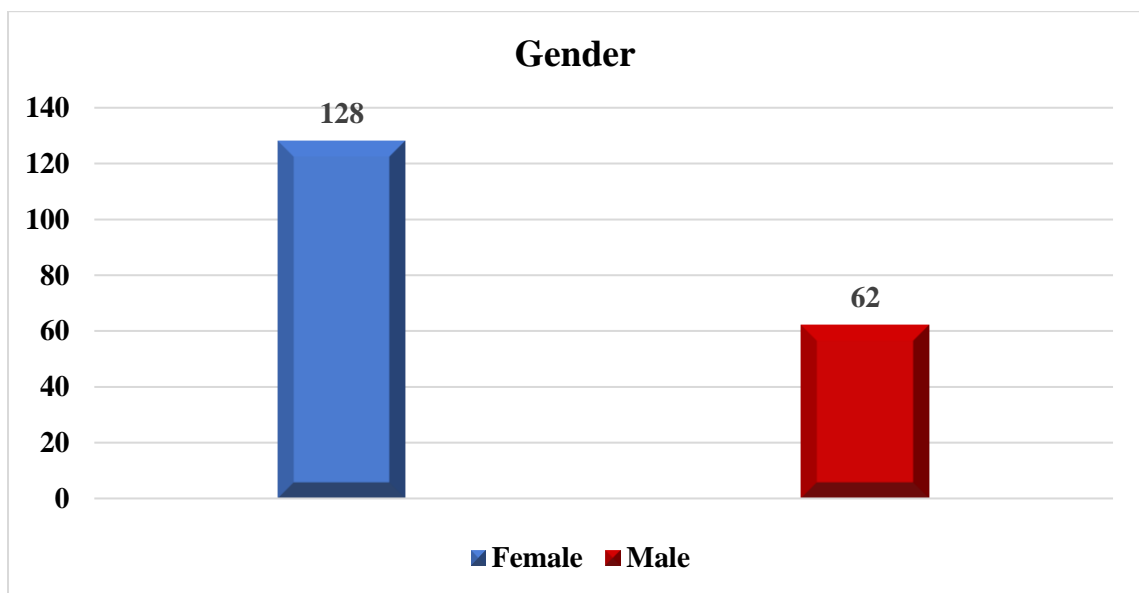


The gender distribution of conservatively treated patients and the clinical presentation is in the ratio female:male 1.25:1 presented in fig. 10

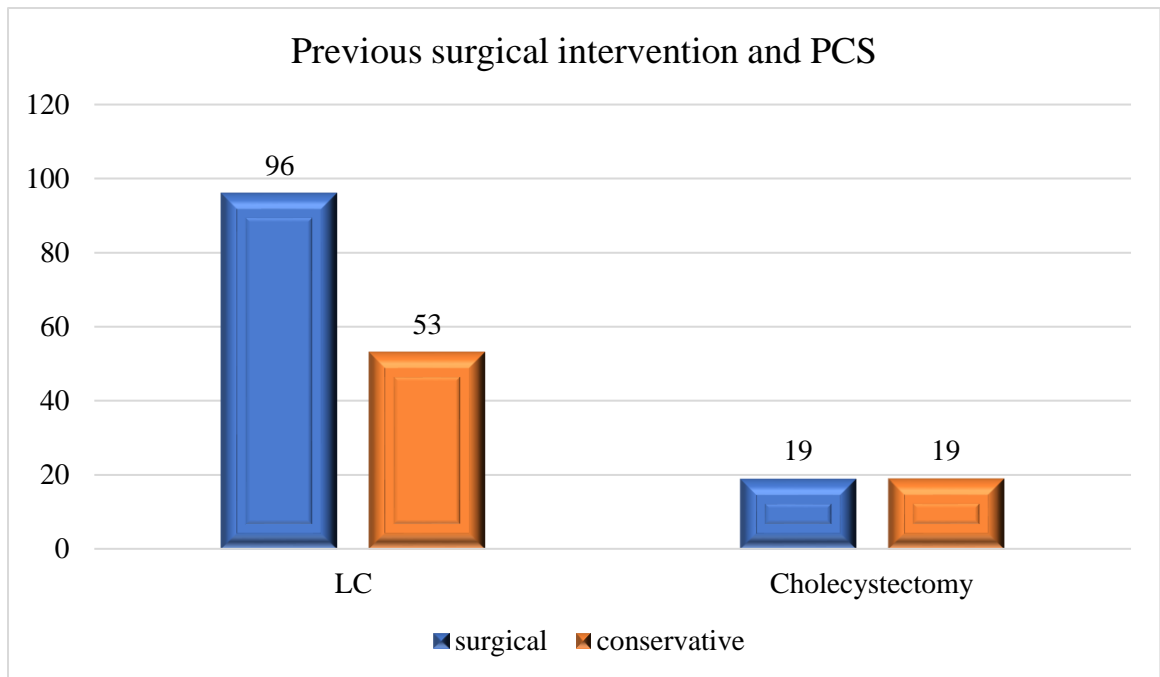




The sex distribution of operated patients with PCS was in the ratio female:male 2.06:1 presented in Fig. 11.



The association between previous surgical intervention and PCS in conservatively treated and operated patients in number is presented in Fig. 12, except for patients with BDI, who are discussed separately.



Comorbidities and preoperative risk assessment by ASA.

Figure 13 shows the distribution of patients (as absolute number of patients) by comorbidities. The total number of patients exceeds 262 (total number of patients with PCS) due to the fact that some of them had more than one comorbidity.

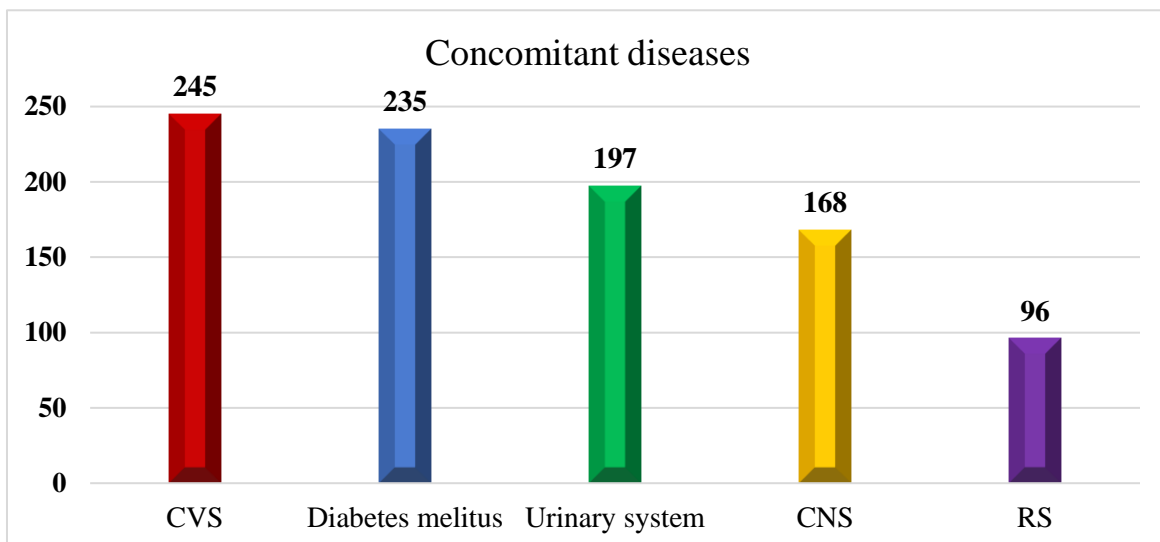
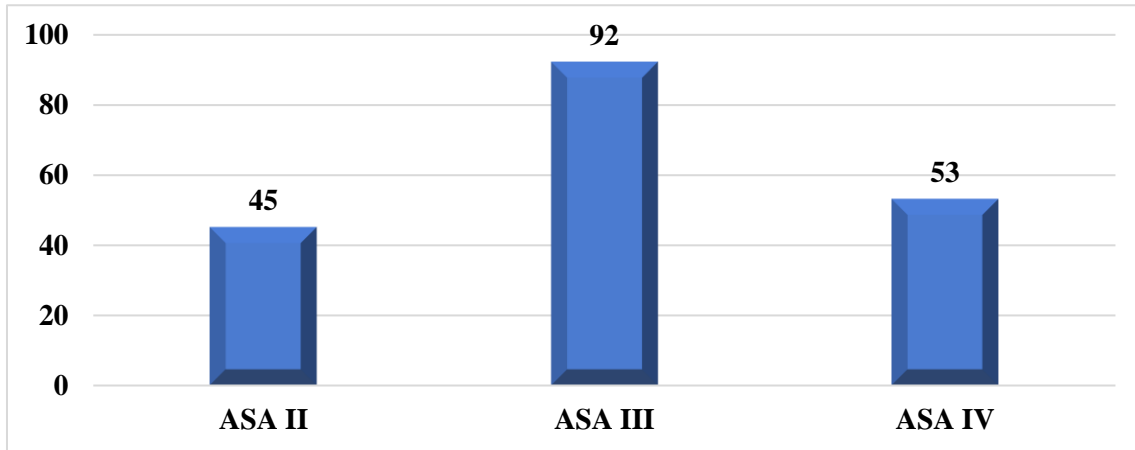


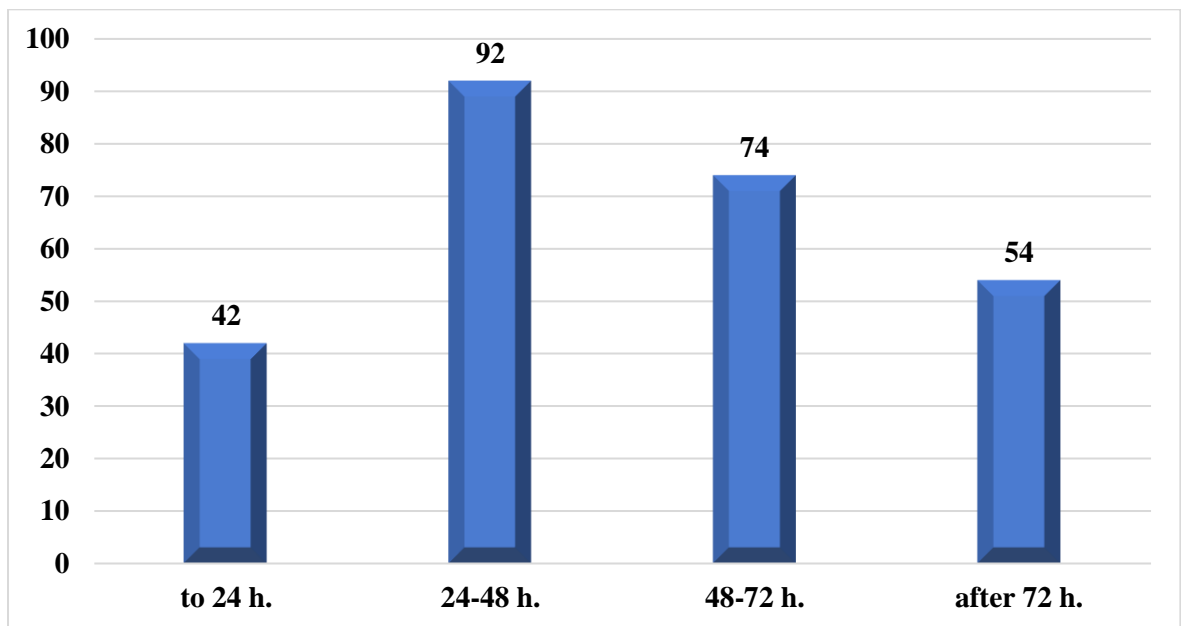
Fig. 13 Distribution of patients by concomitant diseases.

Preoperative risk assessment was performed and 190 operated patients were divided into groups according to the classification of American Society of

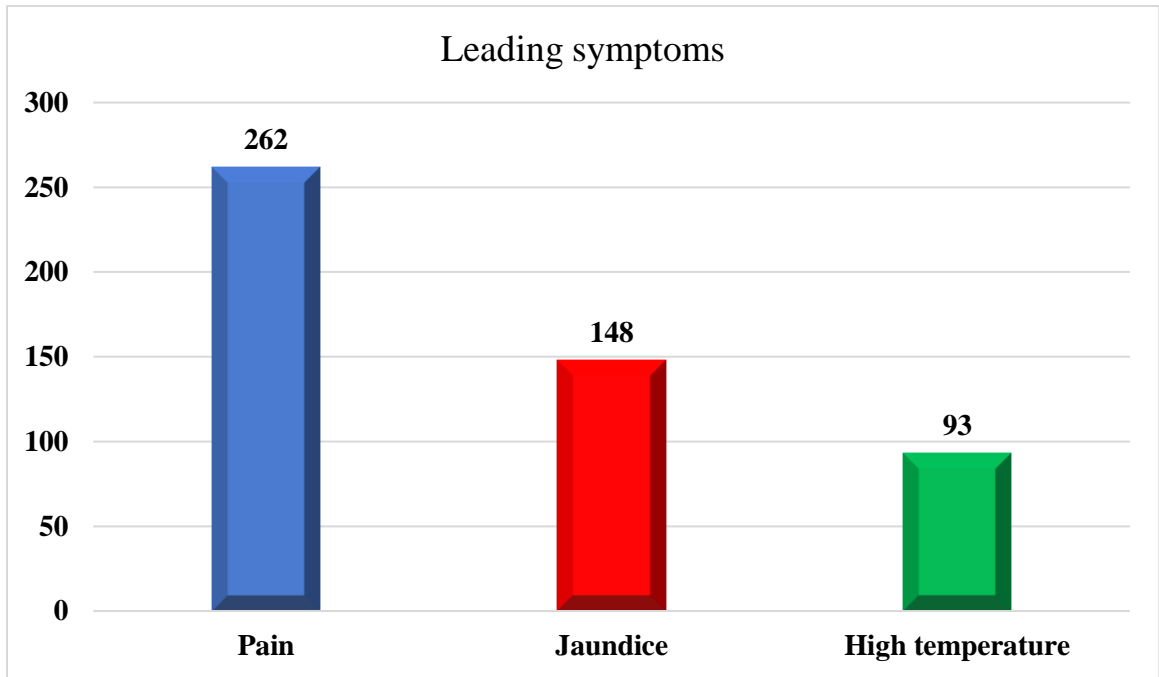
Anesthesiologists (ASA), which shows that no patients were registered with ASA I, 45 patients (23.7%) were registered with ASA II, 92 patients were registered with ASA III (48.4%) and 53 patients were registered with ASA IV (27.9%) Figure 14.



All patients with PCS were hospitalized as an emergency. Considering the duration of complaints, we divided them according to their onset until the time of hospitalization, presented in figure 15.



The leading clinical symptoms that led to patients hospitalization are presented in Figure 16.



The types of imaging studies that were performed, in the patients with PCS are demonstrated in Figure 17.

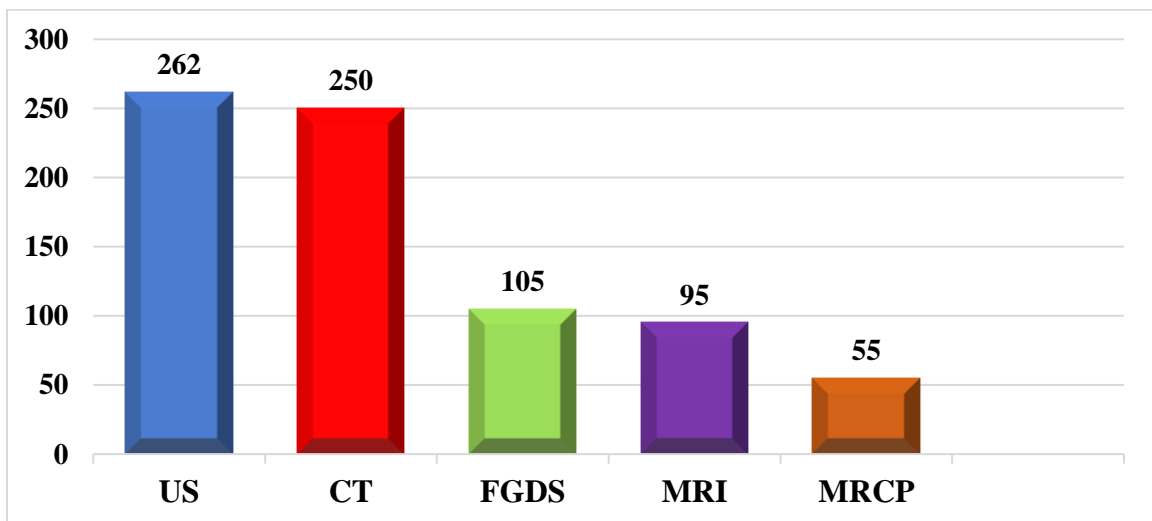


Fig. 17 Imaging methods.

The reasons for surgical intervention in patients with PCS are shown in fig.

18.

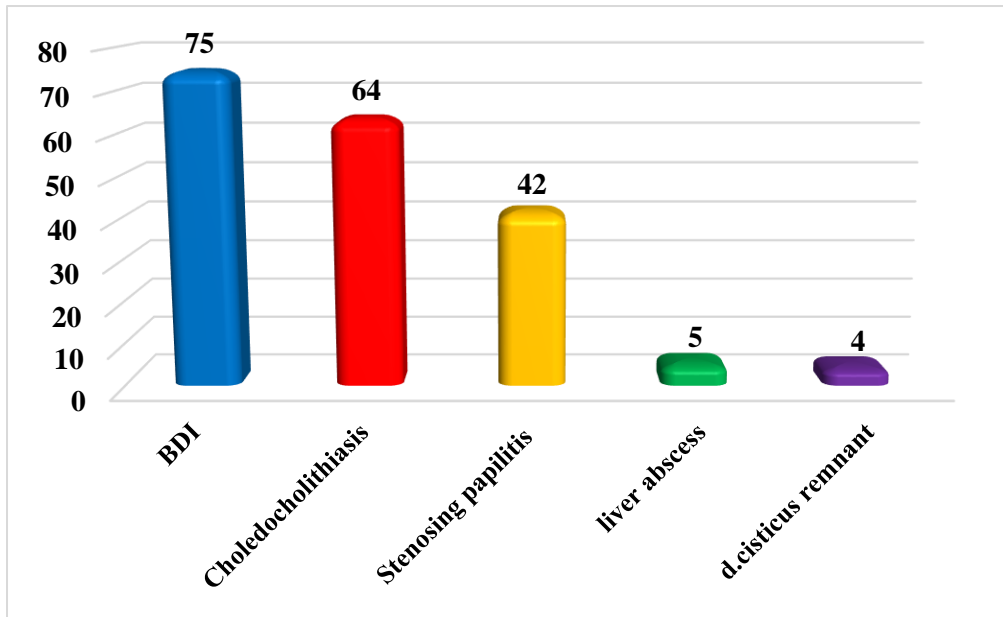
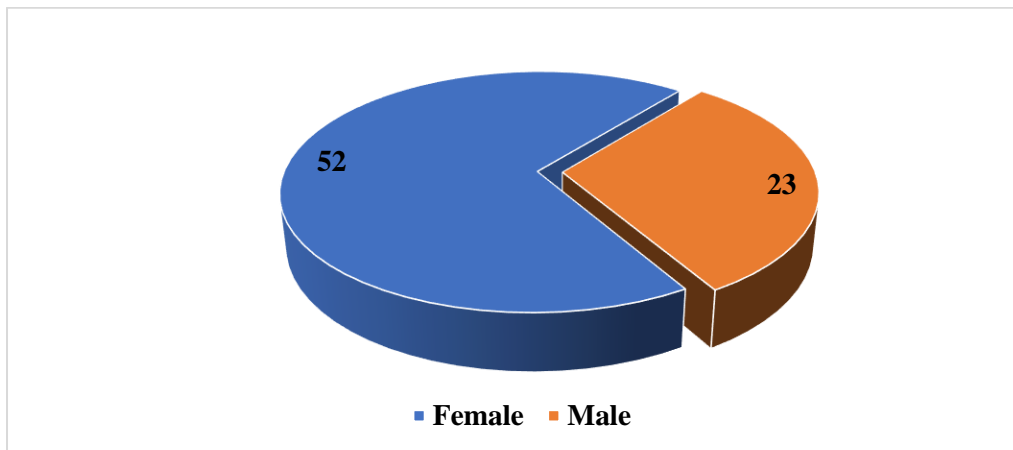


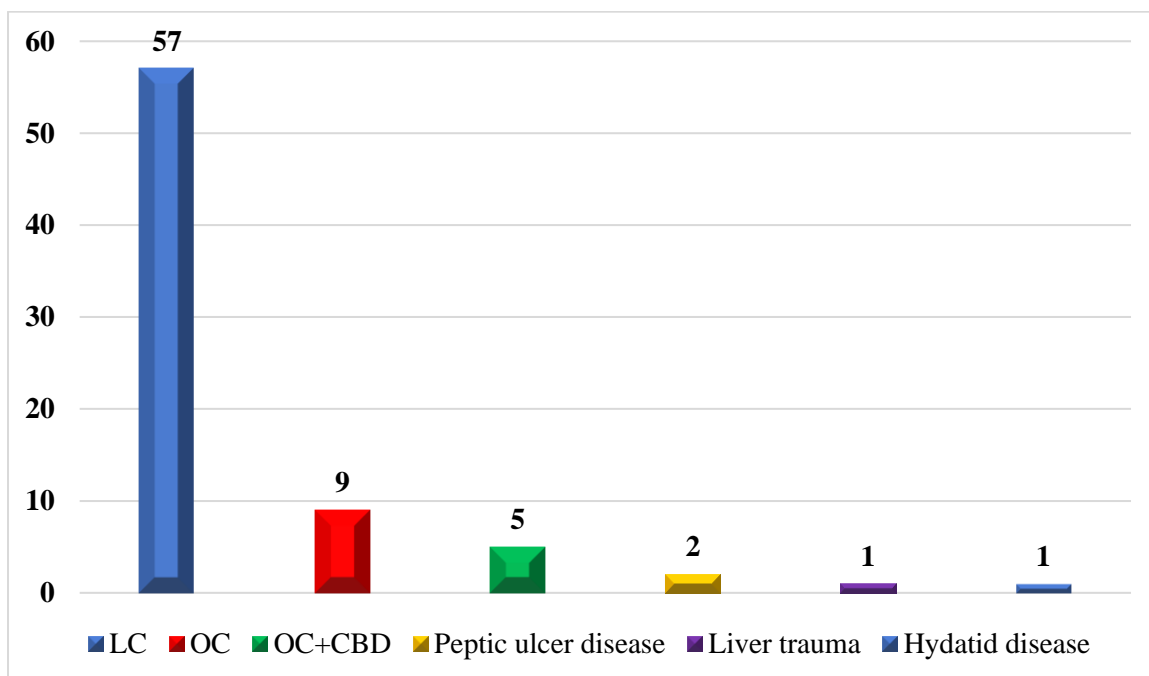
Fig. 18 Causes of PCS

Patients with BDI represent 39.5%, with choledocholithiasis-33.7%, with stenosing papillitis-22.1%, with liver abscess-2.6% and with ductus cysticus remnant-2.1% of patients with PCS. The gender distribution of patients with BDI is shown in figure 19.



Of these, 70.6% were women and 29.4% were men, aged 27 to 77. In 71 patients, the first surgical intervention was performed in another institution. In 21 of them reoperations were performed in the early postoperative period - in 6 after open cholecystectomy and in 15 after LC. In the remaining 54, the period between the first operation and reconstruction ranged from several months to several years. The first surgical intervention performed were laparoscopic cholecystectomy,

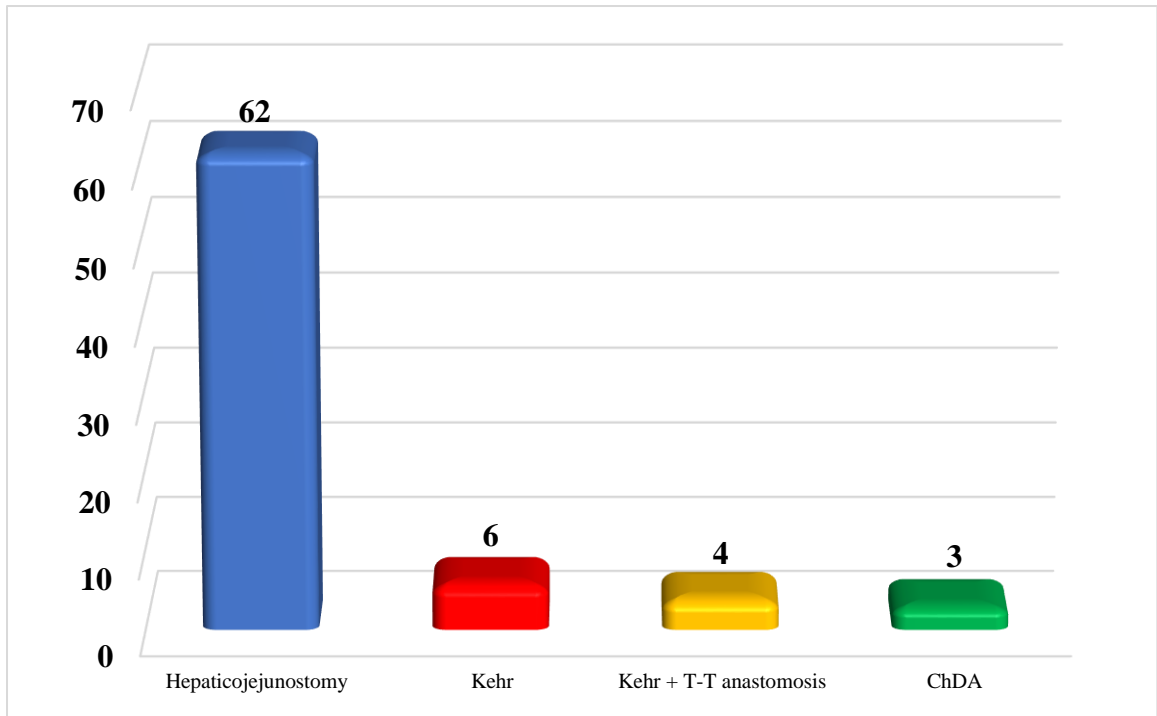
open cholecystectomy, open cholecystectomy with exploration of the CBD, gastric resection for peptic ulcer disease, after liver trauma, and after echinococcectomy, presented in fig. 20



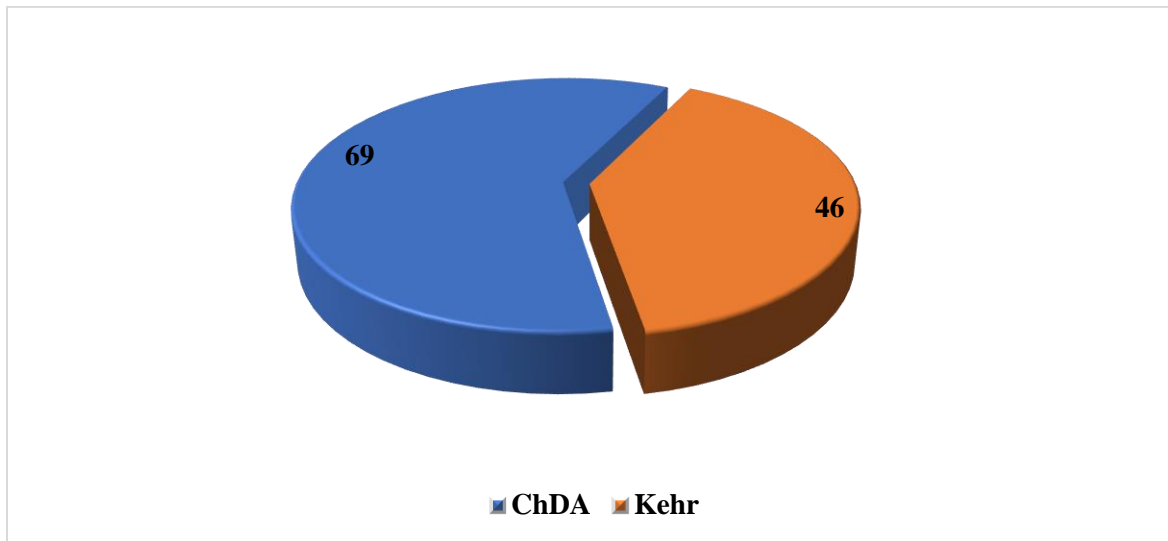
The distribution of lesions is: d. hepaticus com. – 32; d. choledochus – 21. d. hepaticus dex. – 11; d. hepaticus sin. – 2; confluens – 9;

The highest frequency of lesions comparable to the classifications of Bismuth и Strasberg shows that it is greatest in lesions type E 3 – 19 (29,6%), последвано от E 2 - 15 (23,4%); E 1 – 8 (12,5%); E 4 – 6 (9,9%).

We performed the following surgical interventions in the patients with BDI is shown in Figure 21.



The operative interventions we performed in the remaining 115 patients are presented in Fig. 22.



## METHODS

### 1. Diagnostic methods

#### 1.1. Past medical history and physical examination of the patients.

In addition to information about complaints, the question of how long ago the cholecystectomy was performed plays a major role in the history of patients with PCS. In most cases, this is due to the pronounced pain syndrome and patients miss this point as insignificant. Physical examination data supplement the missed information.

## **2. Paraclinical studies - (haematological and biochemical)**

Laboratory findings, especially the study of liver function, are an indirect indicator of pathological processes of the hepatobiliary system.

## **3. Microbiological methods**

All bile materials were processed according to generally accepted methods for bacteriological examination.

- ✓ Microscopic smear by Gram's method was applied to all materials examined.

- ✓ Cultivation

- Aerobic bile culture (for detection of obligately aerobic and optionally anaerobic bacteria and fungi) under standard conditions - temperature 35-37 °C and culture duration 24-48 hours.

- Anaerobic cultivation (for detection of obligately anaerobic bacterial pathogens) under standard conditions - temperature 35-37 °C and cultivation duration 48-72 hours.

- Semi-quantitative determination of bacterial counts in clinical material.

- ✓ Identification of bacteria. Conventional microbiological identification methods based on typical species characteristics - morphological, cultural and biochemical - were applied.

- ✓ Determination of susceptibility of isolates to antibacterial agents. It was carried out by the Bauer-Kirby disk diffusion method in accordance with the requirements of CLSI (Clinical Laboratory Standards Institute).

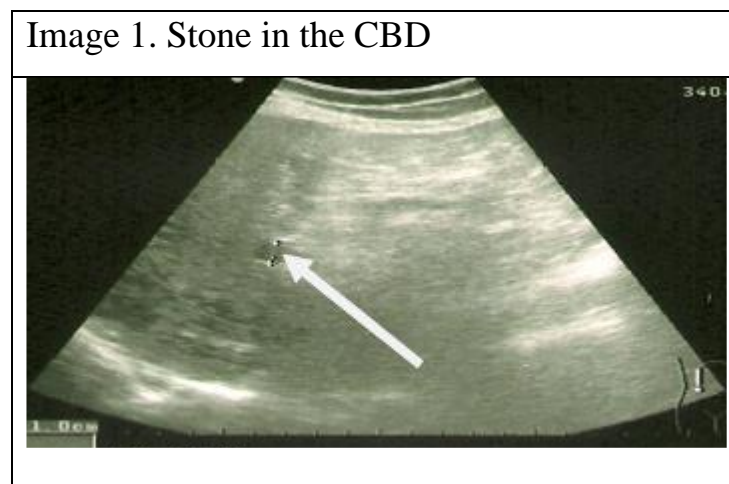


In case of isolation of obligate - anaerobic bacterial species and/or Candida fungi, antibiotic susceptibility testing was not performed and specific treatment recommendations were applied according to the literature data.

#### **4. Imaging methods**

##### **4.1 Ultrasound of the hepato-biliary system.**

It is a modern easily accessible and widely applicable method of imaging diagnostics. In our study, all 262 patients who were subsequently diagnosed with PCS were US were performed between 2011 and 2022. The indications for the application of the method were: pain in the right upper abdominal quadrant or epigastrium or jaundice.



##### **4.2. Computed tomography (CT) scan with or without contrast enhancement=**

In "Saint. Marina Hospital, computer tomography is widely used, proven detailed method in the diagnosis of abdominal pathology. In our study, 250 patients with PCS who underwent computed tomography were included.

Computed tomography is an very important radiological method for diagnosing of pathological processes of the hepatobiliary and pancreatic systems. As a result of the technical progress led to the improvement of

technical parameters of both the devices and the more and more up-to-date software programs, the possibilities of reconstructions of the obtained images and better visualization of the objects that are the subject of the study have improved significantly. The only condition for a good result is the absence of contraindications on the part of the excretory system. In patients with postcholecystectomy syndrome, the study is applied with a confirmatory nature, after ultrasonographic examination, to localize the biliary obstruction, to confirm the etiological causative agent (stenosis, stricture radiopositive stones) and to assess the severity of liver involvement. The CT examination reveals: papillitis, stones in papilla Vateri, dilatation of the intra and extrahepatic bile ducts, size of the biliary tract, diameter of the stone in the biliary tract in mm, biloma, intrahepatic stones, cholecystitis, neoplasms of the hepatobiliary and pancreatic systems.

Indications for the application of the method are:

- cases of insufficient information of conventional ultrasonography
- incomplete diagnostic value in patients with obesity, patients with abdominal wall deformities from previous surgeries, patients with an excessive amount of gas along the course of the gastrointestinal tract disrupting the acoustic window.

However, not all biliary stones can be reliably visualized with this method. As a disadvantage of computer tomography, it can be pointed out that only 10% of all biliary stones are radiopositive, but indirect features can be applied for their recognition and detection, such as a sharp break in the CBD.

Native and contrast scans were applied to all patients. After intravenous application of contrast, arterial and venous phase of the sections were evaluated. The combination of the findings allows the surgeon detailed knowledge of the findings and assists in the selection of an appropriate therapeutic strategy in the course of PCS treatment.

Image 2. CT - Male patient – two years after cholecystectomy –  
Choledocholithiasis

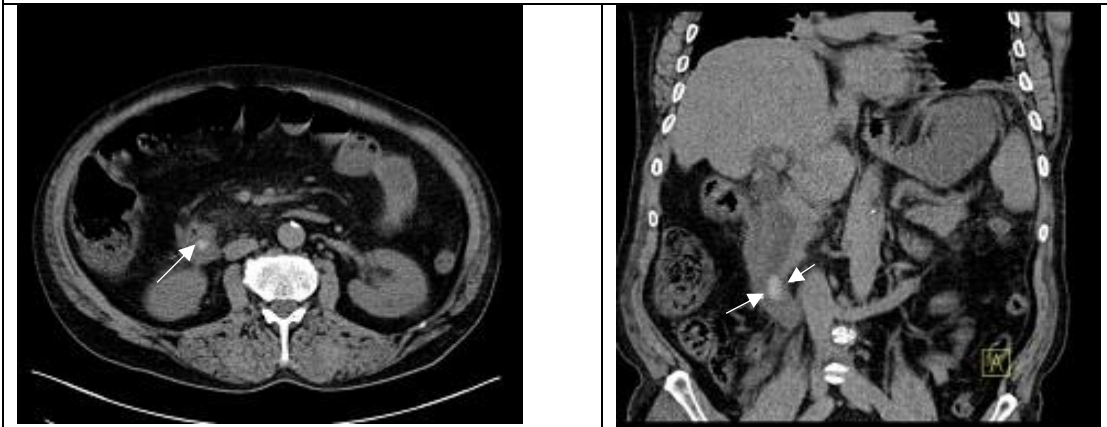


Image 3. CT – Male patient – 1 year after cholecystectomy. Dilated intra  
and extrahepatic bile ducts. CBD - 18mm in middle third to 22mm  
preampulary to 16mm. Several stones.

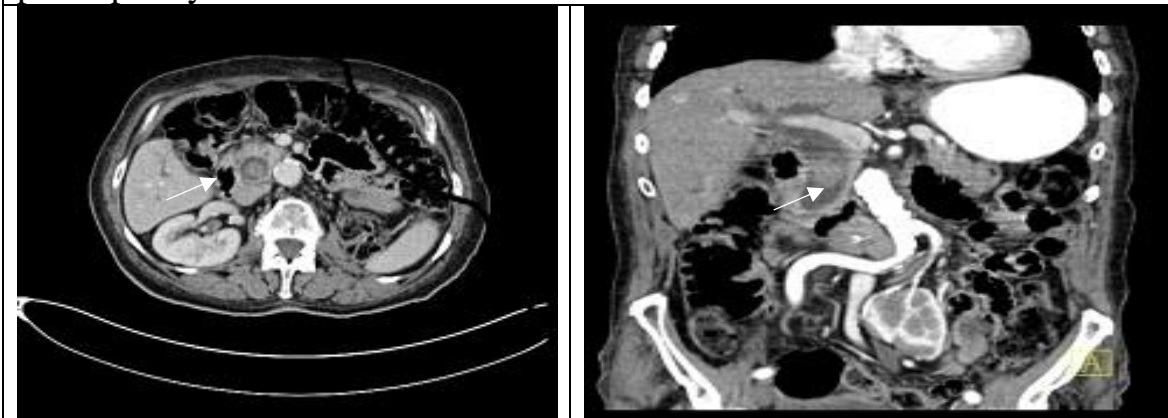


Image 4. Patient after LC. Clips on CBD.



Image 5. Same patient, few days after LC- dilated IHBD. PTC- of the patient

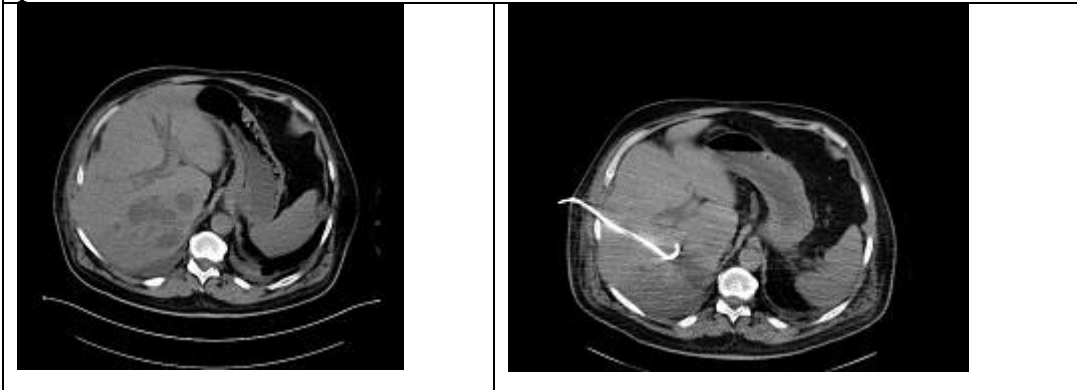
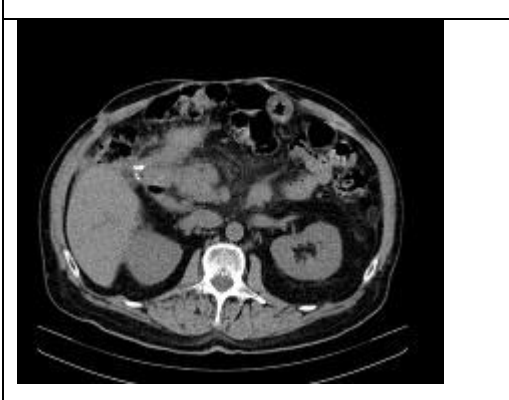


Image 6. After HJS



#### 4.3. Magnetic resonance imaging (MRI)

The study included 95 patients with PSH in whom magnetic resonance imaging was performed. The indication for the application of the method was not the good diagnostic value of ultrasonography or computed tomography in the determination of pathological findings in the upper abdomen. Extremely high diagnostic value of BDI. With the improvement of protocols, contraindications to the application of the method are decreasing.

Image 7. MRI – 83 years old female three months after LC. Dilated CBD – 23mm. In the distal part two defects. Dilated stump of d. cysticus to 11,3mm.

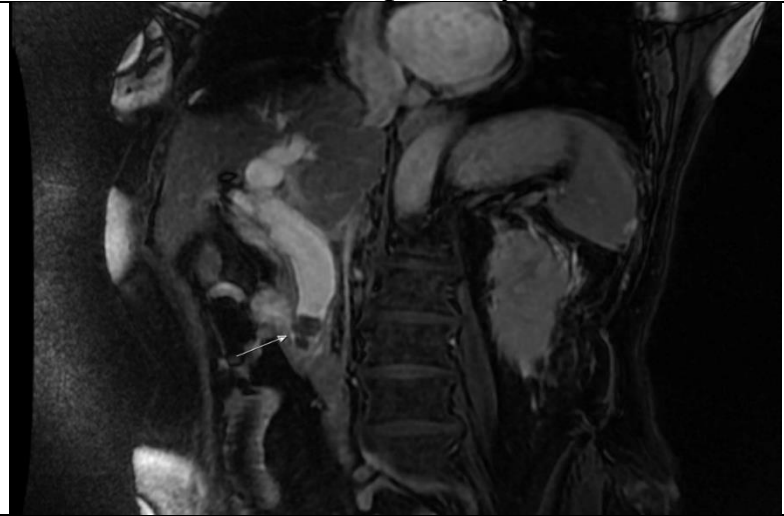


Image 8. MRI – Patient after ERCP; LC; clip and stone

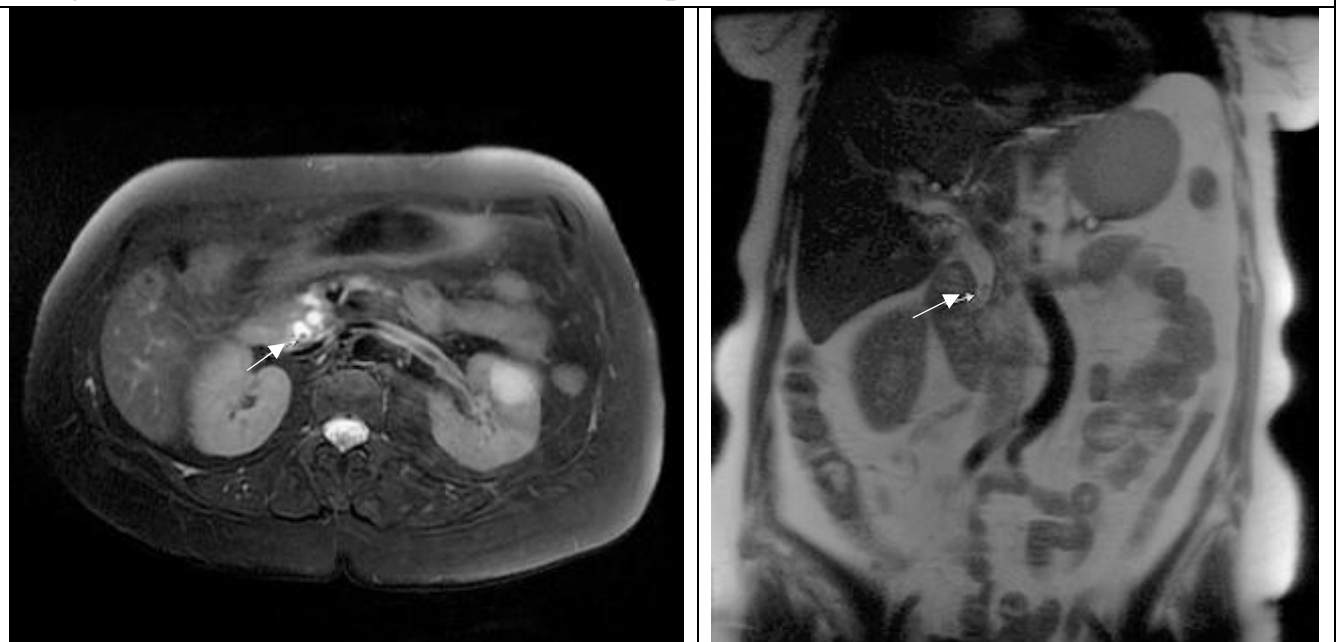


Image 9. MRI Choledocholithiasis

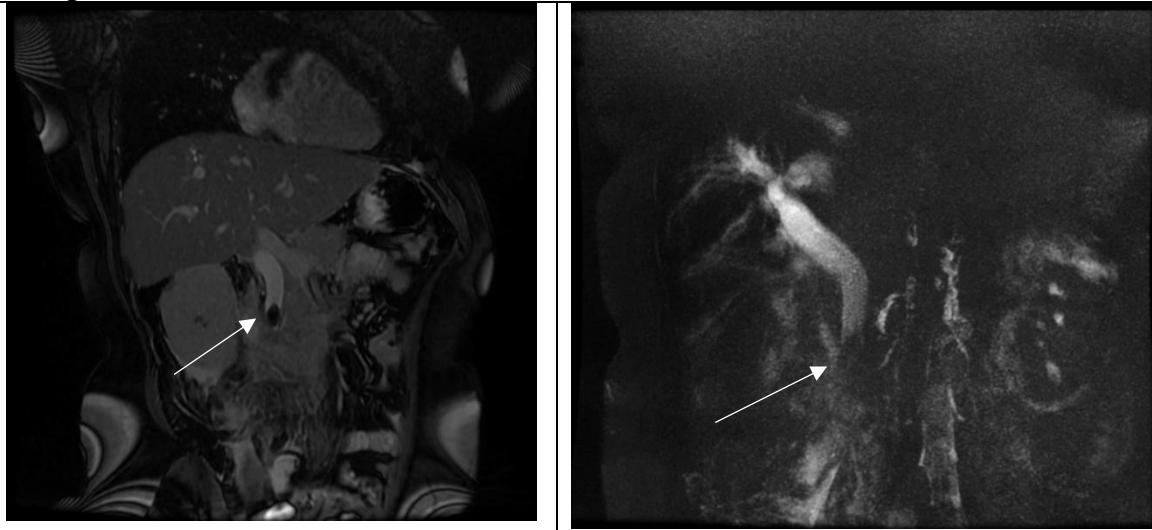


Image 10. MRCP 86-year-old choledocholithiasis. Arrow - stone in the distal part.

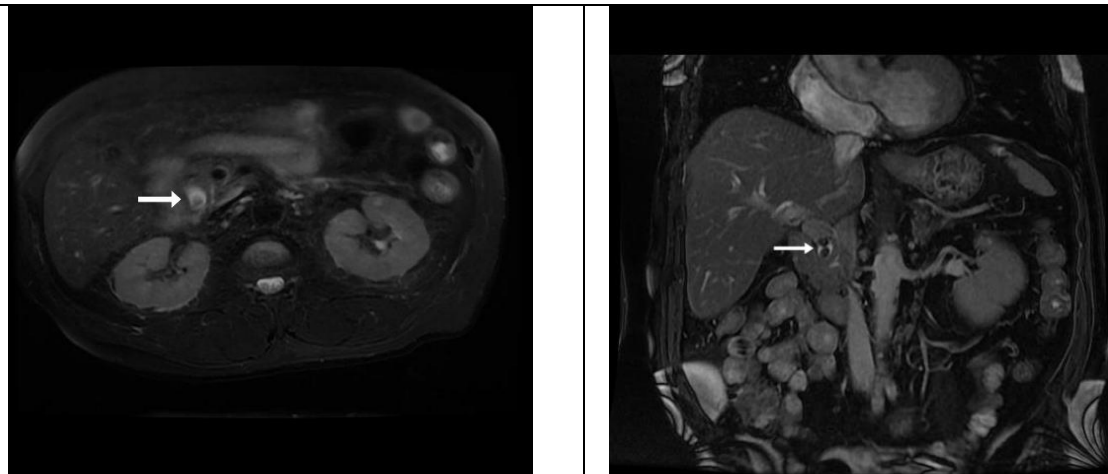


Image 11. MRCP – Choledocholithiasis after cholecystectomy

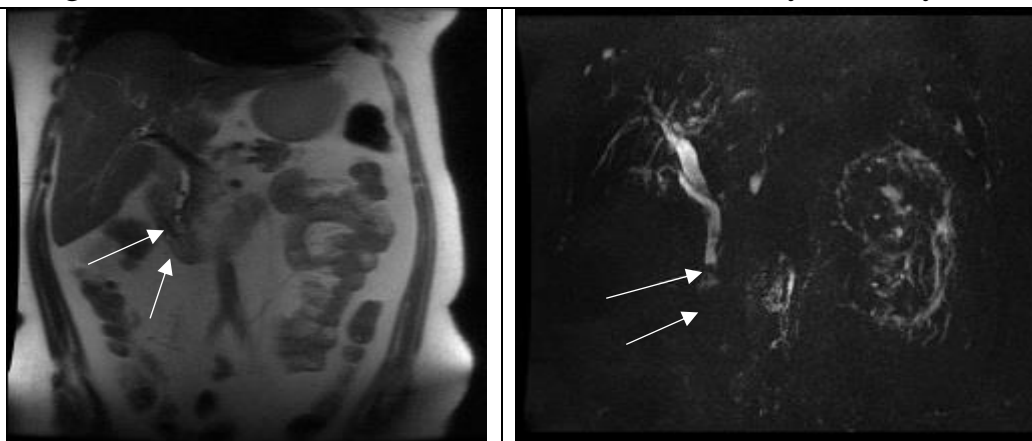
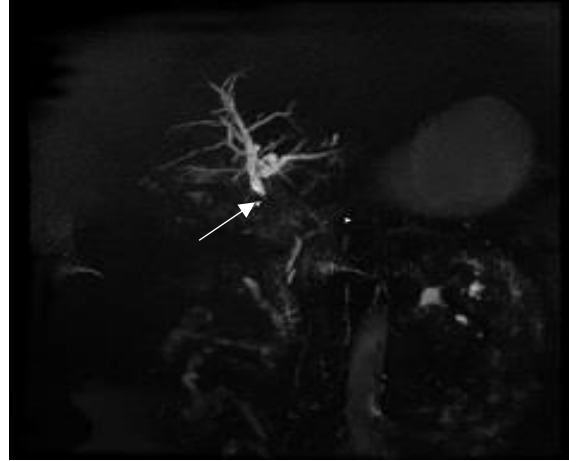


Image 12. BDI Female patient after LC – clips on CBD.



BDI Patient after LC – HJS contrast in small intestine.

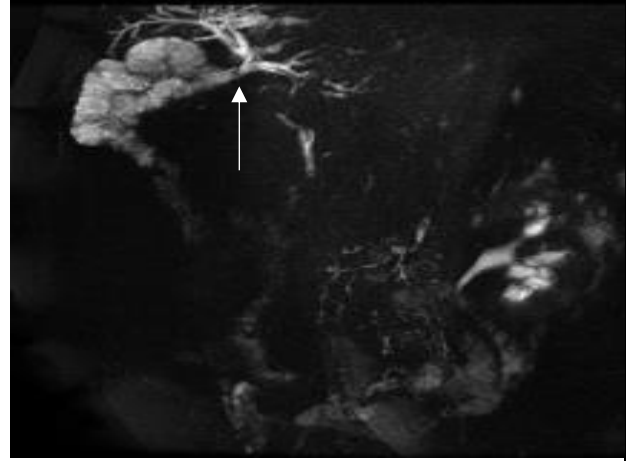


Image 13. Patient after LC. Lesion of CBD, conversion Kehr - drainage. Dilatation of IHBD.

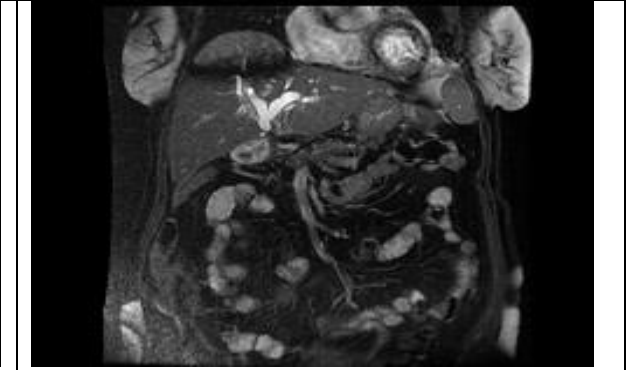
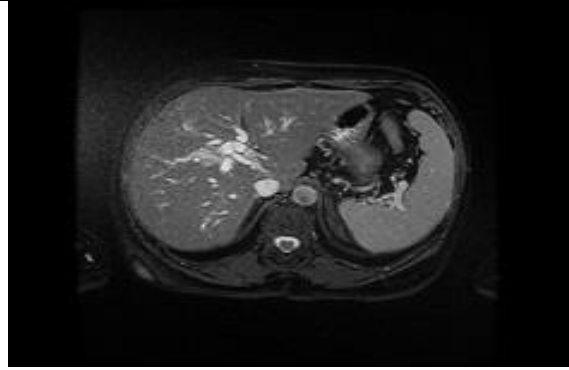
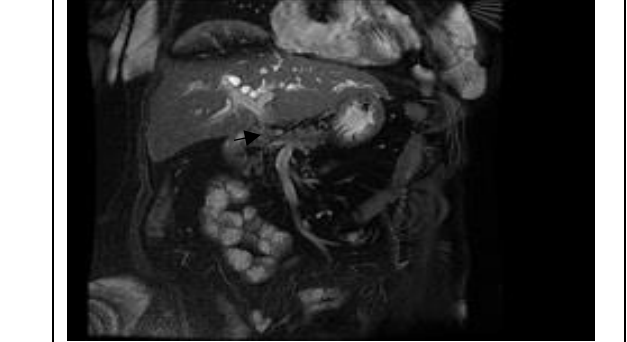
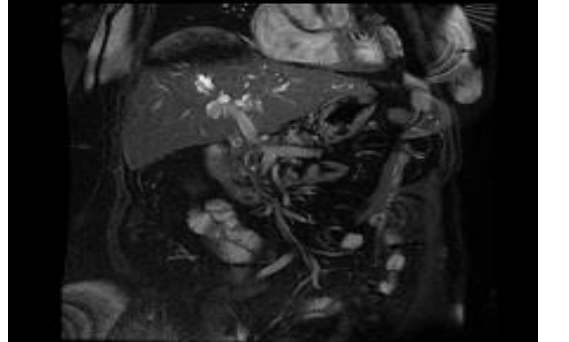


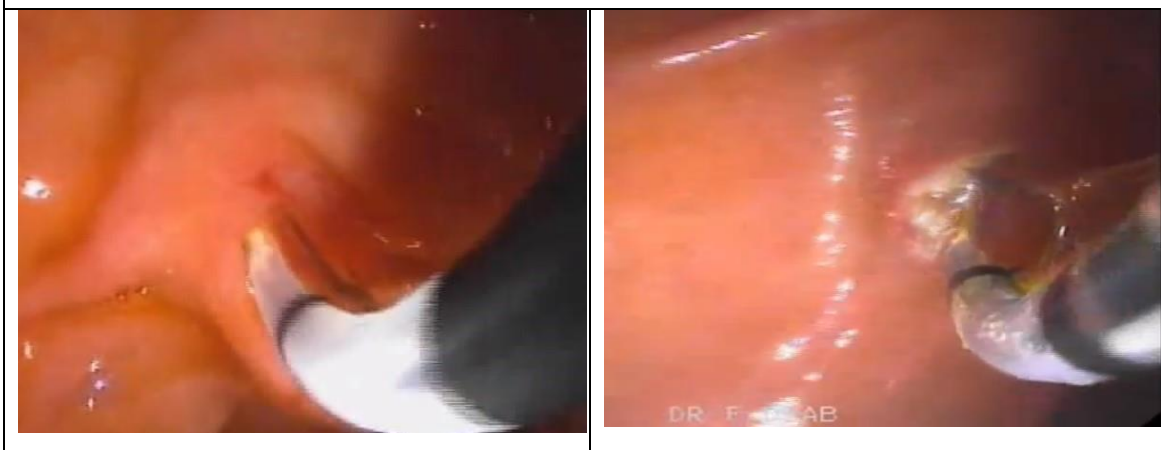
Image 14. The contrast doesn't pass in CBD, stone in CBD.



#### 4.4 Endoscopic retrograde cholangio- pancreatography (ERCP)

It is a combination of endoscopic and radiological methods. It allows accurate diagnosis of the causes leading to obstruction of the biliary passage. An invasive method that can immediately pass into a radical curative tool, indicated in all cases of dilated CBD. Once the diagnosis is made, it allows for permanent resolution and eradication of biliary tree obstructions.

Image 15. Stages of papylotomy



### 5. Operative methods

The gold standard for the treatment of cholelithiasis is the laparoscopic cholecystectomy. There is no universally accepted consensus on surgical interventions on the CBD, which mainly is due to the fact that they are determined by the experience and traditions of the clinics in which they are performed, rather than by the superiority of one method over another. Any intervention on the biliary tract has strict indications which are based on the principle of ensuring unobstructed bile duodenal oedema and preventing further complications and re-operative interventions. Surgical treatment is the main method of treatment for PCOS. Between 2011 and 2022, conventional surgical techniques were predominant. Patients with history and clinical evidence of PCS were indicated



for surgical intervention. The main contraindications for surgery were, elderly patients, patients with severe comorbidities, patients with satisfactory, effect of conservative treatment, patients refusing surgical treatment.

Our preferred approach is subcostal laparotomy. Having the advantage of this type of laparotomy is a direct access to the liver, CBD, duodenum, and allows expansion of the laparotomy with an upper mediastinal incision. After penetration into the abdominal cavity, careful identification of the CBD follows. In the case of previous laparoscopic cholecystectomy, we are also guided by the clips placed on the a. cystica or d. cysticus. In the majority of cases, dilated CBD are visualized, which may be "covered" by an inflammatory process. In the presence of changes in topographic-anatomic relationships, it is advisable to perform a choledochal puncture before performing a choledochotomy or removing the clips from d. cysticus and to insert a catheter through it into the choledoch to aid its identification in the distal direction. Bile duct drainage is accomplished by external biliary drainage - drains bile to the outside; internal - to the GIT and combined - both to the outside and the duodenum.

We applied the following conventional surgical methods and techniques on CBD:

1. Kehr drainage
2. Choledochoduodenostomy
3. Hepaticojejunostomy
4. Endoprosthesis of CBD

#### **5.1. Kehr drainage.**

After the identification of the ductus choledochus and definition of its dilatation, a longitudinal choledochotomy is performed with a size between 20 - 25mm. This is followed by aspiration of bile from the choledochus and removal of freely mobile stones. The less mobile stones can be pushed into the

supraduodenal part of the CBD and then extracted with a forceps. Some of the distally located ones can be "pushed" through the papilla into the duodenum. We also perform distal choledochal revision using "oliva" type dilators with the goal of passing it through the papilla to be dilated.

The next step is the choice of T-drain, which should not exceed 1/3 of the CBD width is introduced into the choledochotomy. Soupault recommends moving the drain in the choledochotomy outlet up and down the axis of the drain. Next, the choledochotomy is sutured with 3/0 or 4/0 atraumatic sutures. Checking for drain tightness by instillation of 10 ml. saline serum. We observe for its leakage past the drain. It is of particular importance that the drain be directed directly to the anterior abdominal wall, and not clamped during the anterior abdominal wall restoration, to ensure unobstructed drainage of bile through the drain.

## 5.2 Choledochoduodenostomy

The main indications for ChDA were formulated in 1974 by Degenschein et al. Later C. Schein, A. Baker expanded the indications for ChDA.

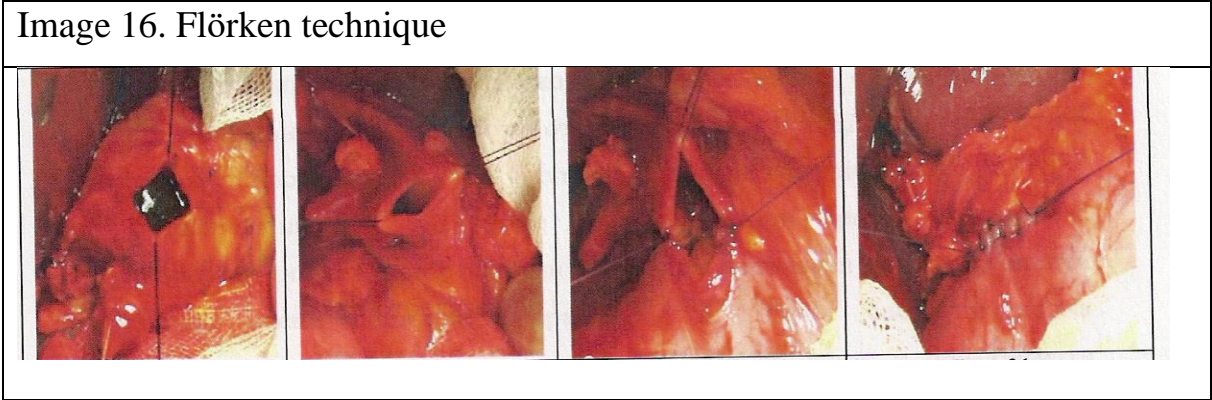
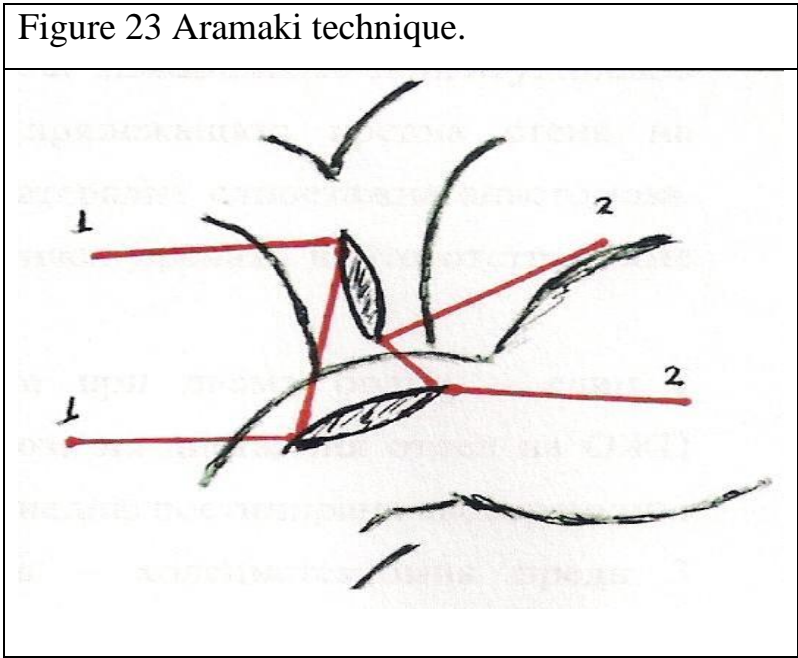
There are also contraindications such as active duodenal ulcer, acute pancreatitis, duodenostasis, and undilated CBD (< 8-9 mm).

There are several types of ChDA depending on how the anastomosis is constructed:

- ✓ Supraduodenal;
- ✓ Retroduodenal;
- ✓ Transduodenal, suprapapilar.

In case of an enlarged CBD > 14 - 15 mm we mobilize the duodenum using the Kocher method and perform a longitudinal choledochotomy and revision of CBD. Ensure patency of papilla Vateri perform single level choledochoduodenostomy with 3/0 - 4/0 interrupted suture. In the clinic, we perform a modified version of the Flörken choledochoduodenostomy. In some patients we also apply the relatively easy to perform Aramaki method of

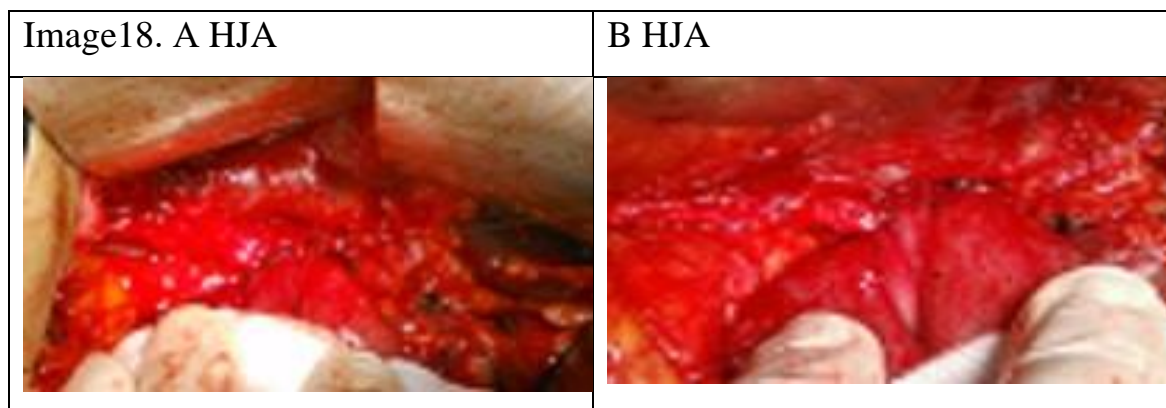
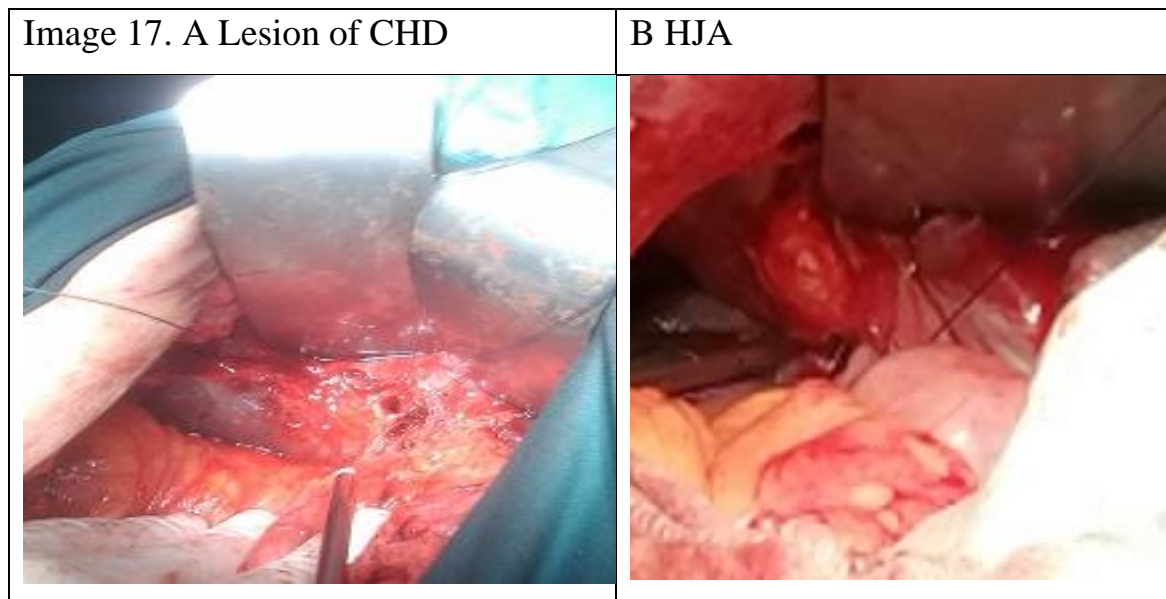
anastomosis. After suture placement, the aim is to reduce the tension between the two segments of the anastomosis, especially in its distal part.



### 5.2. Hepaticojejunostomy

After the choledochotomy and the revision of the CBD, a small bowel loop is selected approximately 40 - 50 cm from the lig. Treizi, after which a terminal-lateral or lateral-lateral Roux-en-Y hepaticojejunostomy is performed. The indications for surgery are iatrogenic lesions of the bile ducts

most often after laparoscopic cholecystectomy or in neoplasms of the distal part of the CBD.



### 5.3. Ендопротеза на жлъчните пътища

Процедурата се състои в поставяне на пластмасов тръбен дрен в дуктус холедохус, след дилатация на стенозата на ЕХЖП. Следва „глухо“ зашиване на дуктус холедохус с конци 4/0.

Image 19 Endoprosthesis – black arrow

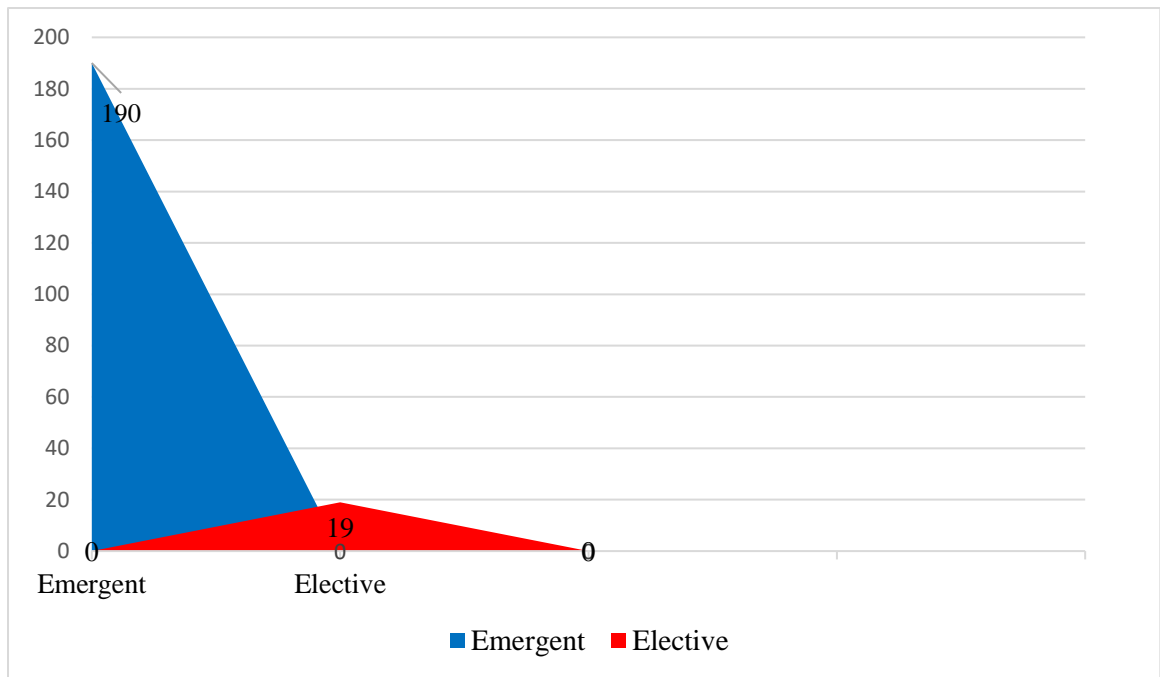


## RESULTS

We analyzed the patients with PCS according to the type of hospitalization, examination data at admission - history of cholecystectomy, cicatrix, clinical symptomatology - pain, icterus, febrility.

### 1. Type of hospitalization

Hospitalization of patients with PCS was emergent in all 72 patients who were treated conservatively. From the operated 190 patients or 19(10%) were hospitalized electively after the diagnosis was made at another hospital. Fig. 24



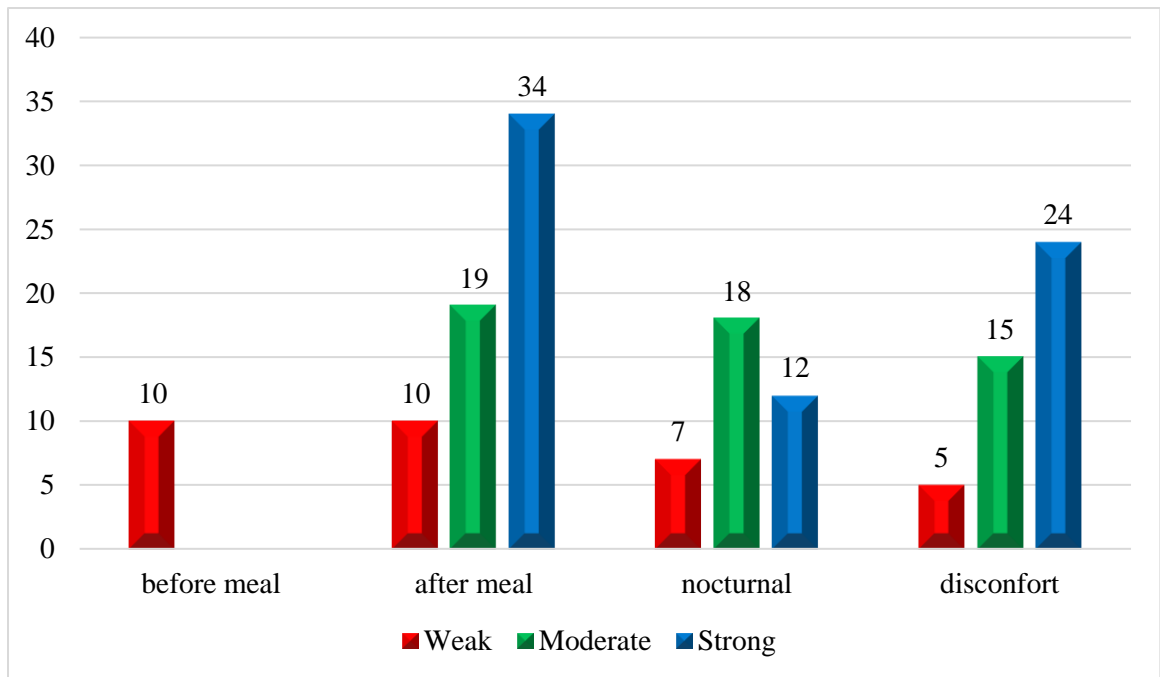
## 2. Symptoms

### 2.1. Abdominal pain

Patients with PCS report for a pain in the epigastrium, right upper quadrant with irradiation to the right lumbar region or to the right lower mesogastrum.

The type of the pain can determine both its extent at the time of examination and the period of the complaints, as after a more thorough past medical history, it was found that the pain appeared with varying intensity soon after the cholecystectomy, with patients attributing it to other diseases. We divided the pain into strong or weak according to its intensity, as well as the time of occurrence, before, after meal or constant unremitting at night, or discomfort during the day.

Fig.25



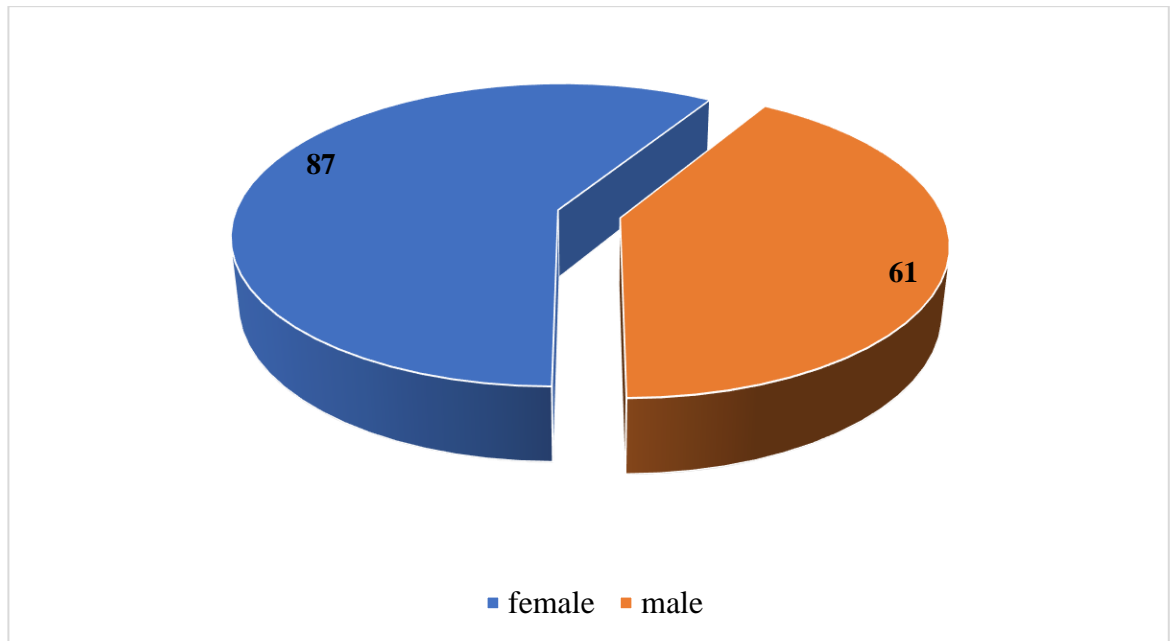
The coefficient of correlation - r was the highest in patients with postprandial discomfort - 0.985 - a very strong straight relationship - statistically significant. Followed by the correlations between nocturnal pain and discomfort -  $r = 0.481$  and nocturnal pain after meal  $r = 0.322$  moderately strong statistically significant straight relationship.

The relative proportion of patients with PCS pain is summarized in Table 1

PCS	without pain n%	with pain n%	total n%
BDI	0(00.0)	75(100.0)	75 (100.0)
Choledocholithiasis	11 (17.2)	53 (82.8)	64 (100.0)
Stenosing papillitis	3 (7.2)	39 (92.8)	42 (100.0)
Liver abscess	1 (20.0)	4 (80.0)	5 (100.0)
Ductus cysticus remnant	2 (50.0)	2 (50.0)	4 (100.0)
Cholangitis	0(00.0)	39(100.0)	39 (100.0)
Acute pancreatitis	0 (00.0)	33(100.0)	33 (100.0)
Total	17 (6.4)	245 (93.5)	262(100.0)

## 2.2. Jaundice

Jaundice was found in 148 (56.5%) of the patients with PCOS. Its manifestation was also found to be statistically significant when comparing patients of both sexes. It occurred more frequently in females than males  $r=0.01$ -weak linear relationship. Fig. 26



It has been recorded to the greatest extent in patients with ALFP and choledocholithiasis, followed by those with stenosing papillitis.

Patients with jaundice - table 2

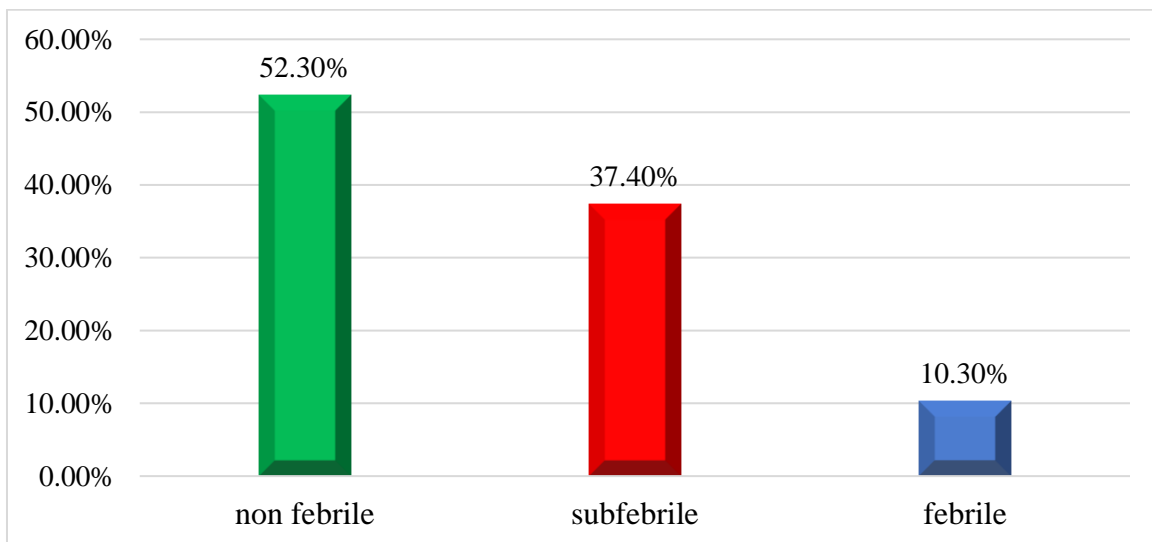
PCS	without jaundice n%	with jaundice n%	total n%
BDI	15 (20.0)	60 (80.0)	75 (100.0)
Choledocholithiasis	21 (32.8)	43 (67.2)	64 (100.0)
Stenosing papillitis	23 (54.7)	19 (45.3)	42 (100.0)
Liver abscess	4 (80.0)	1 (20.0)	5 (100.0)
Ductus cysticus remnant	3 (75.0)	1 (25.0)	4 (100.0)
Cholangitis	15 (38.4)	24 (61.6)	39 (100.0)
Acute pancreatitis	33 (100.0)	0 (00.0)	33 (100.0)



Total	114 (43.5)	148 (56.5)	262(100.0)
-------	------------	------------	------------

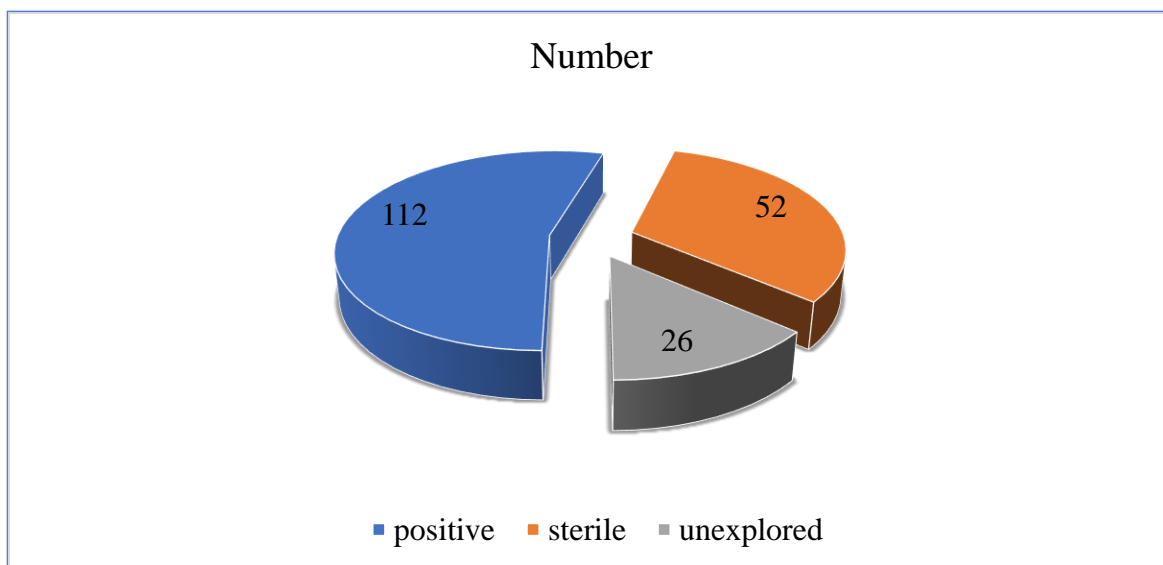
### 2.3. Temperature

The obtained data from the analysis of the patients showed that 137 (52.3%) did not have febrility. We divided the patients into three groups, afebrile, up to 36,9 C 137, from 37 oC to 37,9 C - 98 and above 38 C - 27 (Fig. 27).



### 2.4. Microbiology of biliary cultures

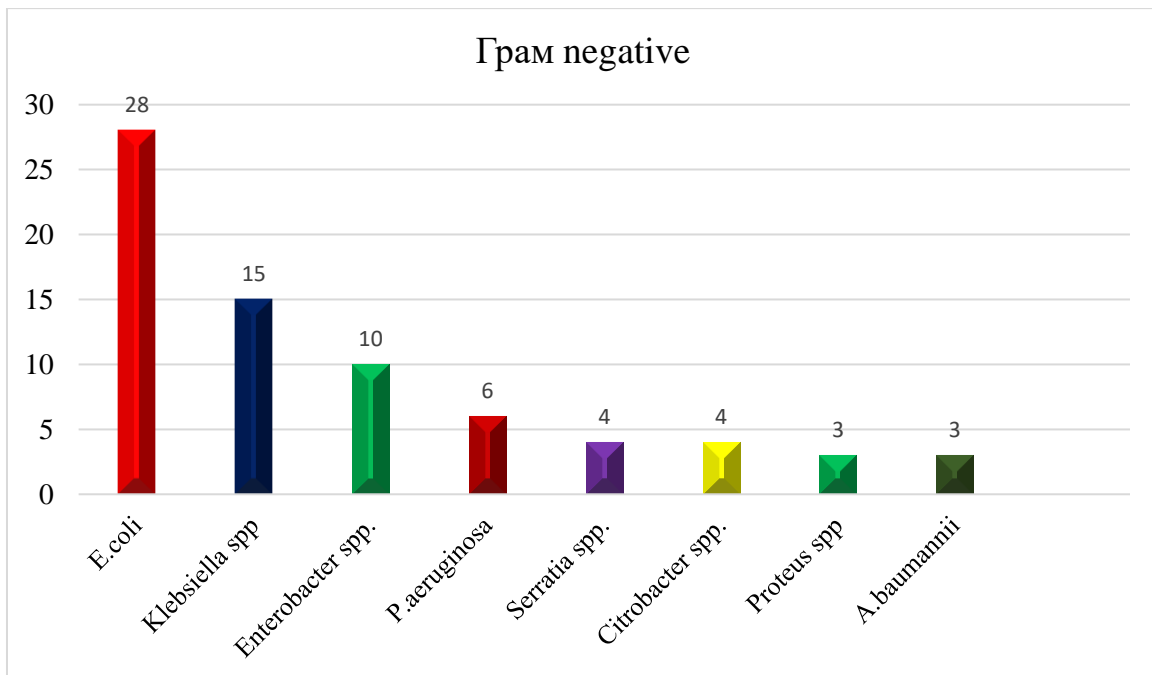
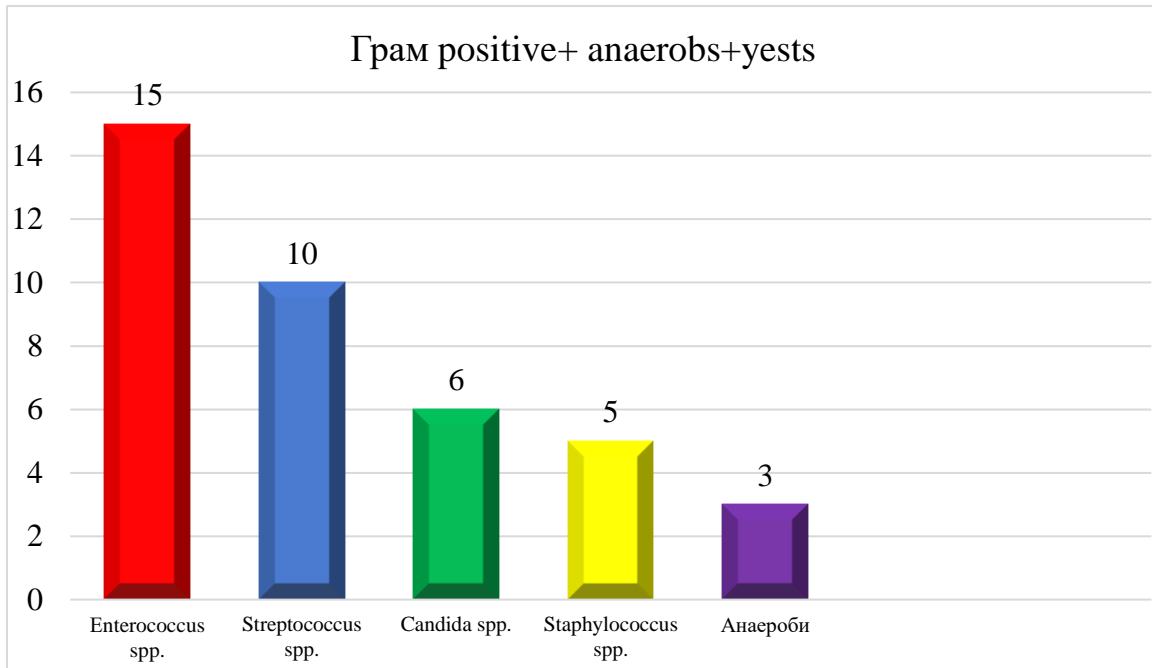
Biliary cultures were examined in 164 (86.3%) patients with PCOS. Twenty-six (13.7%) were not examined. The percentages of positive, sterile, and untested biliary cultures are presented in figure 28



The most common causative agents in terms of absolute number and relative proportion are presented in Table 3.

Causitive agent	number	%
<i>E. coli</i>	28	25,0
<i>Enterococcus spp.</i>	15	13,4
<i>Klebsiella spp.</i>	15	13,4
<i>Enterobacter spp.</i>	10	8,9
<i>Streptococcus spp.</i>	10	8,9
<i>Candida spp.</i>	6	5,3
<i>Pseudomonas aeroginosa</i>	6	5,3
<i>Staphylococcus spp.</i>	5	4,5
<i>Citrobacter spp.</i>	4	3,6
<i>Serratia spp.</i>	4	3,6
Анаероби	3	2,7
<i>A. baumannii</i>	3	2,7
<i>Proteus spp</i>	3	2,7

The microbial agents are divided into two groups according to their morphological and physiological characteristics, presented in figures 29 and 30.



We examined the level of resistance of the isolates shown in table 4.

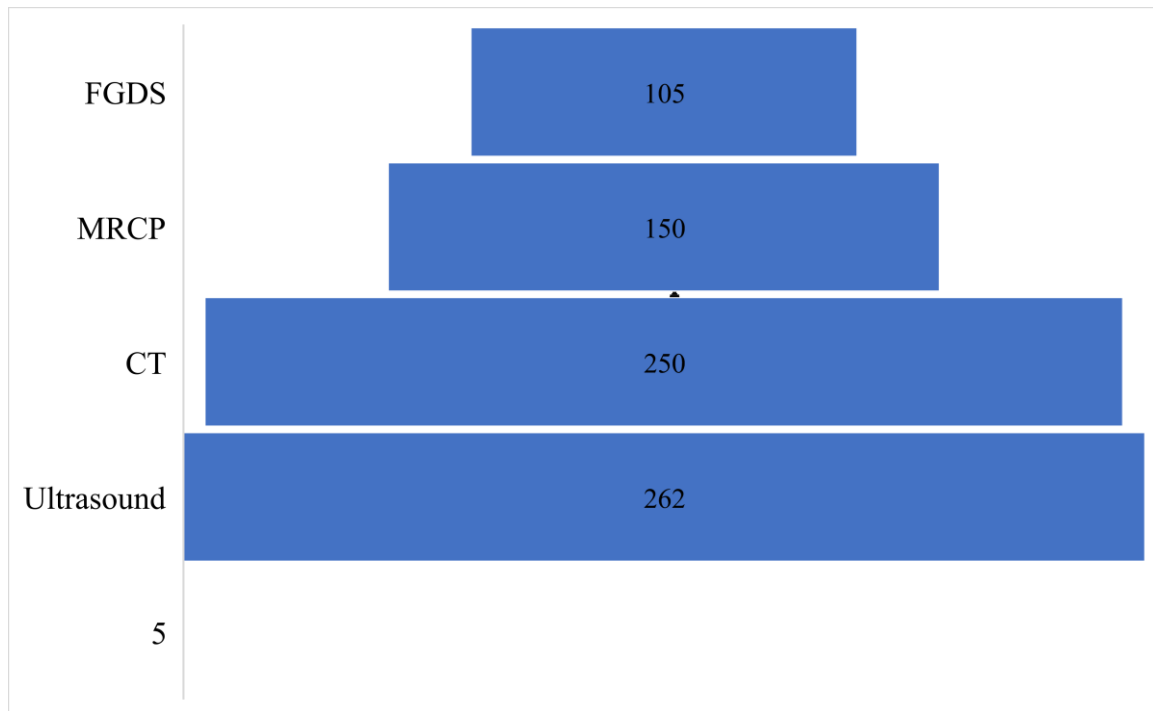
Causitive agent	Amoxicillin/ clav.acid	Piperacillin/ Tazobactam	Cefuroxime	Ceftriaxone	Ceftazidime	Cefoperazone/ Sulbactam	Ciprofloxacin	Imipenem	Vancomycin
<i>E.coli</i> n=28	35,7	14,3	21,4	17,9	17,9	14,3	35,7	0	n.t.
<i>Klebsiella spp.</i> n=15	66,7	26,7	40,0	33,3	33,3	26,7	60,0	0	n.t.
<i>Enterobacter spp.</i> n= 10	100*	10,0	10,0	10,0	10,0	10,0	20,0	0	n.t.
<i>Serratia spp.</i> n= 4	100*	0	100*	25,0	0	0	25,0	0	n.t.
<i>Citrobacter spp.</i> n= 4	50,0	25,0	25,0	25,0	25,0	25,0	50,0	0	n.t.
<i>Proteus spp</i> n= 3	66,6	0	33,3	0	0	0	0	0	n.t.
<i>P. aeruginosa</i> n= 6	100*	50,0	100*	100*	33,3	100*	50,0	33,3	n.t.
<i>A. baumannii</i> n= 3	100*	100*	100*	100	66,6	33,3	100	66,6	n.t.
<b>Грам - resistance</b>	64,4	17,8	36,9	30,1	21,9	23,2	41,1	5,5	n.t.
<i>Enterococcus spp.</i> n= 15	26,7	26,7	100*	100*	100*	100*	46,7	13,4	0
<i>Streptococcus spp.</i> n= 10	20,0	20,0	20,0	10,0	100*	n.t.	20,0	10,0	0
<i>Staphylococcus spp.</i> n= 5	40,0	40,0	40,0	40,0	100*	n.t.	60,0	40,0	0
<b>Грам + resistance</b>	26,7	26,7	63,3	56,6	100*	n.t.	40,0	13,3	0

With the symbol \* we have indicated the innate / primary / resistance of the bacterial causative agent to the noted antibacterial agents.

n.t. – non tested

## 2.5. Imaging diagnostics

One or more than one imaging modality was used in all patients with PCS. The distribution of patients according to the methods used is presented in Figure 31.



We investigated the sensitivity and specificity of imaging methods compared with intraoperative findings and found the following table 5

Imaging diagnostics	Specificity %	Sensitivity %
US	62,7	100*
CT	90,4	100*
MRCP	100*	100*

\* Sensitivity is 100% due to the fact that patients diagnosed with PCS were selected

## 2.6. Combining the symptoms

In PCS patients, we combined the main symptoms of pain and jaundice. Fig. 32, 33, 34.

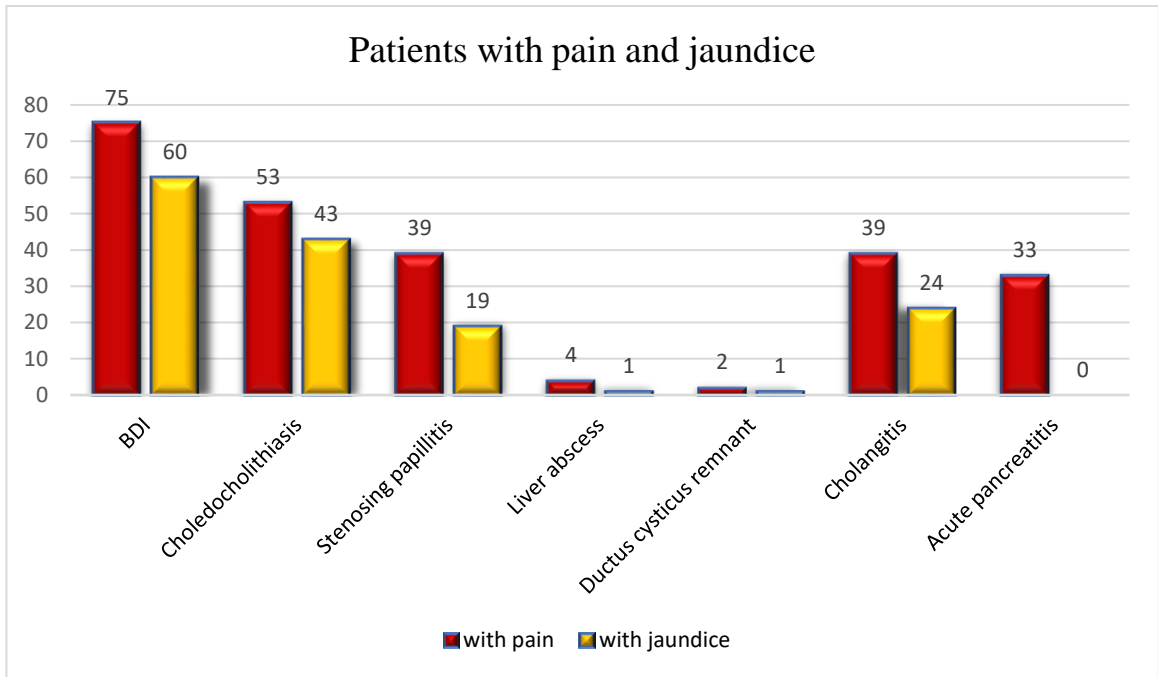


Fig. 32 The correlation coefficient  $r = 0.908$  shows a very strong statistically significant linear relationship

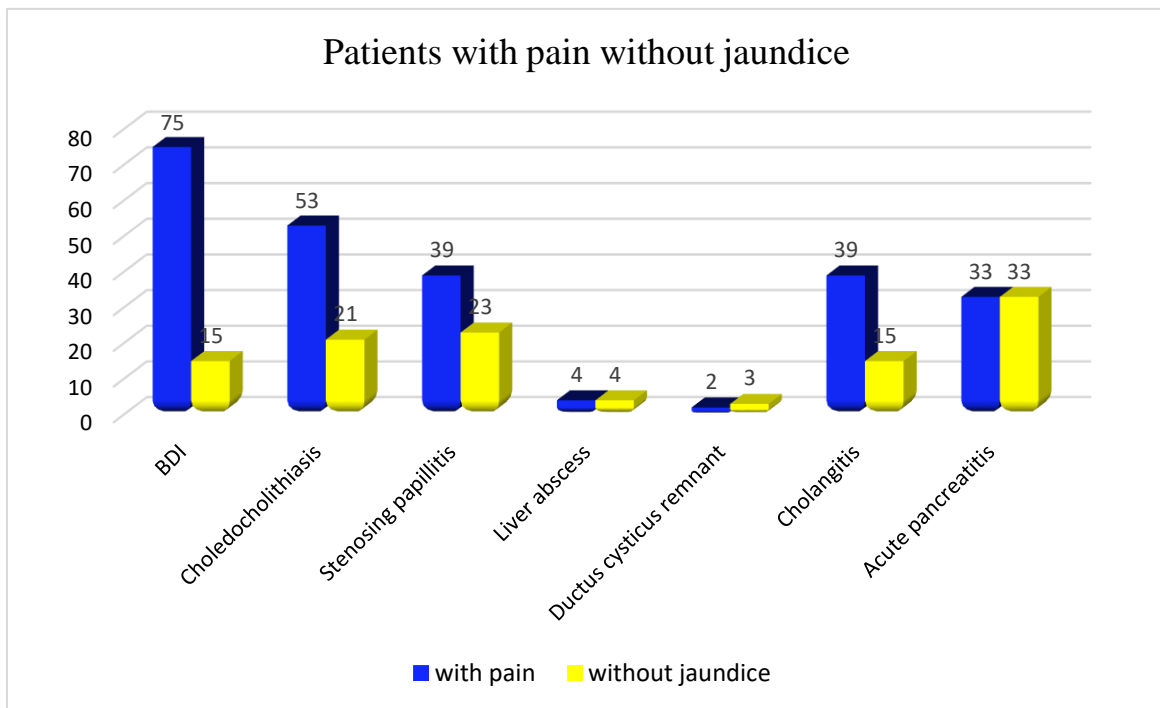


Fig. 33 The correlation coefficient  $r = 0.510$  indicates a statistically significant direct relationship

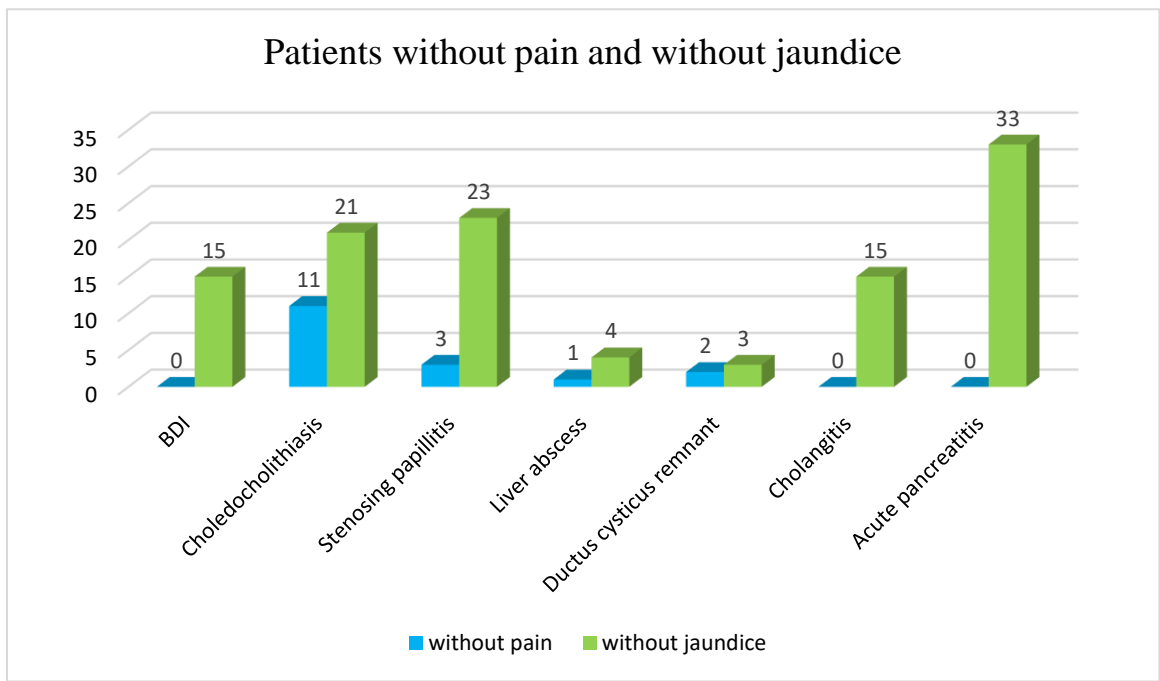
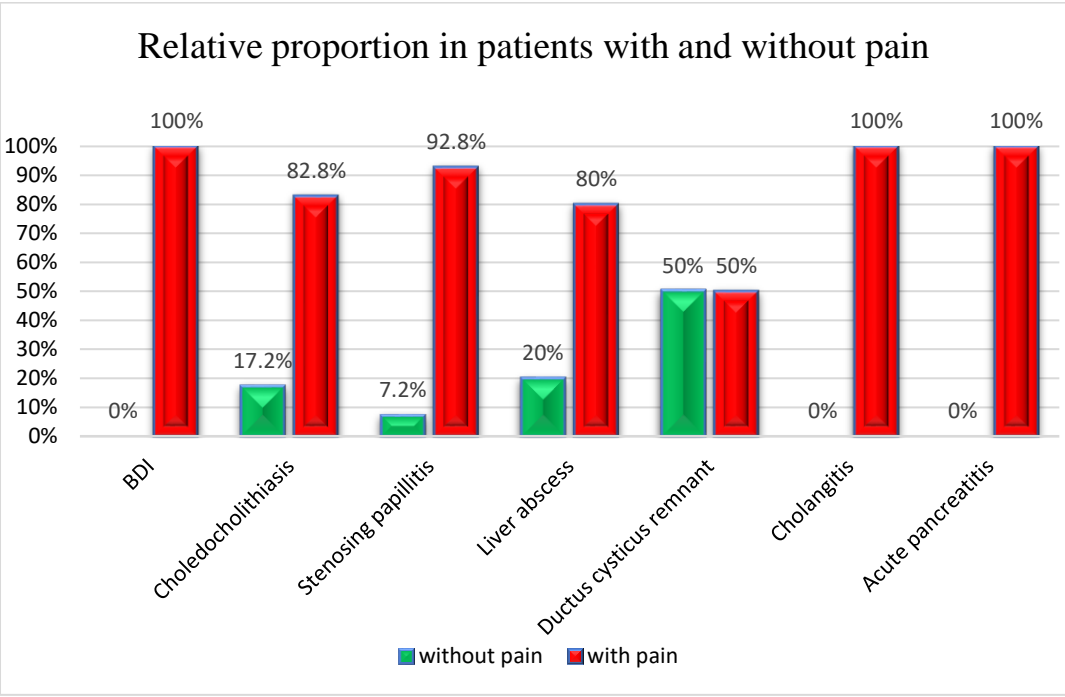
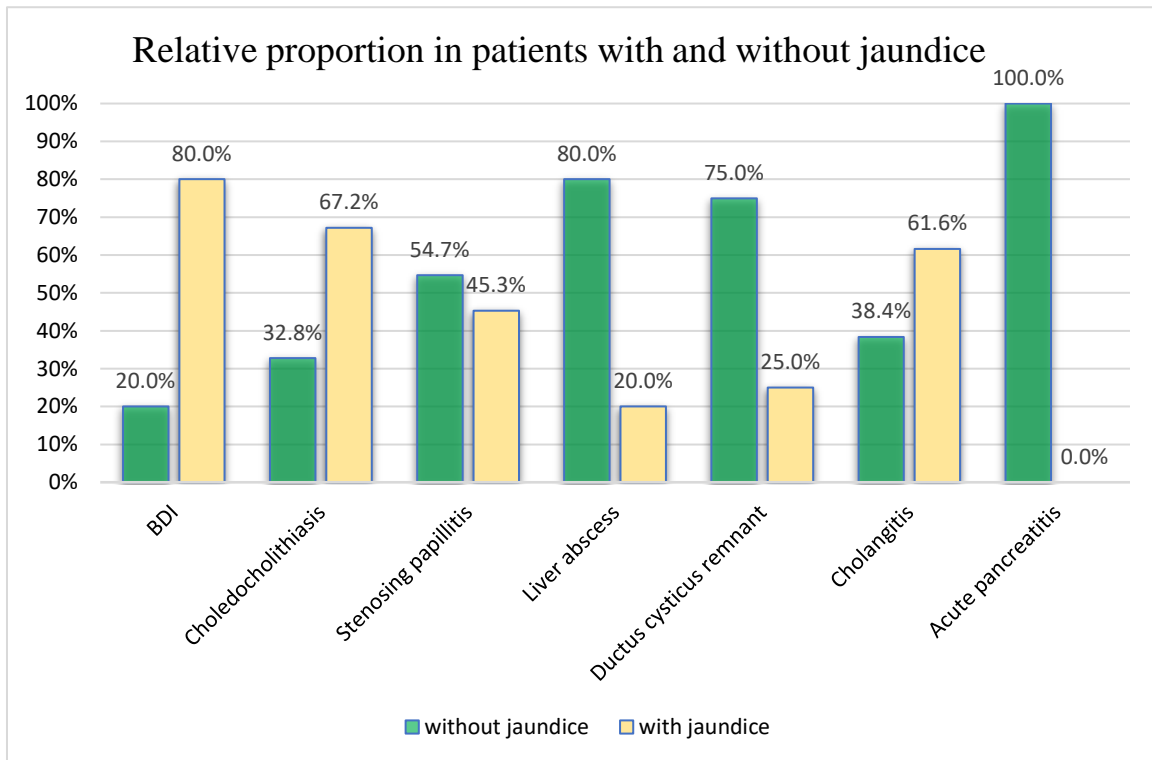


Fig.34 The correlation coefficient  $r = 0.132$  indicates a weak statistically significant direct relationship.

On figure 35 и 36 are presented the relative proportion of pain syndrome and icterus in patients with PCS. Fig. 36

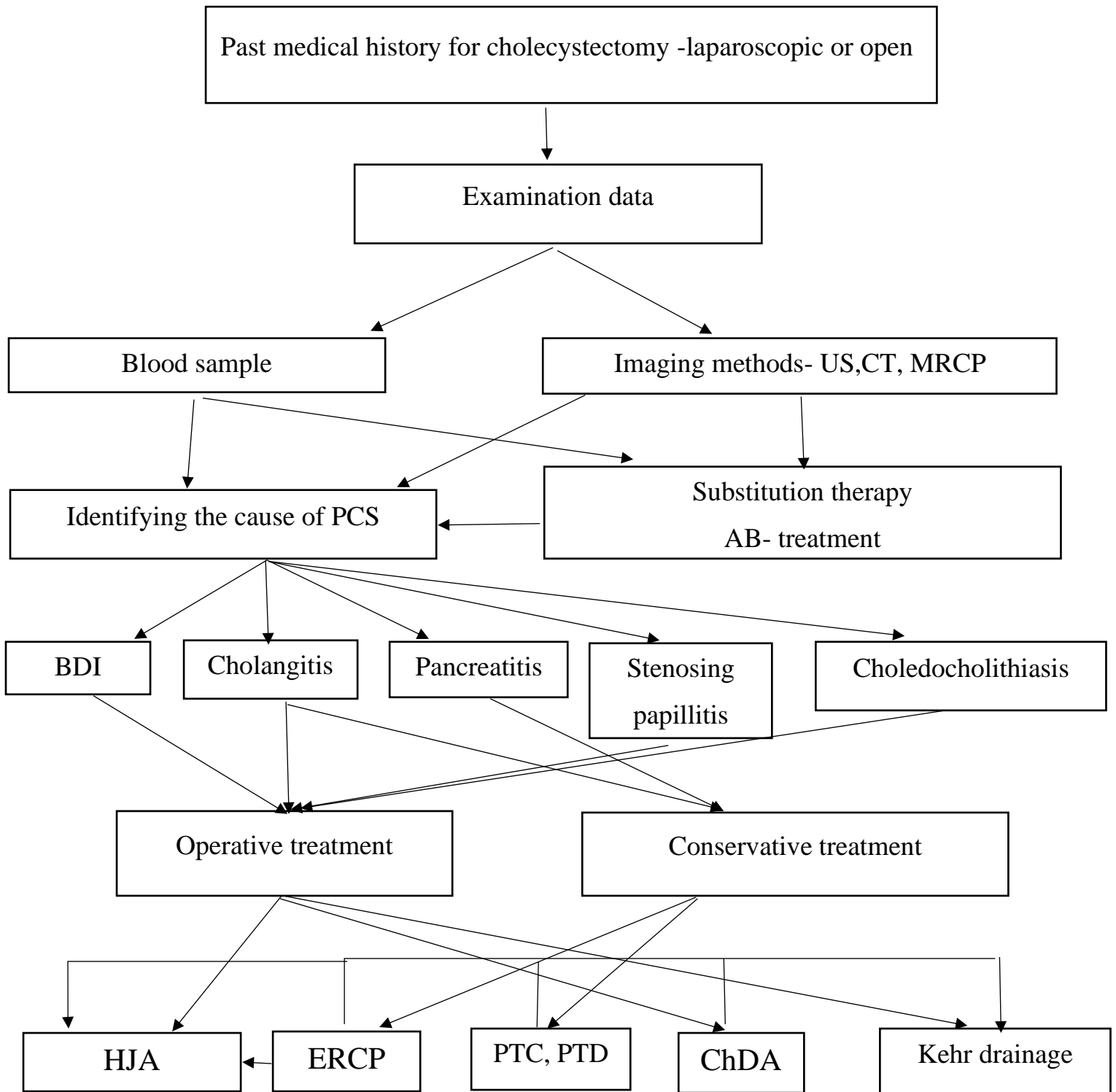


**Fig. 37**





## Diagnostic and therapeutic algorithm for the treatment of PCS



## CONCLUSIONS

1. The analysis of the literature has revealed that PCS is again become a actual problem, with the underlying cause being the wide application of laparoscopic cholecystectomy.

2. The results of the treatment of patients with PCS over a ten-year period showed that an individualized approach should be sought and chosen for each specific patient, with the best results in the surgical treatment of PCS, using external or internal biliary drainage.

3. BDI are a serious complication with an increasing incidence of great medical, social and economic importance.

4. The surgical techniques we applied provide longterm adequate biliary drainage and are characterized by low perioperative morbidity and lethality. At the same time, they provide a good quality of life for operated patients.

5. Internal biliary drainage is preferable to external biliary drainage. Endoscopic and minimally invasive procedures are applied early in the therapeutic process with subsequent surgical intervention if necessary.

6. The treatment of PCS requires an individualized multidisciplinary approach and a team of interventional radiologists, endoscopists, gastroenterologists and surgeons in specialized hepatobiliary centers.

## **STATEMENT OF CONTRIBUTIONS TO THE DISERTATION**

1. A ten-year retrospective analysis of patients with PCS was performed.
2. The place and role of interventional nonsurgical and endoscopic methods in the treatment of PCOS are clarified.
3. An algorithm for the treatment of patients with PCS was developed and applied in practice.
4. The results of the applied surgical techniques were analyzed, including long-term follow-up of the patients.
5. Current and accurate criteria for surgical management of patients with PCS have been established and introduced into the practice of the clinic.

## LIST OF PUBLICATIONS RELATED TO THE DISSERTATION:

1. Плачков И., Пл. Арнаудов, Пл. Чернополски, **В. Божков**, Кр. Георгиев, А. Лисничков, Т. Иванов, Д. Чаушев, Я. Стефанов, Р. Маджов Остър некротичен панкреатит - терапевтична стратегия. XV-Национален Конгрес по хирургия с международно участие. Сб.доклади под ред. на: Р. Маджов, Кр. Иванов, ISBN: 1314-297; т. I, стр. 58- 64.
2. Р. Маджов, Арнаудов П., **Божков В.**, Чернополски П., Плачков И. Ятрогенни лезии на жлъчните пътища – хирургична стратегия. XV-Национален Конгрес по хирургия с международно участие. Сб. доклади под ред. на: Р. Маджов, Кр. Иванов, ISBN: 1314-297; т. I, стр. 98- 105.
3. Чернополски П., Чаушев Д., **Божков В.**, Арнаудов П., Плачков И., Иванов Т., Лисничков А., Стефанов Я., Маджов Р. Синдром на Мирици. XV-Национален Конгрес по хирургия с международно участие. Сб. доклади под ред. на: Р. Маджов, Кр. Иванов, ISBN: 1314-297; т. I, стр 118- 124.
4. Д. Чаушев, П. Чернополски, **В. Божков**, П. Арнаудов, И. Плачков, Т. Иванов, А.Лисничков, Стефанов Я., Маджов Р. Усложнени форми на остър холецистит при възрастни пациенти. XV-Национален Конгрес по хирургия с международно участие. Сб. доклади под ред. на: Р. Маджов, Кр. Иванов, ISBN: 1314-297; т. I, стр 149- 155.
5. Р. Маджов, **В. Божков**, П. Чернополски И. Плачков - Усложнения след операции върху жлъчния мехур и билиарния тракт Плевен Национална конференция по хирургия с международно участие 31 май- 2 юни 2017г. гр. Плевен Сб. Доклади под ред. на акад. Д. Дамянов ISBN: 978-954-756-209-3 стр. 61-78.
6. Плачков И., А.Лисничков, Пл. Чернополски, В. Божков, Кр. Георгиев, Т. Иванов, В. Драганова, Р. Маджов - Постоперативни

пиогенни чернодробни абсцеси – стратегия за поведение -  
Национална конференция по хирургия с международно участие 31  
май- 2 юни 2017г. гр. Плевен Сб. Доклади под ред. на акад. Д.  
Дамянов ISBN: 978-954-756-209-3 стр. 143-148.

7. П. Чернополски, В. Драганова, Д. Чаушев, В. Божков, И. Плачков,  
Т. Иванов, А.Лисничков, Р. Маджов -Усложнения след  
холецистектомия Национална конференция по хирургия с  
международно участие 31 май- 2 юни 2017г. гр. Плевен Сб.  
Доклади под ред. на акад. Д. Дамянов ISBN: 978-954-756-209-3 стр.  
84-90.
8. Съвременен диагностичен и терапевтичен подход при пациенти с  
билиодигестивни фистули и билиарен илеус. - Д. Чаушев, В.  
Божков, Пл. Чернополски, И. Плачков, Я. Стефанов, В. Драганова,  
Т. Иванов, А. Лисничков, Хр. Ников, Р. Маджов. XVI Национален  
Конгрес по Хирургия Сб. Доклади ISSN 2603-4034 стр. 481 -488.
9. Хирургичен подход към пациентите с остър холецистит в  
напреднала и старческа възраст. Д. Чаушев; В. Божков; Пл.  
Чернополски; И. Плачков; Я. Стефанов; Т. Иванов; Ат. Лисничков;  
Р. Маджов. Списание "Хирургия" бр. 2/2018 ISSN 0450-2167, стр.  
80-87.
10. Постхолецистектомичен синдром – диагностика и терапевтична  
стратегия. В. Божков, П. Чернополски, Д. Чаушев, В. Драганова, А.  
Лисничков, Т. Иванов, Я. Стефанов, Р. Маджов. XVIII Национален  
Конгрес по хирургия с международно участие. Сб. Доклади ISBN-  
978-954-756-299-8, стр.514-520.