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The impact of a multidisciplinary team evaluation on the diagnosis and management of acute and chronic pancreatitis in a tertiary referral center

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Abstract

Background: Multidisciplinary team meetings (MTM) are crucial in benign conditions such as acute pancreatitis (AP) and chronic pancreatitis (CP). Our aim was to evaluate the impact of MTM on the diagnosis and management of AP and CP in a tertiary referral center.

Research design and methods: This retrospective study analyzed 232 patients with AP/CP discussed with biweekly MTM (10/2020–06/2024). The patients were classified according to etiology or complication management, recording diagnostic and therapeutic outcomes over six months.

Results: Of 536 referred patients, 232 were analyzed (142 AP, 90 CP). In AP subgroup, MTM revised etiology in 34.4% of cases and identified a cause in 45.5% of idiopathic AP. MTM also ensured successful management of AP complications in 100% of cases, including endoscopic or surgical interventions for pseudocysts and walled-off necrosis. In CP, the diagnosis was revised in 38.9%, with a cause identified in 45.5% of idiopathic cases. MTM effectively guided CP complication management, with 55% of cases managed surgically and 10% endoscopically. MTM identified 6 cases of low-grade pancreatic intraepithelial neoplasia and 9 previously undiagnosed pancreatic ductal adenocarcinomas (PDAC) across both cohorts.

Conclusions: In high-volume centers, MTM enhance diagnostic accuracy and optimize the tailored management of benign pancreatic diseases.

Keywords: Acute pancreatitis; Chronic pancreatitis; Diagnostic accuracy; Multidisciplinary team meeting; Pancreatic ductal adenocarcinoma

1. Introduction

Multidisciplinary team meetings (MTM) are a vital component of modern healthcare, particularly for managing oncological patients [1]. Systematic reviews in recent years have shown that case discussions on MTM lead to improved outcomes, such as higher adherence to established treatment guidelines, more accurate diagnoses, better cancer staging, advancements in surgical techniques, and fewer treatment delays [2,3]. Most studies in this area have focused on cancers such as breast, lung/thoracic, head/neck, or gastrointestinal cancers [4,5]. However, the management of pancreatic diseases is often complex and requires a collaborative approach involving radiologists, gastroenterologists, oncologists, surgeons, nuclear medicine specialists, and pathologists. As a result, studies on the role of MTM in pancreatic neoplasms have been published [6,7]. Yet, research on MTM in the management of benign pancreatic diseases, particularly acute or chronic pancreatitis, remains limited.

Acute and chronic pancreatitis are the third most common gastrointestinal disorders requiring hospital admission and thirty-day readmissions in the United States [8]. A recent meta-analysis showed a steady increase in acute pancreatitis incidence over the past 56 years in most Western countries [9]. Current estimates indicate chronic pancreatitis occurs at a rate of 4.4 to 14 cases per 100,000 people, with a prevalence ranging from 36.9 to 52.4 cases per 100,000 individuals [10].

Given the significant heterogeneity of both acute and chronic pancreatitis and their associated complications, it is evident that their management requires a collaborative approach across multiple medical disciplines [11]. Major errors in the management of acute and chronic pancreatitis include overlooking the underlying etiology, such as pancreatic ductal adenocarcinoma (PDAC). Additionally, rapidly evolving diagnostic and therapeutic procedures, including advanced endoscopic techniques, are available for these patients [12,13]. These interventions carry notable risks, making prior deliberation in MTM, with approval from all relevant stakeholders essential, especially for non-malignant conditions. Recent guidelines emphasize the importance of high-volume centers and recommend multidisciplinary management of complex acute [14–16] and chronic pancreatitis [17,18] cases in specialized referral centers.

The primary aim of this study was to evaluate the impact of MTM on the diagnosis and treatment of acute pancreatitis (AP) and chronic pancreatitis (CP) in a tertiary referral center for pancreatic diseases.

2. Materials and Methods:

2.1 Setting/Study population

The MTM for benign pancreatic conditions is held biweekly at our tertiary care pancreatic center institution in San Raffaele Hospital, Milan (Italy). Each session typically included 10–15 patients diagnosed with pancreatic cystic lesions, pancreatic inflammatory diseases, or indeterminate pancreatic masses. These meetings involved experts from various disciplines including gastroenterologists with specific expertise in advanced pancreatobiliary endoscopy, immunologists, surgeons, pathologists, and radiologists with specific expertise in pancreatic disorders.

Patients referred to the MTM were either first seen as inpatients or outpatients by medical staff working in our Pancreas Center or referred to the outpatient clinics of our center from other Italian hospitals for a second opinion. As part of the approved observational biobank protocol BIO-PANCREAS (code IRB 96/INT/2021) conducted within the Pancreas Translational and Clinical Research Center of the San Raffaele Hospital, Milan (Italy), and upon informed consent, data were obtained through direct interviews and from medical records.

A concise presentation of the patients was meticulously prepared, including the clinical history, laboratory tests, imaging, and endoscopic examinations. MTM was conducted in a room where all participants could view and comment on the radiological and endoscopic images, with the possibility of joining the discussion online throughout the verified connection. Disputes arising during the discussion were resolved by reaching a consensus.

Following multidisciplinary discussion, a possible diagnostic or therapeutic plan is proposed, which is potentially re-appraisable with further laboratory, radiological, or endoscopic investigation. All recommendations provided collectively by the MTM are documented, and a comprehensive official report is generated. A case manager is responsible for reaching out to the patient to communicate the results and organize additional procedures when needed.

2.2 Data Collection and Analysis

This is a retrospective, single-center, observational study based on data derived from a prospectively maintained database. We screened all patients with AP and CP discussed at the MTM between October 2020 and June 2024 with at least a 6-month follow-up. Patients referred for MTM for pancreatic cystic lesions, non-pancreatic inflammatory diseases, or those lost to follow-up after the MTM decision were excluded from this analysis.

Patients were initially categorized into AP and CP subgroups and further subdivided based on the specific clinical problem driving the need for MTM discussion: a) etiology of AP, b) treatment of AP complications, c) etiology of CP, and d) treatment of CP complications.

Regarding the etiology of AP, we categorized suspected etiologies as follows: autoimmune (AIP), biliary, triglyceride-induced, hypercalcemia-induced, adenocarcinoma-related, genetic, drug-induced, divisum-associated, toxic (alcohol or smoking), and otherwise idiopathic. Similarly, in the etiology of the CP subgroup, we categorized the patients based on the underlying causes of CP, which included toxic, idiopathic, genetic, autoimmune, recurrent, obstructive, and potentially contributing anatomical abnormalities, such as pancreas divisum.

The diagnosis of AP was established according to the revised Atlanta criteria, requiring at least two of the following: typical abdominal pain, serum amylase/lipase ≥3× ULN, or consistent imaging findings [19]. Biliary etiology was defined by the presence of gallstones or sludge in the gallbladder or common bile duct and/or ALT ≥3× ULN in the absence of other causes; in uncertain cases, EUS was performed to confirm microlithiasis or choledocholithiasis. Hypertriglyceridemia-induced AP was defined as serum triglycerides

>1000 mg/dL, or >500 mg/dL in the absence of other causes in patients with a history of hypertriglyceridemia. AIP was suspected in the presence of elevated IgG4 and/or typical imaging findings and confirmed according to ICDC criteria [20]. Genetic pancreatitis was diagnosed in the presence of pathogenic variants (PRSS1, SPINK1, CFTR, CTRC, CPA1) identified on panel testing. Toxic pancreatitis was defined by a history of significant alcohol consumption or smoking, while drug-induced AP was diagnosed when a temporal association with drug intake was established after exclusion of other causes. Idiopathic AP was diagnosed when no etiology could be identified despite a comprehensive evaluation.

Patients presenting with complications of acute pancreatitis, including pancreatic pseudocysts (PPC), walled-off necrosis (WON), duodenal stenosis, common bile duct (CBD) stenosis, or pancreatic duct (PD) lithiasis, were evaluated in the MTM to decide on their management.

We reported whether the final proposed treatment (surgical, endoscopic, or follow-up) was conclusive or not. Complications associated with CP were classified into distinct categories, encompassing conditions such as suspected solid malignant focal lesions, PD/CBD stenosis, duodenal stenosis, and vascular thrombosis.

For all four groups, we recorded data regarding the need to perform multiple discussions and whether additional examinations were requested, such as computed tomography (CT), magnetic resonance imaging (MRI), positron emission tomography (PET), endoscopic ultrasound (EUS), upper gastrointestinal endoscopy (EGDS), colonoscopy, or endoscopic retrograde cholangiopancreatography (ERCP).

Finally, we documented the final decision, and as for the etiology assessment, we verified whether the initially suggested diagnosis was confirmed or if an alternative diagnosis emerged after MTM discussion. Regarding the therapeutic subgroups, we assessed whether the approach proposed by the MTM solved this problem during follow-up.

Continuous variables are reported as medians with interquartile ranges (IQR), while categorical variables are expressed as frequencies and percentages.

3. Results

Between October 2020 and June 2024, a total of 536 patients were discussed in the pancreatic benign disease MTM at our hospital, amounting to 971 discussions (mean: 2 discussions per patient). Of these, 304 (56.7%) were excluded from the present analysis because of referral for pancreatic cystic lesions, non-pancreatic inflammatory diseases, or loss to follow-up. Finally, 232 patients (142 with AP and 90 with CP) were included in the present analysis, as depicted in **Figure 1**. The median age of the cohort was 55 years (IQR: 44.9–68.1), with 146 out of 232 patients (62.9%) being male (**Table 1**). Re-discussion occurred in 37/143 (25.9%) AP cases (12/93 for etiology and 25/50 for treatment) and 31/90 (34.4%) CP cases (4/16 for etiology and 27/74 for treatment). Nearly half of the patients were referred for MTM from other institutions (118 patients; 50.8%) or from a hospital in a region other than Lombardy (106 patients; 45.7%). In our institution, a slight majority of AP (72/142, 50.7%) and CP cases (48/90, 53.3%) were presented at the MTM by surgeons, followed by gastroenterologists.

3.1 Acute Pancreatitis subgroup

One hundred and forty-three patients were enrolled in the AP subgroup, with 93 (65%) discussed regarding their etiology and 50 (35%) regarding treatment of complications.

Before engaging in MTM discussions, the prevailing initial etiology of AP included suspected AIP (53 patients, 57%) and idiopathic pancreatitis (22 patients, 23.7%). A small proportion of the cases involved suspected biliary causes (6 cases; 6.6%), genetic factors (2 cases; 2.2%), suspected neoplasm (4 cases; 4.4%), and a single suspicion of a toxic etiology (1.4%). In one case (1%), a multifactorial etiology (AIP plus pancreas divisum) was suspected. Fourty-six patients (49.5%) experienced at least one recurrent episode.

Upon revision during the MTM of the clinical history, endoscopic/radiological examinations, and laboratory tests, the clinical suspicion changed from the original suspicion in 34.4% of the cases (32 patients) (**Figure 2**). Specifically, out of 53 cases of suspected AIP, the diagnosis was changed in 28.3% (15 patients). The etiological suspicion was altered upon review of the documentation in four idiopathic cases, two cases of pancreas divisum, two cases of suspected biliary etiology, one case of PDAC, one case of genetic etiology, one case of toxicity, and one infectious case. In four cases, the diagnosis of acute pancreatitis was not confirmed. Considering the management of patients with AIP during the MTM discussion, 24 steroid trials, 1 endoscopic treatment, and 33 imaging repetitions (including 20 MRI scans, 1 PET scan, 3 colonoscopies, and 11 EUS) were suggested. Among the 22 AP cases initially considered idiopathic, three were diagnosed with AIP, one was caused by hypercalcemia, seven had a genetic etiology, one was diagnosed with PDAC, one was considered drug-related (ezetimibe), one was infectious, and eight remained undetermined. Ten patients continued with periodic clinical and laboratory follow-up; in three patients, genetic panel testing was indicated, and one patient was requested to undergo histological slide reassessment at our center.

Subsequently, following additional investigations suggested by the MTM, the final diagnosis underwent further changes in 36.5% of cases. At the end of the required diagnostic investigations, the etiologies that most frequently changed were AIP (from 53 to 37 patients, with a reduction of 30.2%), genetic (from 2 to 0 patients, with a reduction of 100%), PDAC (from 4 to 2, with a reduction of 50%), and biliary (from 6 to 4, with a reduction of 33.3%). Among the initial 22 idiopathic cases, only 12 remained undetermined following MTM recommendations. The remaining cases were diagnosed as follows: three AIP, one biliary, one triglyceride-related, one drug-related, one infectious and one caused by hypercalcemia. Remarkably, this diagnostic refinement also led to the identification of two previously overlooked PDAC cases, whereas none of the seven genetically suspected cases was confirmed by MTM.

The treatment of AP complications was discussed in 50 patients referred to MTM. Most patients were evaluated for potential treatment of pseudocysts (PPC, 19 patients, 38%) or walled-off necrosis (WON, 16 patients, 32%). The remaining cases included duodenal stenosis (1 patient, 2%), common bile duct (CBD) stenosis (3 patients, 6%), combined duodenal and CBD stenosis (1 patient, 2%), and AP related to anatomical variants (10 patients, 20%).

Among the 19 patients with PPC, 10 were symptomatic, of whom eight underwent endoscopic drainage, one underwent surgery, and one remained under follow-up. All 9 asymptomatic patients were planned for imaging follow-up. Half of the patients with WON were symptomatic and were managed endoscopically with drainage, whereas the other half were scheduled for follow-up.

Among the two patients with biliary or combined obstruction, surgical management revealed pancreatic dysplasia in one case. Of the three patients with isolated CBD stenosis, one underwent surgery and two underwent endoscopic treatment, identifying two cases of PDAC. For the ten symptomatic patients with anatomical variants or main pancreatic duct obstruction (including three with pancreas divisum, one with main pancreatic duct stones, four who had previously undergone duodenopancreatectomy, one with annular pancreas, and one with pancreaticobiliary maljunction), three underwent surgery (one patient with main pancreatic duct stones, one with annular pancreas, and one with pancreaticobiliary maljunction), two were treated endoscopically (two patients with prior duodenopancreatectomy), and five remained under follow-up (**Table 2**).

In conclusion, the MTM approach achieved a 100% resolution rate, effectively addressing all cases. In particular, MTM led to steroid initiation in 24 suspected AIP cases, endoscopic or surgical intervention in 9 of 19 pseudocysts and in 8 of 16 WON, and tailored management of ductal obstruction or anatomical variants (3 surgeries, 2 endoscopic treatments). Notably, MTM-guided decisions also enabled the detection of two previously unrecognized PDACs.

3.2 Chronic Pancreatitis Subgroup

Ninety patients were globally referred to the MTM for the management of chronic pancreatitis: 18 (20%) in the etiology group and 76 (80%) in the complication management group, with 4 patients discussed for both etiology and complications.

Regarding CP etiology, of the 18 cases, two patients were referred to our center for suspected genetic CP (11.1%), two for suspected obstructive CP (11.1%), and one case each for suspected AIP and pancreas divisum. Eleven (61.1 %) patients were referred for idiopathic CP. After the MTM's review of the clinical history and the imaging/lab tests already performed, we recommended further genetic panel testing for nine patients and additional imaging in 12 cases (MRIs, EUS, CT scan, and other endoscopic evaluations). At the conclusion of the workups proposed by the MTM, the initial suspected etiology was changed in seven out of 18 cases (38.9%). Specifically, four new diagnoses of genetic chronic pancreatitis were identified: one SPINK1 pathogenic variant in a 22-year-old patient, two heterozygous CFTR pathogenic variants in patients aged 57 and 64 years, and one presumptive diagnosis in a 32-year-old patient, based on clinical presentation and geneticist evaluation despite the absence of pathogenic variants in the five-gene panel analyzed. Moreover, of the 11 pancreatitis cases previously considered idiopathic, a specific etiology was defined in five cases, specifically genetic (two cases) and biliary (one case), and the diagnosis of CP was not confirmed in two cases (**Figure 3**).

Seventy-six patients were referred to the MTM for management of CP-related complications. The majority (23 patients, 30.2%) were referred for MTM discussion for stenosis or obstruction of the main pancreatic duct. Among these, 15 patients were symptomatic: five received endoscopic treatment (33.3%), six underwent surgery, and four remained under imaging follow-up (26.7%). Following MTM discussion, 10 patients ultimately underwent surgery (those with multiple intraductal stones throughout the gland and frequent acute exacerbations or chronic pain), while five underwent endoscopic treatment (those with a limited number of small stones located in the pancreatic head), with evidence of one PDAC. The remaining eight asymptomatic patients were kept under follow-up.

Eleven patients (14.4%) were referred for CBD stenosis, with three treated endoscopically (27.2%) and 7 surgically, identifying one case of low-grade pancreatic intraepithelial neoplasia (PanIN). One patient continued to undergo follow-up.

Duodenal stenosis was present in four patients (5.2%), three of whom underwent surgery with no PDAC identified, while the fourth, asymptomatic, remained under follow-up. Twenty patients were referred for suspected solid focal lesions of the pancreas. Of these, 11 (55%) underwent resective surgery (**Table 3**) with a diagnosis of PDAC in three and low-grade PanIN in one, while the others remained under follow-up.

One symptomatic patient with the double-duct sign (dilation of both the main bile duct and pancreatic duct) underwent surgical intervention, while the other two were asymptomatic and were followed up for suspected AIP.

Sixteen patients presented with pain; among them, one received medical therapy for deep vein thrombosis (DVT), five were managed with analgesic therapy and follow-up, and ten (62.5%) underwent surgery. Three of these surgical patients had previously failed endoscopic attempts at ductal decompression by ERCP. Overall, two underwent derivative surgical procedures and eight pancreatic resections. Surgical intervention was mainly reserved for patients with a positive genetic background, younger age, or the presence of a suspicious lesion. Overall, all cases were successfully managed, with surgical interventions accounting for 55% and endoscopic treatments for 10%. The MTM approach led to the identification in CP patients of four previously undiagnosed PDAC cases: three with prior radiological suspicion (progressive ductal strictures, rising CA19-9, or weight loss; aged 71, 57, 82, and 79 years), including two advanced cases and two resected tumors (pT2N2, G3 and pT3b, pN0, G2), and one patient with obstructive chronic pancreatitis. In total, six low-grade PanINs were also identified. These included: one 40-year-old patient with CBD stenosis and toxic CP, one 50-year-old patient with a suspected solid lesion and known genetic CP (heterozygous pathogenic CFTR mutation), one patient with weight loss and a history of alcohol and tobacco use, two patients with chronic pain refractory to medical treatment in the setting of groove pancreatitis, and one 43-year-old patient with exotoxic CP and pancreas divisum who had undergone multiple minor papilla stentings for recurrent flares.

4. Discussion

Our observational investigation demonstrated that MTM performed at a specialized referral center for non-malignant pancreatic disorders enables the accurate determination of the etiology and effective management of complications of both acute and chronic pancreatitis. Notably, of the 232 patients with either AP or CP that were discussed and managed, PDAC was diagnosed in nine cases (3.9%) and PanIN with low-grade dysplasia in six (2.6%).

In the context of acute pancreatitis, international guidelines highlight the crucial role of specialized centers dedicated to pancreatic diseases, offering advanced endoscopy services and implementing a thorough multidisciplinary approach, particularly for patients with idiopathic acute pancreatitis or those encountering complications [14–16,21].

Conversely, the management of CP focuses on addressing persistent pain, which is a challenging aspect that significantly affects patients' quality of life. In patients with painful chronic pancreatitis and main pancreatic duct obstruction who are suitable surgical candidates, surgical evaluation should be considered before initiating endoscopic treatment, as confirmed by the most recent randomized controlled trial [12,22]. Surgery is generally reserved for those who have exhausted medical options, with comprehensive evaluation performed in specialized centers [17,18,23]. Endoscopic therapy is usually advised as the first-line approach for main pancreatic duct stones that are radiolucent or less than 5 mm in size and located in the head or body

of the pancreas, or as an alternative when extracorporeal shockwave lithotripsy is not available [24]. If endoscopic management fails, surgical options should be considered within a multidisciplinary discussion. [23,24]. Pain assessment in chronic pancreatitis involves evaluating the severity, pattern, and influence of pain on daily functioning and quality of life. A comprehensive multidisciplinary approach is crucial, involving various healthcare professionals to address the multifaceted nature of chronic pancreatitis and improve patients' overall well-being. [17,18,23].

An MTM should be characterized by the availability of a minimum of two specialists in each field of expertise to ensure adequate coverage [16,25].

According to these guidelines, our study demonstrated the utility of MTM in altering the etiology of both AP and CP and influencing the therapeutic course. In particular, the final diagnosis of the etiology of acute and chronic pancreatitis was changed in 36.9% of patients, with a very similar rate of 36.5% for AP and 38.9% for CP. The resolution rate of AP and CP complications was 100%.

The existing literature supports the idea that MTM can enhance the management of pancreatic diseases. Chingkoe et al. [26] conducted an evaluation of the impact of MTM on altering the management of pancreatic disorders, involving 252 patients, including 52 with acute and chronic pancreatitis. The re-evaluation of abdominal CT scans and MRIs revealed that MTM influenced the interpretation of imaging in 33.7% of cases, with 23.5% pertaining to acute/chronic pancreatitis. Furthermore, MTM resulted in an 8.7% change in the overall diagnosis and a 17.9% change in the treatment approach.

Francisse et al. [27] indicate that the initially suggested therapeutic management plan experienced modifications following MTM discussions in 72.2% of the patients, resulting in a shift in the proposed diagnosis in 17.6%.

In our MTM, most patients that were referred for the investigation of AP etiology were previously suspected of having AIP (57%), with confirmation in 69.8% of cases. AIP is uncommon, and its prevalence and incidence in the United States are still not well documented [28], with an estimated prevalence of 10.1 per100,000 persons in Japan [29]. Although specific epidemiological data for Europe are lacking, it is estimated that AIP represents approximately 6% of all chronic pancreatitis cases, with a prevalence ranging between 10 and 40 cases per 100,000 individuals [30]. AIP exhibits varied symptoms and often mimics PDAC, posing diagnostic challenges and emphasizing the importance of its discussion in MTM. Dickerson et al. [31] underscored the significance of MTM in distinguishing AIP from PDAC. They conducted a study involving patients with AIP who underwent surgical resection for a suspected malignancy. Following surgery, concurrent malignancy was identified in only 11.1% of patients with AIP. Therefore, reassessment with an experienced multidisciplinary team is crucial, considering the clinical, imaging, and histological indicators, or supporting evidence that may favor a specific diagnosis [32]. Notably, many of the cases in which AIP was initially suspected only had a marginal, non-specific increase in IgG4, which is not sufficient to make a diagnosis of AIP type I.

One of the most relevant findings of the present study was the high diagnostic yield for previously undetected PDAC. After the investigations proposed by the MTM, four cases of PDAC and six cases of

PanIN with low-grade dysplasia were found in patients discussed for the need for treatment for CP, while five PDAC were found in patients discussed for the etiology of AP. Although guidelines underline the importance of ruling out PDAC in idiopathic or recurrent AP as well as in suspected focal masses of CP, these lesions are often missed in clinical practice. Two PDAC cases were initially referred to the MTM as benign CBD stenosis in the setting of CP. In a randomized controlled trial of endoscopic stenting in patients with CP and presumed benign CBD stenosis, 6.7% of the patients were ultimately diagnosed with PDAC [33]. These data suggest being extremely prudent and to consider surgery in all patients with CP and CBD stenosis, as PDAC is frequently missed even in experienced centers.

Following an inconclusive initial assessment, EUS has emerged as the preferred diagnostic modality for unexplained acute and recurrent pancreatitis, revealing potential etiologies in 29–88% of cases [34], and EUS performed at high-volume referral centers can provide an additional advantage to MTM. In our cohort, all PDAC diagnoses were made using EUS with rapid on-site evaluation.

According to findings from a retrospective study by DeWitt et al. [35], repeated EUS procedures performed by experts for comparable clinical indications at tertiary referral centers demonstrated a clinical impact in 63% of cases. Additionally, in a study by Suzuki et al. [36], repeat EUS-FNA at a referral center clarified the diagnosis in 82.1% of cases.

Despite systematic attempts to ascertain the cause of AP, it remains undetermined in 16–27% of cases [34]. Genetic counseling should be considered in patients diagnosed with idiopathic acute pancreatitis, where the etiology remains unidentified, particularly after a second episode of idiopathic pancreatitis [16]. Genetic testing should also be considered in patients with clinical evidence of pancreatitis-associated disorder or possible CP in which the etiology is unclear, especially in younger patients, those with a family history of idiopathic CP, or relatives with confirmed mutations linked to hereditary pancreatitis [18,37].

In our study, two patients were initially suspected to have a genetic cause of AP, but were identified by the end of the MTM evaluation as idiopathic and one with pancreas divisum. Seven of the 22 idiopathic AP cases underwent genetic testing after MTM, but none were positive. One case of genetic AP and six cases of genetic CP (7/232, 3%) were ultimately identified at the end of the MTM evaluation.

Overall, although adherence to international guidelines in the management of benign pancreatic diseases may be challenging in real-life practice [38], our study shows that in high-volume tertiary referral centers specifically dedicated to pancreatic diseases, it is feasible to follow international recommendations.

This study has certain limitations. First, its retrospective nature presents inherent challenges related to the common issue of missing data. However, in our specific instance, the data were acquired through documented and validated prospective recordings of the patients' MTM interactions, thus minimizing the likelihood of inadequate or absent data. Furthermore, the absence of a thorough long-term follow-up analysis precluded the evaluation of the possible advantages stemming from MTM discussions in relation to patients' prognostic outcomes. On the other hand, to the best of our knowledge, our study is the largest of its kind in evaluating the effect of MTM discussions on patients with AP and CP.

5. Conclusions

We conducted a comprehensive review of consecutive patients within a specialized center and compared the impact of MTM discussions on the management of both AP and CP. These data support the need for MTM discussions to identify the definitive etiology of AP and CP when this is uncertain and to optimize their treatment when this is not straightforward. In this view, it is crucial that not only the care of malignant but also of complex benign pancreatic disorders be centralized in high-volume institutions, where full MTM is available.

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Declaration of interest

The authors have no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties.

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Author Contributions

- Substantial contributions to the conception or design of the work: GL, MT, SC, GB, DP
- Acquisition, analysis, or interpretation of data for the work: FA, ML, RPdLP, PB, FF, RN, NB, IM, PZ, GV, LA, MCP, GR, CD, DT, AM, AM, SD, PP, EDT
- Drafting the manuscript: GL, MT, GC
- Revising it critically for important intellectual content: All authors
- Final approval of the version to be published: All authors
- Accountability for all aspects of the work: All authors

Ethical Statement

As part of the approved observational biobank protocol BIO-PANCREAS (code IRB 96/INT/2021) conducted within the Pancreas Translational and Clinical Research Center of the San Raffaele Hospital, Milan (Italy), and upon informed consent, data were obtained through direct interview and from medical records.

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AI-based tools and technologies declaration:

No AI-based tools or technologies were used in the preparation of this manuscript.

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* of interest

** of considerable interest

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Table and Figure Legends

Table 1. Demographic and clinical characteristics of the study population.

Baseline demographic, referral, and subgroup characteristics of patients with acute and chronic pancreatitis discussed at the multidisciplinary team meeting.

HSR: Hospital San Raffaele

Table 2. Indications and final management decisions in acute pancreatitis.

Clinical indications leading to multidisciplinary evaluation and corresponding final therapeutic strategies, including endoscopic, surgical, or imaging-based management.

MRI: magnetic resonance imaging; CT: computed tomography; EUS: endoscopic ultrasound; MTM: multidisciplinary team meeting.

Table 3. Management of chronic pancreatitis complications.

Summary of complications evaluated at the multidisciplinary meeting and related final treatment decisions.

MTM: multidisciplinary team meeting.

FIGURE LEGENDS

Figure 1. Study flowchart.

Flow diagram showing patient selection and classification. Of 536 evaluated patients, 304 were excluded (mainly cysts, non-pancreatic inflammatory disease, or loss to follow-up). The remaining 232 patients were divided into acute pancreatitis (n=142) and chronic pancreatitis (n=90), each further stratified according to etiology and treatment indication.

AP: acute pancreatitis; CP: chronic pancreatitis.

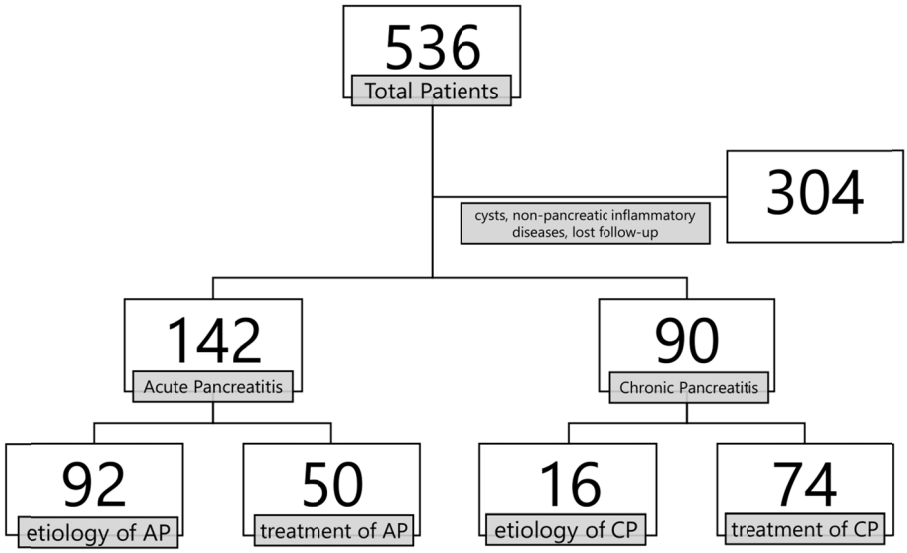
Figure 2. Changes in etiological classification of acute pancreatitis before and after multidisciplinary team meeting (MTM).

Sankey diagram illustrating the redistribution of etiological diagnoses following MTM discussion. A relevant proportion of cases initially classified as idiopathic or autoimmune were reassigned to more specific categories, highlighting the impact of multidisciplinary evaluation on diagnostic refinement.

Figure 3. Changes in etiological classification of chronic pancreatitis before and after multidisciplinary team meeting (MTM).

Sankey diagram showing modifications in etiological attribution after MTM discussion. Several cases initially labeled as idiopathic were reclassified into genetic, obstructive, or biliary etiologies.

Figure 1. Study flowchart



AP: acute pancreatitis; CP: chronic pancreatitis

Figure 1

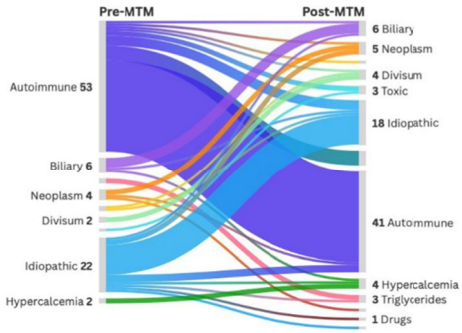


Figure 2

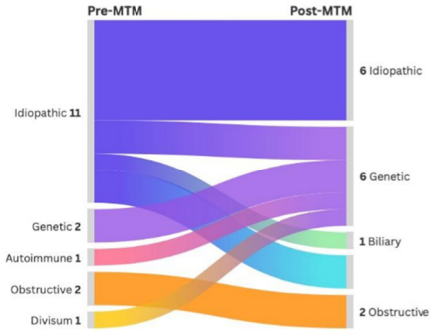


Figure 3

Table 1. Population demographics

	Acute pancreatitis 142		**Chronic pancreatitis 90**	
Subgroup	Etiology	Treatment	Etiology	Treatment
Number of patients	93	50	18	76
Female	55 (38.7%)		31 (34.4%)	
Center (HSR)	69 (48.6%)		45 (50%)	
Out of region	63 (44.4%)		43 (47.8%)	
Patients >1 discussion	12 (12.9%)	25 (50%)	4 (22.2%)	27 (35.5%)

HSR: Hospital San Raffaele

Table 2. Treatment of acute pancreatitis

Reason of treatment (number of suspect)	**Final decision after MTM**
Pseudocyst (19)	Endoscopy (8) Surgery (1) Imaging (10) - MRI 4, CT 2, EUS 4
Duodenal stenosis (1)	Surgery (1)
Common bile duct stenosis (3)	Endoscopy (2) Suergery (1)
Paraphysiological anatomy (10)	Endoscopy (2) Surgery (3) Imaging (5) -> MRI 5
Walled-off necrosis (16)	Endoscopy (8) Imaging (8) -> MRI 2, CT 6, EUS 1
Double obstruction (1)	Surgery (1)

MRI: magnetic resonance imaging; CT: computed tomography; EUS: endoscopic ultrasound; MTM: multidisciplinary team meeting

Table 3. Treatment of complications of chronic pancreatitis

Treatments of complications (number of patients)	Final decision after MTM
Appearance of focal lesion (20)	Surgery (11) Imaging (9)
Obstructive/wirsung duct stenosis (23)	Endoscopy (5) Surgery (10) Imaging (8)
Common bile duct stenosis (11)	Endoscopy (3) Surgery (7) Imaging (1)
Duodenal stenosis (4)	Surgery (3) Imaging (1)
Pain (16)	Medical treatment (1) Surgery (10) Imaging (5)
Double duct sign (3)	Surgery (1) Imaging (2)

MTM: multidisciplinary team meeting

STROBE Statement—Checklist of items that should be included in reports of ***cohort studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract: **Present in the abstract as 'retrospective study'**	4
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found: **Present in the abstract**	4
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported: **Addressed in the Introduction**	5,6
Objectives	3	State specific objectives, including any prespecified hypotheses: **Clearly stated in the Introduction**	6
Methods			
Study design	4	Present key elements of study design early in the paper: **Described in the Methods section**	7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection: **Provided in the Setting/Study Population section**	6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up: **Detailed in the Inclusion/Exclusion Criteria in the Methods**	7,8
		(*b*) For matched studies, give matching criteria and number of exposed and unexposed: **Not applicable**	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable: **Discussed in Data Collection and Analysis**	6,7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group: **Addressed in Data Collection**	6,7
Bias	9	Describe any efforts to address potential sources of bias: **Mentioned in the Discussion section**	19
Study size	10	Explain how the study size was arrived at: **Discussed in Methods – Data Collection**	7,8
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why: **Addressed in Statistical Analysis**	9
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for	9

		confounding: **Detailed in Statistical Methods**	
		(*b*) Describe any methods used to examine subgroups and interactions: **Discussed in Statistical Methods**	7,9
		(*c*) Explain how missing data were addressed: **Addressed in Data Collection**	7,8
		(*d*) If applicable, explain how loss to follow-up was addressed: **Mentioned in Exclusion Criteria**	7,8
		(*e*) Describe any sensitivity analyses: **Not applicable**	
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed: **Provided in Results – Table 1**	23
		(b) Give reasons for non-participation at each stage: **Addressed in Exclusion Criteria**	7,8
		(c) Consider use of a flow diagram: **Provided in Figure 1**	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders: **Provided in Table 1**	23
		(b) Indicate number of participants with missing data for each variable of interest: **Addressed in Exclusion Criteria and Results**	7,7
		(c) Summarise follow-up time (eg, average and total amount): **Discussed in Methods and Results, Reported in Table 2, Table 3, Figure 2, Figure 3**	7,8,23,24
Outcome data	15*	Report numbers of outcome events or summary measures over time: **Reported in Results, Provided in Tables 2 & 3, Figure 2, Figure 3**	10,11

Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included: **Discussed in Statistical Analysis** (*b*) Report category boundaries when continuous variables were categorized: **Addressed in Statistical Methods and Results** (*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period: **Not applicable**	8,9 8.9
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses: **Addressed in the Results section**	10,11
Discussion			
Key results	18	Summarise key results with reference to study objectives: **Discussed in the Discussion section**	15-18
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias: **Addressed in Limitations**	18
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence: **Discussed in the Discussion section**	15-18
Generalisability	21	Discuss the generalisability (external validity) of the study results; **Addressed in Conclusions**	18
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based: **Acknowledged and Funding section**	20

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org.