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PERORAL PANCREATOSCOPY IN THE EVALUATION AND MANAGEMENT OF PANCREATIC DUCT DISORDERS: A NARRATIVE REVIEW

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ABSTRACT

Background: Peroral pancreatoscopy is an advanced endoscopic modality that enables direct visualization of the pancreatic duct. It may be useful when cross-sectional imaging, endoscopic ultrasound, or conventional endoscopic retrograde cholangiopancreatography do not provide sufficient information on intraductal pancreatic pathology.
Aim: This review aimed to summarize the current diagnostic and therapeutic applications of peroral pancreatoscopy, with emphasis on intraductal papillary mucinous neoplasms, indeterminate pancreatic duct strictures or dilatation, and pancreatic duct stone disease.
Material and methods: This narrative review was based on available literature concerning the clinical utility of peroral pancreatoscopy in pancreatic duct disorders. Particular attention was given to studies evaluating intraductal lesion morphology, preoperative and intraoperative mapping, diagnostic assessment of indeterminate ductal abnormalities, and pancreatoscopy-guided lithotripsy.
Results: Current evidence suggests that pancreatoscopy may provide additional clinically relevant information in selected patients with intraductal papillary mucinous neoplasms by improving assessment of ductal morphology and disease extent. In indeterminate pancreatic duct strictures or unexplained ductal dilatation, it may support diagnostic evaluation through direct visualization and targeted tissue acquisition. Therapeutically, pancreatoscopy-guided lithotripsy has shown favorable efficacy in difficult pancreatic duct stones. However, broader use is limited by technical complexity, operator dependence, restricted availability, and adverse events, particularly post-procedural pancreatitis.
Conclusions: Peroral pancreatoscopy is a valuable complementary tool in selected cases of pancreatic duct disease. Further prospective studies, procedural standardization, and consistent safety reporting are needed to define its role in routine practice.

KEYWORDS

Peroral Pancreatoscopy, IPMN, Pancreatic Duct Stricture, Pancreatic Duct Stones, Pancreatic Endoscopy

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Introduction

Peroral pancreatoscopy has become an increasingly relevant component of advanced pancreatic endoscopy, particularly in clinical settings where standard imaging and conventional endoscopic techniques do not provide sufficiently detailed information about intraductal pathology. By permitting direct visualization of the pancreatic ductal system, this technique adds a level of morphological assessment that cannot be achieved with fluoroscopic pancreatography alone and may improve the characterization of intraductal lesions encountered during diagnostic evaluation (Miller and Chen, 2018). Its growing importance is closely linked to technological progress, particularly the development of digital single-operator platforms, which has improved image quality, maneuverability, and the integration of pancreatoscopy into routine ERCP-based practice (Mansilla-Vivar, Segovia-Vergara and Pons-Beltrán, 2025). As a result, pancreatoscopy is no longer viewed solely as a niche adjunctive procedure, but rather as a specialized modality that may refine diagnostic reasoning and expand therapeutic possibilities in selected pancreatic disorders (Abusharar et al., 2026). Current evidence indicates that the most established applications of pancreatoscopy include the assessment of intraductal papillary mucinous neoplasms, the evaluation of indeterminate pancreatic duct strictures, and the treatment of obstructing pancreatic duct stones (Miller and Chen, 2018). In the setting of suspected IPMN, direct intraductal inspection may provide clinically relevant information regarding the extent of ductal involvement and the distribution of visible lesions, thereby contributing to preoperative or intraoperative decision-making in carefully selected patients (de Jong et al., 2023). In parallel, therapeutic pancreatoscopy has gained recognition through pancreatoscopy-guided lithotripsy, which has emerged as a minimally invasive option for difficult

pancreatic duct stones and has shown favorable pooled efficacy and safety outcomes in recent evidence syntheses (Huang et al., 2024). Despite these advances, pancreatoscopy remains a technically demanding procedure whose broader adoption is limited by restricted availability, the need for substantial operator expertise, and the fact that the quality of evidence differs considerably across indications. For this reason, contemporary reviews consistently frame pancreatoscopy as a complementary rather than replacement modality, best applied when prior cross-sectional imaging, EUS, or ERCP leaves persisting diagnostic or therapeutic uncertainty. Within such a framework, pancreatoscopy may be regarded as a method that links high-resolution intraductal visualization with targeted intervention, supporting a more individualized and anatomically precise approach to pancreatic duct disease (Abusharar et al., 2026).

Pancreatoscopy in IPMN: assessment of intraductal lesions and estimation of malignant potential

The role of peroral pancreatoscopy in intraductal papillary mucinous neoplasms has been investigated primarily in the context of direct intraductal visualization, preoperative mapping of disease extension, and support for risk stratification when conventional imaging leaves clinically relevant uncertainty (Arnelo et al., 2014; Nagayoshi et al., 2014; Kishimoto et al., 2022; Hara et al., 2002). Rather than serving as an isolated diagnostic test, pancreatoscopy has generally been studied as an adjunctive modality capable of refining morphological assessment of the main pancreatic duct and informing subsequent management decisions in selected patients with suspected IPMN (Arnelo et al., 2014; Nagayoshi et al., 2014; Kishimoto et al., 2022; Hara et al., 2002).

In the study by Arnelo and colleagues, single-operator pancreatoscopy was evaluated as a tool in patients with suspected IPMN, with the central aim of determining whether direct ductal inspection could add clinically meaningful information beyond standard preprocedural work-up. The importance of that study lies less in simple lesion detection and more in its demonstration that pancreatoscopic findings contributed to clinical decision-making, including decisions related to further management of the lesions under investigation. This work therefore supports the concept that pancreatoscopy may have practical value when the key clinical question is not merely whether a ductal abnormality is present, but whether its visual characteristics are sufficiently concerning to alter diagnostic or therapeutic planning. At the same time, the authors emphasized that post-procedural pancreatitis remained an important limitation, indicating that any incremental diagnostic benefit must be interpreted against procedural risk (Arnelo et al., 2014). A related but more technically focused perspective was provided by Nagayoshi et al., who assessed the SpyGlass system in the evaluation of IPMN involving a dilated main pancreatic duct. The purpose of that study was to examine whether single-operator pancreatoscopy could be feasibly applied to direct inspection of intraductal lesions in this setting and whether the resulting endoscopic information could improve lesion assessment before surgery. Its relevance for a review section on IPMN lies in showing that pancreatoscopy may be used not only to confirm the presence of intraductal abnormalities, but also to analyze their endoluminal morphology in a way that may complement radiologic and endosonographic findings. Accordingly, this study is particularly useful when discussing pancreatoscopy as a method of direct intraductal phenotyping rather than as a purely sampling-based technique (Nagayoshi et al., 2014). Kishimoto and colleagues extended this line of investigation by studying 39 patients with main pancreatic duct-type IPMN who underwent peroral pancreatoscopy with videoscopy and narrow-band imaging, thereby focusing on high-resolution endoscopic evaluation of intraductal protruding lesions. In that cohort, protrusions within the main pancreatic duct were identified in 36 of 39 patients, which illustrates the capacity of pancreatoscopy to depict subtle intraductal surface abnormalities directly rather than infer them indirectly from imaging surrogates. The study also incorporated cytology and biopsy obtained at the time of pancreatoscopy, and these combined tissue-based assessments achieved a sensitivity of 85% and a specificity of 87.5%. Among the 19 patients who subsequently underwent surgery, 18 had negative surgical margins, corresponding to 95% of the operated subgroup, whereas one patient had a positive margin. These findings make the study particularly valuable for discussion of how pancreatoscopy may contribute to preoperative estimation of lesion extent, while also illustrating that even detailed intraductal assessment does not eliminate the need for careful pathological correlation and postoperative interpretation (Kishimoto et al., 2022).

An earlier and methodologically influential contribution was provided by Hara et al., who evaluated 60 patients with histopathologically confirmed intraductal papillary-mucinous tumor and specifically examined the usefulness of peroral pancreatoscopy together with intraductal ultrasonography. The central aim of that study was twofold: first, to differentiate benign from malignant disease, and second, to assess the role of these methods as preoperative examinations. Its long-term significance stems from the fact that it helped establish a

morphological framework for interpreting pancreatoscopic findings in mucin-producing pancreatic tumors and demonstrated that combining POPS with IDUS improved diagnostic discrimination compared with less direct diagnostic approaches. For a contemporary review, this study remains especially important because it anchors the concept that visual classification of intraductal lesions is not merely descriptive, but can be linked to clinically meaningful estimation of malignant potential (Hara et al., 2002). Taken together, these studies suggest that the main contribution of pancreatoscopy in IPMN lies in its ability to provide direct endoluminal information on lesion morphology and intraductal spread, thereby complementing conventional imaging and, in selected cases, influencing the extent of surgery or the overall management strategy. However, the available evidence also indicates that the interpretation of pancreatoscopic findings must remain cautious, because procedural risk, operator dependence, and the limited size of published cohorts constrain the generalizability of the results (Arnelo et al., 2014; Nagayoshi et al., 2014; Kishimoto et al., 2022; Hara et al., 2002).

Pancreatoscopy in indeterminate pancreatic duct strictures and ductal dilatation

Peroral pancreatoscopy has been increasingly considered in patients with indeterminate pancreatic duct strictures or unexplained ductal dilatation, particularly when cross-sectional imaging and standard ERCP-based evaluation do not allow a confident distinction between benign and neoplastic disease. Its principal diagnostic advantage is the possibility of direct intraductal visualization, which may be combined with targeted tissue acquisition when endoscopic appearance alone is insufficient for definitive characterization (Miller and Chen, 2018). The most informative primary study for this indication is the single-center series by El Hajj et al., which analyzed 79 patients who underwent per-oral pancreatoscopy for pancreatic duct stricture or dilatation. In that cohort, technical success was achieved in 78 of 79 procedures, corresponding to a success rate of 97%, which supports the procedural feasibility of pancreatoscopy in carefully selected patients. For the diagnosis of pancreatic duct neoplasia, visual impression during pancreatoscopy yielded a sensitivity of 87% and a specificity of 86%, indicating that endoscopic morphology alone provided substantial discriminatory value. Importantly, when visual assessment was combined with pancreatoscopy-guided tissue sampling, diagnostic performance improved further, with sensitivity increasing to 91% and specificity to 95%. This study is therefore particularly important because it showed that pancreatoscopy may add clinically meaningful diagnostic information precisely in cases where conventional work-up remains inconclusive (El Hajj et al., 2017). Miller and Chen, in a later review, placed such findings in a broader clinical context by emphasizing that pancreatoscopy offers direct ductal inspection, macroscopic lesion assessment, and targeted tissue acquisition, which together define its main diagnostic rationale in pancreatic duct pathology (Miller and Chen, 2018). De Luca et al. similarly described pancreatoscopy as a method primarily used for visualization of the main pancreatic duct and highlighted its value in selected diagnostic settings, while also underscoring that its use remains specialized rather than routine (De Luca et al., 2019). Kaura et al., in their systematic review, further supported the role of per-oral pancreatoscopy in pancreatic duct neoplasia by concluding that renewed technological interest in this modality has strengthened its diagnostic and therapeutic relevance, although the underlying evidence remains limited in scope (Kaura et al., 2019). More recent review data by Mansilla-Vivar et al. reaffirm that pancreatoscopy should be regarded as an advanced, high-resolution technique that may improve the evaluation of strictures and intraductal neoplasms, but one whose interpretation still depends on expert use and careful integration with the overall clinical picture (Mansilla-Vivar et al., 2025). Taken together, the available literature suggests that pancreatoscopy is most useful in indeterminate pancreatic duct abnormalities not as a first-line standalone test, but as a complementary modality that may refine diagnosis when standard imaging and sampling are insufficiently conclusive.

Preoperative and intraoperative assessment of lesion extent

In patients with main-duct or mixed-type IPMN, pancreatoscopy has emerged as a complementary method for assessing the longitudinal extent of intraductal disease when cross-sectional imaging or EUS does not fully define lesion distribution (Trindade et al., 2018; Ohtsuka et al., 2018). In a multicenter retrospective study, Trindade et al. showed that digital pancreatoscopy detected previously unrecognized abnormalities in 42% of patients with MD-IPMN, indicating that direct intraductal visualization may reveal additional disease features beyond those identified by standard imaging modalities. In the same cohort, pancreatoscopic findings influenced the choice of surgical procedure in 42% of resected patients, with the greatest impact observed in cases of diffuse main pancreatic duct dilatation greater than 10 mm. These findings suggest that digital pancreatoscopy may be particularly valuable when MD-IPMN is suspected but preoperative imaging does not identify a clearly localized lesion (Trindade et al., 2018). Similarly, Ohtsuka et al. investigated the role of

SpyGlass-DS in the preoperative evaluation of IPMN involving the main pancreatic duct and highlighted its potential usefulness in determining lesion extent and guiding selection of the resection line. In this setting, direct intraductal inspection may provide additional information on proximal and distal ductal spread when conventional radiologic assessment remains inconclusive (Ohtsuka et al., 2018). Early experience with peroral pancreatoscopy combined with narrow-band imaging, reported by Itoi et al., further supported the concept that enhanced endoscopic visualization may disclose subtle intraductal mucosal abnormalities that are not readily detected on routine imaging. Although that report reflected preliminary clinical experience rather than large-scale comparative evidence, it provided an important technical basis for subsequent studies focused on intraductal mapping and the detection of discontinuous lesions (Itoi et al., 2007). The potential relevance of pancreatoscopy becomes even more evident in the intraoperative setting, where direct ductal assessment may help tailor the extent of resection to the true distribution of disease (Navez et al., 2015; Arnelo et al., 2023; Yelamali et al., 2012; Yang et al., 2023). In the study by Navez et al., complete intraoperative pancreatoscopy with intraductal biopsies identified eight occult IPMN lesions in 21 patients and led to modification of the initially planned extent of pancreatic resection in 23.8% of cases. These findings support the view that intraoperative pancreatoscopy may influence operative management in a clinically meaningful subset of patients (Navez et al., 2015). This concept was reinforced by Arnelo et al., who demonstrated in a pilot study that intraoperative pancreatoscopy was feasible and safe and could improve detection of skip lesions during surgery for MD- and MT-IPMN. From a surgical perspective, this observation is important because discontinuous intraductal spread may result in underestimation of lesion extent if intraoperative assessment is based only on gross inspection and frozen-section analysis (Arnelo et al., 2023). An earlier case-based report by Yelamali et al. also illustrated the possible role of intraoperative pancreatoscopy with narrow-band imaging in resection margin assessment for IPMN. Although limited by its descriptive design, that study showed how enhanced intraductal visualization could assist real-time evaluation of lesion extension at the transection line (Yelamali et al., 2012). The applicability of intraoperative pancreatoscopy has also been explored in minimally invasive surgery. In a retrospective series by Yang et al., intraoperative pancreatoscopy was performed in 28 patients undergoing pancreaticoduodenectomy for IPMN of the pancreatic head and resulted in a change of operative strategy in 17.8% of cases. These data suggest that intraoperative ductal mapping may also be incorporated into laparoscopic surgery and may retain value beyond the setting of open pancreatic resection (Yang et al., 2023). Taken together, the available evidence indicates that pancreatoscopy may support surgical decision-making in IPMN at two clinically relevant stages: preoperatively, by improving delineation of main-duct involvement when imaging findings are inconclusive, and intraoperatively, by identifying occult extension or skip lesions that may justify modification of the resection strategy (Trindade et al., 2018; Navez et al., 2015; Arnelo et al., 2023). However, this body of evidence remains limited by retrospective study design, small sample size, and the highly selected nature of available surgical cohorts (Trindade et al., 2018; Arnelo et al., 2023). Moreover, although the published reports generally suggest that the procedure is feasible, detailed and uniform reporting of procedure-related adverse events remains limited across studies (Ohtsuka et al., 2018; Navez et al., 2015; Arnelo et al., 2023; Yang et al., 2023). Therefore, further investigation is needed to better define the reproducible impact of pancreatoscopy on operative planning and to clarify its safety profile in this specific clinical setting (Trindade et al., 2018; Navez et al., 2015; Arnelo et al., 2023).

Therapeutic applications of pancreatoscopy in pancreatic duct stone disease

Per-oral pancreatoscopy-guided lithotripsy has become an increasingly important therapeutic option in the management of difficult pancreatic duct stones, particularly in patients with chronic pancreatitis in whom conventional endoscopic extraction is ineffective or technically unfeasible. In the systematic review and meta-analysis by McCarty et al., the authors assessed the efficacy and safety of per-oral pancreatoscopy with intraductal lithotripsy for difficult pancreatic duct stones. This analysis included 10 studies comprising 302 patients, with a mean stone size of 10.66 ± 2.19 mm, and the majority of stones were located in the pancreatic head. The pooled technical success rate was 91.18%, whereas the overall fragmentation success rate was 85.77%. Single-session stone fragmentation with pancreatic duct clearance was achieved in 62.05% of cases. Procedure-related adverse events were reported in 14.09% of patients, indicating that the technique is effective but not without procedural risk. Taken together, these findings support pancreatoscopy-guided lithotripsy as a highly effective salvage approach for selected patients with refractory pancreatic duct stone disease (McCarty et al., 2020). A second systematic review and meta-analysis by Saghir et al. further evaluated the role of pancreatoscopy in pancreatic duct stone management, with particular emphasis on both technical and clinical treatment success. The study included 16 articles with 383 patients and a total of 464 pancreatoscopy

procedures. In this analysis, technical success was defined as effective pancreatic duct stone clearance, whereas clinical success referred primarily to symptomatic improvement. The pooled technical success rate was 76.4%, while the pooled clinical success rate reached 76.8%. The pooled adverse event rate was 14.9%, which suggests a meaningful but generally acceptable safety burden in appropriately selected cases. Importantly, this meta-analysis highlights that the therapeutic value of pancreatoscopy should be considered not only in terms of ductal clearance, but also in relation to clinically relevant symptom relief (Saghir et al., 2020). The comparative role of pancreatoscopy-guided lithotripsy relative to extracorporeal shock wave lithotripsy was examined by Iwata et al. in a multicenter retrospective cohort study involving patients with pancreatic duct stones in chronic pancreatitis. The study included 19 patients treated with peroral pancreatoscopy-guided lithotripsy and 47 treated with extracorporeal shock wave lithotripsy. Stone clearance rates were 78.9% in the pancreatoscopy group and 70.2% in the extracorporeal shock wave lithotripsy group, without a statistically significant difference between the two strategies. Procedure-related complication rates were 21% and 6.3%, respectively, again without a statistically significant difference. A notable practical finding was that the median total number of treatment sessions was substantially lower in the pancreatoscopy group than in the extracorporeal shock wave lithotripsy group, at 1 versus 5 sessions. The cumulative stone recurrence rates were reported to be comparable between groups. These data suggest that pancreatoscopy-guided lithotripsy may achieve treatment outcomes similar to extracorporeal shock wave lithotripsy while potentially reducing the treatment burden, although careful attention to safety remains warranted (Iwata et al., 2024). In contrast to the previously discussed studies, the article by Hanada and Shah is a narrative review rather than a primary clinical trial or meta-analysis. The authors describe per-oral pancreatoscopy as a pancreas-preserving therapeutic platform that enables targeted pancreatic duct interventions under direct visualization, particularly when standard approaches are insufficient. Within this framework, pancreatoscopy-guided lithotripsy is presented as one of the most relevant therapeutic applications of the technique in obstructive pancreatic duct disease. Although this review does not provide new pooled efficacy or safety estimates, it is valuable because it places stone-directed pancreatoscopy within the broader context of pancreas-preserving endotherapy and emphasizes the importance of expert case selection and procedural experience (Hanada and Shah, 2024). Overall, the currently available evidence indicates that pancreatoscopy-guided lithotripsy is an effective therapeutic modality for difficult pancreatic duct stones, with technical success rates that are generally high and safety outcomes that appear acceptable in experienced hands (McCarty et al., 2020; Saghir et al., 2020). At the same time, the clinically relevant rate of adverse events across published studies suggests that this technique should be reserved for selected patients and performed in centers with substantial expertise in therapeutic pancreatic endoscopy (McCarty et al., 2020; Saghir et al., 2020; Hanada and Shah, 2024).

Discussion

The findings of this review suggest that peroral pancreatoscopy currently serves primarily as a complementary modality in pancreatic endoscopy, particularly in situations in which cross-sectional imaging, EUS, and conventional ERCP do not provide sufficiently precise information about intraductal pancreatic pathology (Miller and Chen, 2018; Mansilla-Vivar et al., 2025; Kaura et al., 2019). The available evidence indicates that its most clinically relevant applications concern IPMN, indeterminate pancreatic duct strictures or ductal dilatation, and difficult pancreatic duct stones (Abusharar et al., 2026; Kaura et al., 2019; Hanada and Shah, 2024). In the setting of IPMN, the principal value of pancreatoscopy lies in its ability to provide direct endoluminal assessment of lesion morphology and intraductal extension, which may complement standard imaging and support clinical decision-making in selected patients (de Jong et al., 2023; Arnelo et al., 2014; Ohtsuka et al., 2018). This may be particularly relevant when conventional radiologic and endosonographic evaluation does not adequately define the distribution of ductal disease or when the possibility of more extensive intraductal involvement remains clinically important (Trindade et al., 2018; Arnelo et al., 2023; de Jong et al., 2023). The currently available studies also suggest that pancreatoscopy may influence operative planning in selected cases, both before and during surgery, although these observations are derived mainly from retrospective cohorts and limited sample sizes (Trindade et al., 2018; Navez et al., 2015; Yang et al., 2023). At the same time, the interpretation of pancreatoscopic findings in IPMN remains limited by operator dependence, small study populations, and the absence of universally standardized visual criteria across the literature (de Jong et al., 2023; Hara et al., 2002; Abusharar et al., 2026). In patients with indeterminate pancreatic duct strictures or unexplained ductal dilatation, pancreatoscopy appears particularly useful because it combines direct intraductal visualization with the possibility of targeted tissue acquisition (El Hajj et al., 2017; Miller and Chen, 2018; De Luca et al., 2019). The results reported by El Hajj et al. support

the view that pancreatoscopy may improve characterization of suspected pancreatic duct neoplasia when conventional evaluation remains inconclusive (El Hajj et al., 2017). However, even in this indication, pancreatoscopy should not be regarded as a standalone diagnostic solution, because its findings must still be interpreted in conjunction with clinical presentation, imaging, cytology, histopathology, and multidisciplinary assessment (Mansilla-Vivar et al., 2025; Kaura et al., 2019). The therapeutic evidence is currently strongest for pancreatoscopy-guided lithotripsy in difficult pancreatic duct stones, where systematic reviews and meta-analyses have shown high technical success and favorable ductal clearance outcomes in carefully selected patients (McCarty et al., 2020; Saghir et al., 2020; Huang et al., 2024). Comparative cohort data further suggest that pancreatoscopy-guided lithotripsy may achieve outcomes broadly comparable to extracorporeal shock wave lithotripsy while potentially reducing the number of treatment sessions in some patients (Iwata et al., 2024; Hanada and Shah, 2024). Nevertheless, the therapeutic promise of pancreatoscopy must be balanced against its limitations, because adverse events remain clinically relevant across published studies, with post-procedural pancreatitis representing the most important safety concern (Arnelo et al., 2014; McCarty et al., 2020; Saghir et al., 2020). This safety profile is particularly important in diagnostic indications, where the incremental benefit of direct ductal inspection must be weighed against procedure-related risk (Arnelo et al., 2014; de Jong et al., 2023). Another important limitation of the current evidence base is methodological heterogeneity, including differences in patient selection, procedural platforms, outcome definitions, and reporting of adverse events, all of which reduce comparability across studies (Kaura et al., 2019; de Jong et al., 2023; Mansilla-Vivar et al., 2025). Accordingly, the current literature supports the use of pancreatoscopy not as a routine first-line modality, but as a highly specialized tool best reserved for carefully selected patients and experienced centers (Miller and Chen, 2018; De Luca et al., 2019; Hanada and Shah, 2024). Future progress in this field will depend on larger prospective studies, greater procedural standardization, broader validation of visual assessment criteria, and more rigorous reporting of both short- and long-term outcomes (Abusharar et al., 2026; de Jong et al., 2023; Mansilla-Vivar et al., 2025).

Conclusions

Peroral pancreatoscopy has established itself as a valuable adjunct in advanced pancreatic endoscopy, particularly in situations in which cross-sectional imaging, EUS, and conventional ERCP do not provide a sufficiently precise assessment of intraductal pathology. By enabling direct visualization of the pancreatic duct, this technique offers additional diagnostic and therapeutic possibilities in selected clinical settings. Its most well-defined roles currently include the assessment of IPMN, the evaluation of indeterminate pancreatic duct strictures and ductal dilatation, and pancreatoscopy-guided lithotripsy for difficult pancreatic duct stones. Across these indications, the available evidence suggests that pancreatoscopy may improve the morphological characterization of ductal lesions, refine the assessment of intraductal disease extent, and support more individualized clinical and surgical decision-making in carefully selected patients. In the therapeutic setting, pancreatoscopy-guided lithotripsy has emerged as an effective minimally invasive option for refractory pancreatic duct stones, with encouraging technical and clinical outcomes. Nevertheless, the broader clinical adoption of pancreatoscopy remains constrained by its technical complexity, limited availability, marked operator dependence, and a clinically relevant risk of adverse events, most notably post-procedural pancreatitis. At present, pancreatoscopy should therefore be regarded not as a first-line or standalone modality, but as a highly specialized complementary tool whose greatest value lies in resolving persistent diagnostic or therapeutic uncertainty after standard evaluation. Further progress in this field will depend on prospective studies of higher methodological quality, greater standardization of procedural technique and image interpretation, and more rigorous reporting of safety and long-term outcomes. Overall, pancreatoscopy represents a promising and increasingly refined approach to pancreatic duct disease, with the potential to improve diagnostic precision and support a more individualized therapeutic strategy in appropriately selected patients.

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