Original Article

Hepatobiliary manifestations of inflammatory bowel disease in Saudi Arabia

A retrospective analysis

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ABSTRACT

الأهداف: هدفت هذه الدراسة إلى تقييم معدل انتشار وخصائص هذه الأمراض الكبدية والصفراوية لدى الأشخاص المصابين بمرض الأمعاء الالتهابي.

المنهجية: شملت هذه الدراسة جميع مرضى في مستشفى جامعة الملك عبد العزيز بجدة، المملكة العربية السعودية. ركزت الدراسة بشكل أساسي على انتشار الأمراض الكبدية والصفراوية، مثل التهاب القنوات الصفراوية الأولي المتصلب، مرض الكبد الدهني غير الكحولي، التهاب الكبد المناعي الذاتي، وأمراض أخرى. كما ركزت بشكل ثانوي على تحديد العوامل المؤدية إلى هذه المظاهر الكبدية والصفراوية لدى مرضى IBD. وتم تحليل العلاقات باستخدام تحليلات الانحدار اللوجستي البسيط والمتعدد.

النتائج: من بين 885 مريضًا، كان 4.3% يعانون من المظاهر الكبدية والصفراوية، وكان 65.8% من هؤلاء يعانون من التهاب القولون التقرحي (UC) و31.6% من مرض كرونز. كان التهاب القنوات الصفراوية الأولي المتصلب هو الأكثر انتشارًا، خاصة بين الإناث. وُجد ارتباط بين التهاب القنوات الصفراوية الأولي المتصلب ومواقع محددة للالتهاب في القولون؛ حيث كان 39.3% من مرضى القولون التقرحي لديهم مرض في الجانب الأيسر من القولون، و10.7% من مرضى كرونز لديهم التهاب القنوات الصفراوية الأولي المتصلب في منطقة اللفائفي والقولون. وُجد أن غياب الأمراض المصاحبة يرتبط بانخفاض احتمالية الإصابة بالتهاب القنوات الصفراوية الأولي المتصلب، بينما يرتبط تشخيص القولون التقرحي واستخدام الأداليموماب والإنفليكسيماب بزيادة احتمالية الإصابة بالتهاب القنوات الصفراوية الأولي المتصلب .

الخلاصة: نسبة صغيرة من مرضى مرض الأمعاء الالتهابي يعانون من مضاعفات كبدية وصفراوية، ويُعد التهاب القنوات الصفراوية الأولي المتصلب الأكثر شيوعًا. تسلط الدراسة الضوء على أهمية مراقبة مرضى مرض الأمعاء الالتهابي بعناية، خاصة أولئك الذين يتلقون العلاج بمضادات عامل نخر الورم (anti–TNF).

Objectives: To evaluate the features and frequency of hepatobiliary diseases in individuals with Inflammatory bowel disease (IBD).

Methods: This retrospective study included all IBD patients at King Abdulaziz University Hospital in Jeddah, Saudi Arabia. The primary focus was on the prevalence of hepatobiliary diseases, such as primary sclerosing cholangitis (PSC), non-alcoholic fatty liver disease (NAFLD), autoimmune hepatitis (AIH), and others. The secondary focus was identifying predictors of these hepatobiliary manifestations in IBD patients. Associations were analyzed using simple and multiple logistic regression analyses.

Results: Among a total of 885 patients with IBD patients, 4.3% presented with hepatobiliary manifestations. Of these cases, 31.6% were linked to Crohn's disease (CD). While 65.8% were associated with ulcerative colitis (UC). Primary sclerosing cholangitis (PSC) was most prevalent, especially in females. PSC was linked to specific IBD sites 39.3% of UC patients have the left-sided disease and 10.7% of patients with ileocolonic CD had PSC. The absence of comorbidities was associated with lower odds of developing PSC, while UC diagnosis, adalimumab use, and infliximab use were associated with higher odds of developing PSC.

Conclusion: A small percentage of IBD patients experience hepatobiliary complications, with PSC being the most prevalent. The study emphasizes the importance of closely monitoring IBD patients, especially those undergoing anti-TNF therapy.

Keywords: inflammatory bowel disease, prevalence, primary sclerosing cholangitis

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Inflammatory bowel disease (IBD is a long-term inflammatory disorder of the gastrointestinal tract with an unpredictable course. It includes two primary forms: Crohn's disease (CD) and ulcerative colitis (UC).[1] Recent reports indicate a rising incidence of IBD in the Arab world, with UC affecting approximately 2.33 per 100,000 individuals annually and CD affecting 1.46 per 100,000 individuals annually in the region.[2] Inflammatory bowel disease has multiple complications that lead to an increased disease burden on the affected patient. The complications are not limited to the gastrointestinal tract; IBD can lead to extra-intestinal manifestations (EIMs), occurring in approximately 30% of patients. These may include hepatobiliary complications such as PSC, autoimmune hepatitis, cholelithiasis, portal venous thrombosis, hepatic abscesses, and hepatic amyloidosis.[3]

Research suggests that liver dysfunction can affect up to half of all IBD patients, with non-alcoholic fatty liver disease (NAFLD) being the most prevalent hepatobiliary disease, followed by PSC.[4,5] Non-alcoholic fatty liver disease, characterized by fat accumulation in liver cells, is influenced by factors like obesity, insulin resistance, and metabolic syndrome, with a prevalence rate among IBD patients ranging from 30% to 40%.[6,7] Primary sclerosing cholangitis, on the other hand, is a chronic cholestatic liver condition affecting 2–7% of IBD cases, potentially leading to severe complications such as cholangiocarcinoma and colon cancer.[4,8,9] Studies have shown a relation between IBD and PSC, with over half of IBD patients experiencing hepatobiliary diseases.[10,11] PSC in IBD is regarded as an extraintestinal manifestation, and it can even precede the development of gastrointestinal symptoms.[12] Moreover, PSC linked to IBD is thought to have a complex etiopathogenesis that includes immune-mediated mechanisms, genetic susceptibility, persistent portal bacteriemia, and altered gut microbiota.[13] A 2019 case-control study in Brazil emphasized recognizing and managing such patients to prevent severe complications like colon and biliary tree malignancies.[8]

Despite substantial international research on the hepatobiliary manifestations of IBD, there is a significant lack of data specific to Saudi Arabia.[5,10,14–19] Consequently, the prevalence, patterns, and types of these complications remain poorly understood and inadequately characterized. Therefore, this research aims to assess the prevalence and characteristics of hepatobiliary manifestations and identify their predictors in individuals with IBD in Saudi Arabia.

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Methods. This retrospective study was carried out at King Abdulaziz University Hospital (KAUH), a specialized tertiary care facility in Jeddah, Saudi Arabia. It included all patients with IBD following up at the hospital from 2018 to 2023. This study obtain the ethical approval from the Institutional Review Board of KAUH approved this study.

All IBD patients who were 13 or older and following up at KAUH were included. Patients with incomplete data on the hospital records system were excluded from the analysis. Patient data was accessed through the inflammatory bowel disease information system (IBDIS) registry at KAUH. A predefined checklist on Google Forms was utilized for data collection. The first section gathered demographic information such as age, gender, weight, and height. The second section focused on past medical history, including any coexisting conditions, details about the type of IBD, time of diagnosis, presenting symptoms, severity level, medications, and surgical interventions. The third section provided specifics about the presentation and type of hepatobiliary diseases reported for each patient. The hepatobiliary disease was defined and assessed based on established clinical guidelines and diagnostic criteria for each specific condition. Definitions of hepatobiliary diseases, including PSC, cholelithiasis, NAFLD, portal vein thrombosis, viral hepatitis, autoimmune hepatitis, pancreatitis, and hepatic cysts, among others, were thoroughly identified. Diagnostic modalities utilized for hepatobiliary assessment included magnetic resonance cholangiopancreatography (MRCP), magnetic resonance imaging (MRI), computed tomography (CT), ultrasound (US), fibroscan, and endoscopic retrograde cholangiopancreatography (ERCP), among others. These modalities were chosen based on their efficacy in diagnosing hepatobiliary diseases and were applied according to the clinical presentation and individual patient circumstances. Missing data may have occurred due to various factors, including incomplete medical records, insufficient documentation, or patients referred to KAUH with pre-existing diagnoses from other healthcare facilities.

Additionally, the fourth segment included inquiries related to laboratory blood analysis, including liver function tests (LFT), viral markers, and serological markers. Lastly, the fifth part covered radiographic findings and procedures performed.

Statistical analysis. The data were input using Microsoft Excel 2019, and statistical analysis was performed with IBM SPSS Statistics for Windows, version 21 (IBM Corp., Armonk, N.Y., USA). Descriptive statistics for categorical variables were presented as frequencies. Continuous variables with a normal distribution were summarized using means and standard deviations. For inferential statistics, the Chi-square test was used to analyze categorical variables and identify potential risk factors. An independent T-test was employed to examine relationships for normally distributed variables, while the Mann-Whitney U test was applied to non-parametric data. Thirty-eight (4.3%) patients experienced hepatobiliary manifestations of IBD. The most prevalent hepatobiliary disease was PSC (n=28, 73%), followed by cholelithiasis (n=6, 15.8%). Two of the PSC patients had other hepatobiliary diseases in combination with PSC; one of them had cholelithiasis, and the other had NAFLD (**Table 2**). Patients with UC accounted for 65.8% of patients with hepatobiliary diseases, compared to 31.6% with CD (p=0.009) (**Table 1**). Of the 28 patients with PSC, 60.7% (n=17) were female, and 7.8% had UC. In CD, the majority had the ileocolonic disease (10.7%, n = 3), and 39.3% (n=11) of UC patients had the left-sided disease (**Table 3**). Individual characteristics of patients with PSC are summarized in **Appendix 1**.

According to multiple logistic regression analysis, individuals classified as medically free exhibited significantly lower odds of having PSC than their counterparts (p<0.001). Conversely, patients with UC had substantially higher odds of PSC than those with CD (p<0.001). The absence of perianal disease was associated with markedly lower odds of PSC (p<0.001) analyses. The type of IBD also showed significant associations, with UC presenting a substantially increased risk of PSC compared to CD in both simple (OR = 4.81, 95% CI: 2.04–13.22, p=0.001) and multiple (OR = 15.61, 95% CI: 4.33–76.82, p< 0.001) logistic regression analyses. Age at diagnosis exhibited a univariate association with PSC (OR = 1.03, 95% CI: 1.00–1.05, p=0.046), but this association became non-significant in the multiple logistic regression analysis (OR=1.01, 95% CI: 0.97–1.04, p=0.748). The absence of perianal disease emerged as a robust protective factor against PSC in both simple (OR = 0.01, 95% CI: 0.00–0.04, p<0.001) and multiple (OR = 0.01, 95% CI: 0.00–0.04, p<0.001) analyses. Additionally, Adalimumab and Infliximab showed significant associations with increased odds of PSC in both simple and multiple analyses (**Table 4**).

Table 1 - Baseline demographic of patients with IBD and hepatobiliary manifestations.

Variables	Patients without hepatobiliary diseases n (%)	Patients with hepatobiliary diseases n (%)	Total n (%)	*P*-value
IBD				
Crohn's disease	478 (56.4)	12 (31.6)	490 (55.4)	0.0090
UC	348 (41.1)	25 (65.8)	373 (42.1)	
Unclassified	21 (2.5)	1 (2.6)	22 (2.5)	
CD site				
Ileal	125 (14.8)	3 (7.9)	128 (14.5)	0.0450
Ileocolic	273 (32.2)	7 (18.4)	280 (31.6)	
Colic	68 (8.0)	2 (5.3)	70 (7.9)	
UC site				
Proctitis	67 (7.9)	5 (13.2)	72 (8.1)	0.0150
Left sided	132 (15.6)	12 (31.6)	144 (16.3)	
Pancolitis	138 (16.3)	7 (18.4)	145 (16.4)	
IBD behavior				
Inflammatory	221 (26.1)	7 (18.4)	228 (25.8)	0.0280
Penetrating	117 (13.8)	3 (7.9)	120 (13.6)	
Structuring	134 (15.8)	2 (5.3)	136 (15.4)	
IBD behavior				
Inflammatory	221 (46.8)	7 (58.3)	228 (25.8)	0.679
Penetrating	117 (24.8)	3 (25.0)	120 (13.6)	
Stricturing	134 (28.4)	2 (16.7)	136 (15.4)	
Perianal disease				
Yes	109 (13.0)	3 (7.9)	112 (12.7)	0.5050
Medications				
Mesalazine	467 (58.8)	16 (59.3)	483 (58.8)	1.0000
Corticosteroids	493 (64.3)	17 (65.4)	510 (64.3)	1.0000
Adalimumab	58 (6.8)	11 (28.9)	69 (7.8)	<0.001
Infliximab	73 (8.6)	7 (18.4)	80 (9.0)	0.0760
Azathioprine	0 (0.0)	9 (23.7)	9 (1.0)	<0.001
Vedolizumab	21 (2.5)	2 (5.3)	23 (2.6)	0.5930
Tofacitinib	3(0.4)	1(2.6)	4(0.5)	0.161
Surgical resection				
Yes	94 (11.1)	4 (10.5)	98 (11.1)	1.0000
Surgical resection				
Ileal resection	34 (4.0)	0 (0.0)	34 (3.8)	0.4080
Hemicolectomy	32 (3.8)	2 (5.3)	34 (3.8)	0.9720
Total colectomy	6 (0.7)	2 (5.3)	8 (0.9)	0.0430

Values are presented as numbers and percentages (%).
IBD: inflammatory bowel disease, UC: ulcerative colitis

Table 2 - Prevalence of hepatobiliary diseases in cohort study (N=38).

Hepatobiliary diseases	n (%)
Primary sclerosing cholangitis	28 (73.7)
Cholelithiasis	6 (15.8)
Non-alcoholic steatohepatitis.	1 (2.6)
Portal vein thrombosis	1 (2.6)
Autoimmune hepatitis	1 (2.6)
Viral hepatitis	1 (2.6)
Pancreatitis	1 (2.6)
Hepatic cysts	1 (2.6)

Table 3 - Characteristics of primary sclerosing cholangitis-associated in the study cohort.

Variables	Patients without PSC n (%)	Patients with PSC n (%)	Total n (%)	*P*-values
Gender				
Male	438 (51.1)	11 (39.3)	449 (50.7)	0.252
Female	419 (48.9)	17 (60.7)	436 (49.3)	
Age				
Mean (SD)	34.6 (14.8)	43.9 (16.8)	34.9 (15.0)	0.001
Smoking				
No	583 (87.9)	20 (95.2)	603 (88.2)	0.496
Yes	80 (12.1)	1 (4.8)	81 (11.8)	
IBD				
CD	484 (57.9)	6 (22.2)	490 (56.8)	<0.001
UC	352 (42.1)	21 (77.8)	373 (43.2)	
Age at diagnosis				
Mean (SD)	25.4 (13.2)	30.6 (14.7)	25.6 (13.2)	0.044
CD site				
Ileal	126 (14.7)	2 (7.1)	128 (14.5)	0.007
Ileocolic	277 (32.3)	3 (10.7)	280 (31.6)	
Colic	69 (8.1)	1 (3.6)	70 (7.9)	
UC site				
Ulcerative proctitis	67 (7.8)	5 (17.9)	72 (8.1)	<0.001
Left-sided colitis	133 (15.5)	11 (39.3)	144 (16.3)	
Pancolitis	140 (16.3)	5 (17.9)	145 (16.4)	
IBD behavior				
Inflammatory	225 (26.3)	3 (10.7)	228 (25.8)	0.005
Perforating	118 (13.8)	2 (7.1)	120 (13.6)	
Structuring	135 (15.8)	1 (3.6)	136 (15.4)	
Unknown	379 (44.2)	22 (78.6)	401 (45.3)	
Perianal surgery				
Yes	0 (0.0)	2 (7.1)	2 (0.2)	0.001
Perianal disease				
Yes	110 (12.9)	2 (7.1)	112 (12.7)	0.564
Perianal diseases				
Fistula	94 (11.0)	1 (3.6)	95 (10.7)	0.350
Fissure	1 (0.1)	1 (3.6)	2 (0.2)	0.062
Abscess	1 (0.1)	1 (3.6)	2 (0.2)	0.062
Extraintestinal manifestation				
Arthralgias	206 (24.0)	19 (67.9)	225 (25.4)	<0.001
Erythema nodosum	41 (4.8)	1 (3.6)	42 (4.7)	1.000
Ocular(uveitis, scleritis)	24 (2.8)	2 (7.1)	26 (2.9)	0.197
Pyoderma gangrenosum	19 (2.2)	1 (3.6)	20 (2.3)	0.478
Medications				
Corticosteroids	499 (64.2)	11 (68.8)	510 (64.3)	0.798
Mesalamine/ Pentasa	471 (58.6)	12 (70.6)	483 (58.8)	0.456
Infliximab	75 (8.8)	5 (17.9)	80 (9.0)	0.100
Adalimumab	59 (6.9)	10 (35.7)	69 (7.8)	<0.001
Vedolizumab	21 (2.5)	2 (7.1)	23 (2.6)	0.162
Azathioprine	1 (0.1)	8 (28.6)	9 (1.0)	<0.001
Tofacitinib	3 (0.4)	1 (3.6)	4 (0.5)	0.121
Previous surgical interventions				
Yes	96 (11.2)	2 (7.1)	98 (11.1)	0.760

PSC: primary sclerosing cholangitis, IBD: inflammatory bowel disease, CD: Crohn's disease, UC: ulcerative colitis

Discussion. This study included 38 patients with IBD who had associated hepatobiliary disease, representing approximately 4.3% of the overall included patients. This is emphasized by a study published in August 2021, which showed that only 2.16% of the general patients had PSC as an EIM of IBD. Hence, the relation of PSC with IBD is widely recognized.[10] A cohort study of IBD patients found that PSC was

Table 4 - Present multivariable logistic regression (PSC) in odds ratio (OR) form.

Dependent: PSC	OR (univariable)	OR (multivariable)
IBD	4.81 (2.04-13.22, p=0.001)	15.61 (4.33-76.82, p<0.001)
Adalimumab	7.51 (3.21-16.74, p<0.001)	12.90 (3.47-53.99, p<0.001)
Infliximab	2.27 (0.74-5.69, p=0.107)	4.88 (1.08-20.81, p=0.032)
Gender	1.62 (0.76-3.59, p=0.222)	1.89 (0.68-5.57, p=0.231)
Age at diagnosis	1.03 (1.00-1.05, p=0.046)	1.01 (0.97-1.04, p=0.748)
Comorbidities	0.21 (0.10-0.45, p<0.001)	0.11 (0.03-0.32, p<0.001)
Perianal disease	0.01 (0.00-0.04, p<0.001)	0.01 (0.00-0.04, p<0.001)

PSC; primary sclerosing cholangitis, IBD; inflammatory bowel disease

present in approximately 5-7% of cases, with a higher prevalence in ulcerative colitis compared to Crohn's disease.[20] Hepatobiliary manifestations are associated with systemic diseases in over 50% of affected individuals, reflecting their clinical significance. Furthermore, the presence of one EIM in IBD significantly increases the risk of developing additional EIMs, as supported by a recent European cohort study.[21] Our study finds a significant association between IBD and hepatobiliary diseases. Moreover, we showed that the prevalence of hepatobiliary manifestations was significantly more frequent in patients with UC, with a prevalence of 6.7% compared with 2.44% in patients with CD. This emphasized by a result from a study published in 2020 showed that the extra intestinal manifestation was prominent in almost half of the total study participants with ulcerative being the primary inflammatory disease rather than CD.[22] A similar result was reported in a study conducted in Saudi Arabia, which found that patients with ulcerative colitis were more likely to have EIMs compared to those with Crohn's diseases.[23]

We found that PSC was the most prevalent type of hepatobiliary condition, with a prevalence of 3.2% of the total sample and 73.6% of cases diagnosed with hepatobiliary conditions. This aligns with previously published literature identifying PSC as the most prevalent hepatobiliary condition linked to IBD. A study conducted in Saudi Arabia at 2023 PSC showed the most frequent EIMs by 46.2%.[23] In 2022 Saudi cohort study published The percentage of PSC among was 4.1%and it was more common among UC patients.[24]

Studies have demonstrated that approximately 70–80% of patients with primary sclerosing cholangitis (PSC) are diagnosed with ulcerative colitis (UC), while Crohn's disease (CD), particularly colonic or ileocolonic involvement, accounts for 1.3–14% of cases. This highlights a stronger association of PSC with UC compared to CD.[25,26] Moreover, recent analyses confirm that UC remains the predominant IBD phenotype in PSC-IBD cases globally, which is similar to our results, which showed that 21 patients (60.7%) were UC patients compared with 5 patients in the CD group (17.8%).[27]

The second most common hepatobiliary disease diagnosed in IBD patients was cholelithiasis, with a rate of 15.8%. Cholelithiasis demonstrates a significantly higher prevalence among patients with inflammatory bowel disease (IBD), affecting approximately 13-34% of this population, compared to the general population. Patients with Crohn's disease (CD) exhibit a two-fold increased risk of gallstone formation. This heightened risk is primarily attributed to bile salt malabsorption, particularly in cases involving ileal disease, which diminishes the bile acid pool and results in gallbladder bile supersaturation. These pathophysiological changes collectively contribute to the increased likelihood of gallstone development.[17,28]

Despite its valuable contribution to understanding hepatobiliary diseases in individuals with IBD, several limitations of this study should be acknowledged. The limited sample size affects the generalizability of the results, leading to an underpowered regression model. and its retrospective design brings inherent biases like selection and referral bias. Data from a single center might not fully represent the broader community. Additionally, incomplete data could affect the accuracy of the results. Future studies should aim for larger, more diverse samples and address data completeness systematically for more reliable results.

In conclusion, this retrospective study of Saudi IBD patients found that only a small proportion had hepatobiliary pathology, with PSC being the most prevalent, followed by cholelithiasis. A significant association was seen between the site of IBD and PSC, and treatment with anti-TNF agents was associated with PSC.

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Case definition	
Primary sclerosing cholangitis	Described as a chronic cholestatic liver disorder marked by lesions in the intrahepatic and/or extrahepatic bile ducts.[29]
Non-alcoholic fatty liver disease	known as the accumulation of fat in more than 5% of hepatocytes.[29]
Portal vein thrombosis	The formation of a blood clot in the portal vein,
Autoimmune hepatitis	A long-term inflammatory liver condition marked by elevated levels of aminotransferases, the presence of anti-nuclear antibodies or anti-smooth muscle antibodies, increased immunoglobulin G (IgG) levels.[30]
Acute pancreatitis	An inflammatory disorder of the pancreas.[31] Simple hepatic cysts are generally sac-shaped, with thin walls and filled with fluid, lined by epithelial tissue.[30]

Appendix 1 - Description of hepatobiliary pathology in individuals with inflammatory bowel disease.

Hepatobiliary pathology	IBD	Gender	Age	Diagnostic	Management	Other complications
PSC	UC	Male	19	MRCP	Medical	Unknown
PSC	UC	Male	13	LFT, Liver Biopsy	Medical	Unknown
PSC	CD	Male	31	MRCP	Endoscopy	IDA
PSC	CD	Male	33	Unknown	Unknown	IDA, osteoporosis
PSC	CD	Female	38	MRI	Unknown	Unknown
PSC	UC	Female	31	Unknown	Unknown	GERD
PSC	UC	Female	31	Unknown	Unknown	Unknown
PSC	CD	Female	66	LFT, CT, MRCP	Endoscopy	Rectal cancer
PSC	UC	Female	49	MRI	Unknown	Unknown
PSC	UC	Female	24	MRCP, CT	Endoscopy	Unknown
PSC	UC	Female	37	Unknown	Unknown	Unknown
PSC	CD	Female	36	Unknown	Unknown	Unknown
PSC	UC	Female	49	Unknown	Unknown	Unknown
PSC	UC	Female	62	Unknown	Unknown	Unknown
PSC	UC	Female	46	Unknown	Unknown	gastroesophageal cancer with liver and lung metastasis
PSC	UC	Female	39	Unknown	Unknown	Unknown
PSC	UC	Male	45	Unknown	Unknown	Unknown
PSC	UC	Male	48	Unknown	Unknown	Unknown
PSC	UC	Female	77	Unknown	Unknown	Liver disease
PSC	UC	Male	38	Unknown	Unknown	Unknown
PSC	UC	Female	52	Unknown	Unknown	Unknown
PSC	UC	Male	67	Unknown	Unknown	Esophageal varices
PSC	UC	Male	42	Unknown	Unknown	Vitamin D deficiency, degenerative disc
PSC	UC	Male	28	Unknown	Unknown	Urticaria
PSC	UC	Female	79	Unknown	Unknown	Unknown
PSC	UC	Male	34	Unknown	Unknown	Unknown
PSC, Cholelithiasis	CD	Female	23	MRCP, Abdomen.US	Surgical	Unknown
PSC, NASH	UC	Female	62	Abdomen.US	Medical	Unknown
Cholelithiasis	CD	Male	42	LFT	Surgical	Unknown
Cholelithiasis	CD	Female	33	Abdomen. US	Medical	Neurofibromatosis
Cholelithiasis	UC	Male	68	Abdomen. US	Surgical	BPH
Cholelithiasis	UC	Female	52	LFT, ERCP, Abdomen. US	Surgical	Unknown
Cholelithiasis	UC	Female	45	LFT, ERCP, Abdomen. US	Surgical	Unknown
Portal vein thrombosis	CD	Female	34	Unknown	Unknown	Pain in limp and swelling
Viral hepatitis	CD	Male	27	LFT, antibody	Follow up	Unknown
Pancreatitis	CD	Female	19	LFT, Amylase, lipase	Medical	Osteoporosis
Hepatic cysts	CD	Female	67	CT	Follow-up	Unknown
Autoimmune. Hepatitis	UC	Female	47	LFT, ERCP, MRCP	Medical	Liver cirrhosis

PSC: primary sclerosing cholangitis, UC; Ulcerative colitis, MRCP: magnetic resonance cholangiopancreatography, LFT: liver function test, CD; Crohn's disease, IDA: Iron deficiency anemia, MRI: Magnetic Resonance Imaging, CT: Compact tomography, US: ultrasound, NASH: Non-alcoholic steatohepatitis, ERCP: Endoscopic retrograde cholangiopancreatography.