

RISK OF PANCREATITIS FOLLOWING ENDOSCOPIC ULTRASONOGRAPHY: A SYSTEMATIC REVIEW AND META-ANALYSIS

Muhammad Faisal Prananda*¹, Kemal Akbar Suryoadji², Rania Sofia Garnetta³, Najma Ali⁴, Achmad Fauzi⁵, Dadang Makmun⁶

^{1,5,6}*Division of Gastroenterology, Pancreatobiliary and Digestive Endoscopy, Department of Internal Medicine, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia*

²*Research Assistant, Department of Internal Medicine, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia*

^{3,4}*Medical Profession Student, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia*

* Corresponding Author: mfprananda@gmail.com

ARTICLE INFO

Article history:

Received: 03-10-2026

Revised: 04-10-2026

Accepted: 10-10-2026

Available online: 13-10-2026

Kata Kunci:

aspirasi jarum halus, faktor risiko, meta-analisis, pankreatitis, ultrasonografi endoskopik

Keywords:

endoscopic ultrasonography, fine-needle aspiration, meta-analysis, pancreatitis, risk factors

ABSTRAK

Pengambilan sampel jaringan dengan panduan ultrasonografi endoskopik banyak digunakan untuk mendiagnosis lesi pankreas, tetapi pankreatitis tetap menjadi kejadian tidak diinginkan yang relevan secara klinis, dan bukti mengenai faktor risikonya belum konsisten. Telaah sistematis dan meta-analisis ini bertujuan merangkum insidensi pankreatitis setelah ultrasonografi endoskopik serta mengevaluasi faktor risiko terkait pasien dan prosedur. Pencarian dilakukan pada PubMed, Scopus, dan Cochrane Library untuk studi yang melaporkan pankreatitis setelah ultrasonografi endoskopik dan faktor risikonya. Faktor risiko yang dilaporkan oleh sekurang-kurangnya dua studi dengan data dikotomis yang dapat diekstraksi digabungkan sebagai rasio risiko dengan

interval kepercayaan 95% menggunakan model efek tetap Mantel-Haenszel. Lima studi diikutsertakan, yaitu dua studi kohort, satu analisis gabungan multisenter, satu studi kasus-kontrol retrospektif, dan satu laporan kasus. Insidensi pankreatitis yang dilaporkan berkisar antara 0,29% dan 9,2%, mencerminkan perbedaan populasi studi dan risiko prosedural. Hanya dua studi menyediakan data untuk analisis gabungan. Pankreatitis tidak berhubungan bermakna dengan jenis kelamin (rasio risiko 1,13; interval kepercayaan 95% 0,48–2,64), riwayat pankreatitis (1,50; 0,60–3,75), maupun pengambilan sampel di kaput pankreas dibandingkan lokasi lain (1,21; 0,50–2,94), tanpa heterogenitas antarstudi. Pada tingkat studi individual, pankreatitis akut yang baru terjadi dan neoplasma musinosa papiler intraduktal tipe cabang samping berhubungan dengan risiko yang lebih tinggi. Pankreatitis setelah pengambilan sampel pankreas dengan panduan ultrasonografi endoskopik jarang terjadi, dan insidensinya bervariasi menurut seleksi pasien dan karakteristik prosedur. Hasil analisis gabungan terbatas oleh sedikitnya jumlah studi dan partisipan. Pankreatitis yang baru terjadi serta lintasan jarum melalui duktus pankreatikus atau parenkim normal dapat mengidentifikasi pasien berisiko tinggi dan perlu diteliti secara prospektif.

ABSTRACT

Endoscopic ultrasonography-guided tissue sampling is widely used to diagnose pancreatic lesions, but pancreatitis remains a clinically relevant adverse event, and evidence on its risk factors is inconsistent. This systematic review and meta-analysis aimed to summarize the incidence of pancreatitis after endoscopic ultrasonography and to evaluate patient- and procedure-related risk factors. PubMed, Scopus, and the Cochrane Library were searched for studies reporting pancreatitis after endoscopic ultrasonography and evaluating risk factors. Risk factors reported in at least two studies with extractable dichotomous data were pooled as risk ratios with 95% confidence intervals using the Mantel-Haenszel fixed-effect model. Five studies were included: two cohort studies, a multicenter pooled analysis, a retrospective case-control study, and a case report. The reported incidence of pancreatitis ranged from 0.29% to 9.2%, reflecting differences in study populations and procedural risk. Only two studies provided data suitable for pooling. Pancreatitis was not significantly associated with sex (risk ratio 1.13; 95% confidence interval 0.48–2.64), history of pancreatitis (1.50; 0.60–3.75), or sampling of the pancreatic head versus other locations (1.21; 0.50–2.94), and no between-study heterogeneity was observed. In individual studies, recent acute pancreatitis and side-branch intraductal papillary mucinous neoplasm were associated with a higher risk. Pancreatitis after endoscopic ultrasonography-guided pancreatic sampling is uncommon, and its reported incidence varies with patient selection and procedural characteristics. The pooled findings are limited by the small number of studies and participants. Recent pancreatitis and needle passage through the pancreatic duct or normal parenchyma may identify patients at higher risk and warrant prospective investigation.

This is an open access article under the [CC BY-NC](#) license.

Copyright © 2026 by Author. Published by Universitas Bina Bangsa Getsempena



INTRODUCTION

Endoscopic ultrasonography (EUS) is effective in detecting pancreatic masses; however, imaging alone cannot reliably distinguish between different lesion types. EUS-guided fine-needle aspiration (EUS-FNA) provides the tissue diagnosis needed to guide treatment decisions, with reported accuracy rates of 83% to 95% for pancreatic carcinoma, and the introduction of core-biopsy needles has extended the technique to histological and immunohistochemical analysis (Kamata et al., 2016). Because patients with suspected pancreatic tumors or cysts routinely undergo this procedure, any associated harm affects a substantial population (Kamata et al., 2016).

Pancreatitis is the most common adverse event associated with EUS-FNA (Magahis et al., 2024). Pooled incidence estimates range from 0.92% to 1.4% (Magahis et al., 2024; Zhu et al., 2017), underscoring the clinical significance of this complication. In a United States survey of 4,909 FNAs of solid pancreatic masses, 14 patients developed pancreatitis; hospital stays ranged from 1 to 21 days, one case was classified as severe, and one patient with multiple comorbidities died after developing pancreatitis (Eloubeidi et al., 2004). Retrospective series may underestimate the true incidence: the two centers that tracked complications prospectively reported a rate of 0.64%, compared with 0.26% in the

retrospective cohort (Eloubeidi et al., 2004). In a prospective cohort, 9.2% of patients sampled through at least 5 mm of normal parenchyma or through the pancreatic duct developed pancreatitis, and patients who experience this complication may subsequently decline the repeat surveillance EUS that disease management often requires (Ribeiro & Goel, 2018).

Identifying patients at risk of post-procedural pancreatitis remains difficult because the current evidence is inconclusive. In one cohort, recent acute pancreatitis was a significant predictor (odds ratio 9.48; Ribeiro & Goel, 2018). Another study found that side-branch intraductal papillary mucinous neoplasm (SB-IPMN) increased the pancreatitis rate to 8%, compared with 1.3% for other cysts (Siddiqui et al., 2015). Additional factors, such as small lesions, neuroendocrine tumors, same-day endoscopic retrograde cholangiopancreatography (ERCP), and a higher number of punctures, have also been implicated (Katanuma et al., 2013; Lee et al., 2017). The American Society for Gastrointestinal Endoscopy (ASGE) guideline attributes this uncertainty to inconsistent outcome definitions and a lack of prospective studies (Sheth et al., 2024). Published meta-analyses have pooled incidence and examined study-level covariates; the most recent found no association with age, sex, cyst size, needle caliber, or number of passes (Magahis et al., 2024).

To our knowledge, no meta-analysis has pooled within-study comparisons of individual risk factors using dichotomous data. We therefore conducted a systematic review and meta-analysis to summarize the incidence of pancreatitis following EUS and to pool risk factors reported by at least two eligible studies, with the aim of helping endoscopists identify high-risk patients before the procedure.

RESEARCH METHOD

A systematic literature search was conducted in three electronic databases (PubMed, Scopus, and the Cochrane Library) to identify studies evaluating the risk of pancreatitis following EUS. The search string was “(post endoscopy ultrasonography) AND (pancreatitis) AND (risk)”. Studies reporting pancreatitis following EUS and evaluating potential risk factors were eligible for inclusion.

Risk factors reported in at least two eligible studies with extractable dichotomous data were pooled in a meta-analysis. Pooled risk ratios (RRs) with 95% confidence intervals (CIs) were calculated using the Mantel-Haenszel fixed-effect model. Between-study heterogeneity was assessed using the chi-square (χ^2) test and quantified with the I^2

statistic; I^2 values of 0–25%, 26–50%, and >50% were considered to indicate low, moderate, and substantial heterogeneity, respectively. A p -value < 0.05 was considered statistically significant for all analyses.

RESULTS AND DISCUSSION

Results

The literature search identified five studies that met the inclusion criteria, all of which were included in this systematic review (Figure 1). The included studies varied in design: two cohort studies (one prospective and one retrospective), a multicenter pooled analysis, a retrospective case–control study, and a case report (Ardengh et al., 2019; Eloubeidi et al., 2004; Ribeiro & Goel, 2018; Siddiqui et al., 2015; Yu et al., 2021). Across these studies, the reported incidence of post-EUS pancreatitis ranged from 0.29% to 9.2% (Table 1).

Several factors associated with post-EUS pancreatitis were identified at the individual-study level. Ribeiro and Goel (2018) reported that a history of recent acute pancreatitis was the only significant predictor of post-EUS pancreatitis in logistic regression ($p = 0.008$). Siddiqui et al. (2015) found that patients with SB-IPMN had a substantially higher risk of pancreatitis than those with other cyst types (8% vs. 1.3%; odds ratio [OR] 6.4, $p = 0.05$). In contrast, Yu et al. (2021) reported no significant association between patient factors, lesion location, or procedural details and the risk of post-EUS pancreatitis. The characteristics and findings of all included studies are summarized in Table 1.

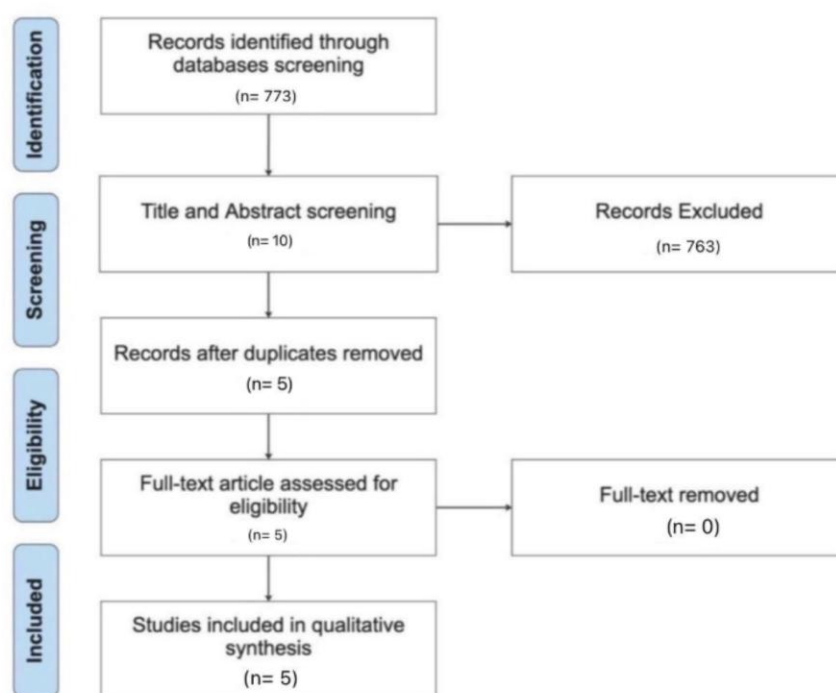


Figure 1. Flowchart of the literature search and study selection

Table 1. Characteristics of the included studies

Study	Population	Study design	Main findings
Ribeiro and Goel (2018)	712 patients (163 in the high-risk group)	Prospective cohort study	Pancreatitis developed in 9.2% of high-risk patients after EUS-FNA; a history of recent acute pancreatitis was the only significant risk factor ($p = 0.008$).
Siddiqui et al. (2015)	743 patients (186 with pancreatic cysts)	Retrospective cohort study	Pancreatitis developed in 2.6% of patients with pancreatic cysts; patients with SB-IPMN had a higher rate than those with other cyst types (8% vs. 1.3%; OR 6.4, $p = 0.05$).
Eloubeidi et al. (2004)	4,909 procedures	Multicenter pooled analysis	Pancreatitis occurred after 0.29% of procedures; the frequency was higher (0.64%) at centers with prospective data collection.
Ardengh et al. (2019)	1 patient	Case report	Five episodes of acute pancreatitis occurred within one year after EUS-FNA.
Yu et al. (2021)	2,008 patients	Retrospective case-control study	Pancreatitis developed in 0.75%; no significant associations were found between patient factors, lesion location, or procedural details and post-EUS pancreatitis.

EUS-FNA, endoscopic ultrasonography-guided fine-needle aspiration; OR, odds ratio; SB-IPMN, side-branch intraductal papillary mucinous neoplasm.

Of the five included studies, only two (Ribeiro & Goel, 2018; Siddiqui et al., 2015) provided extractable subgroup data suitable for meta-analysis. Pooled analyses were therefore conducted for three suspected risk factors: sex, history of pancreatitis, and the anatomical location of FNA within the pancreas.

For sex, pooled analysis of 188 female and 161 male patients showed no significant difference in the risk of pancreatitis (RR 1.13, 95% CI 0.48–2.64; $Z = 0.28$, $p = 0.78$), with no heterogeneity between studies ($I^2 = 0\%$) (Figure 2).

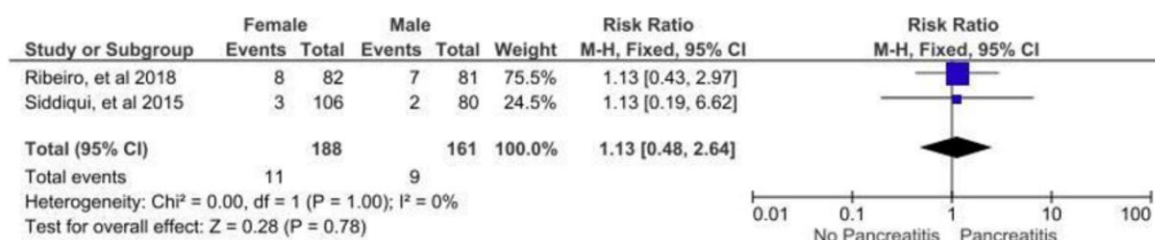


Figure 2. Forest plot of the association between sex and the risk of post-EUS pancreatitis

For history of pancreatitis, pooled analysis of 69 patients with and 280 patients without a prior history showed no significant association with the risk of post-EUS pancreatitis (RR 1.50, 95% CI 0.60–3.75; $Z = 0.87$, $p = 0.39$; $I^2 = 0\%$) (Figure 3).

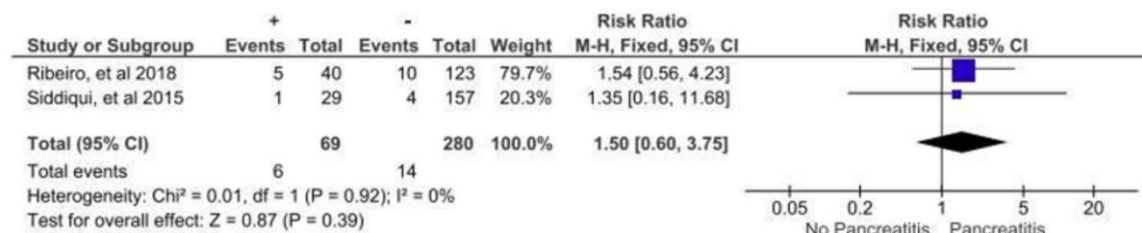


Figure 3. Forest plot of the association between history of pancreatitis and the risk of post-EUS pancreatitis

For FNA location, pooled analysis of 171 procedures in the pancreatic head and 178 procedures at other pancreatic locations showed no significant difference in pancreatitis risk (RR 1.21, 95% CI 0.50–2.94; $Z = 0.42$, $p = 0.67$; $I^2 = 0\%$) (Figure 4).

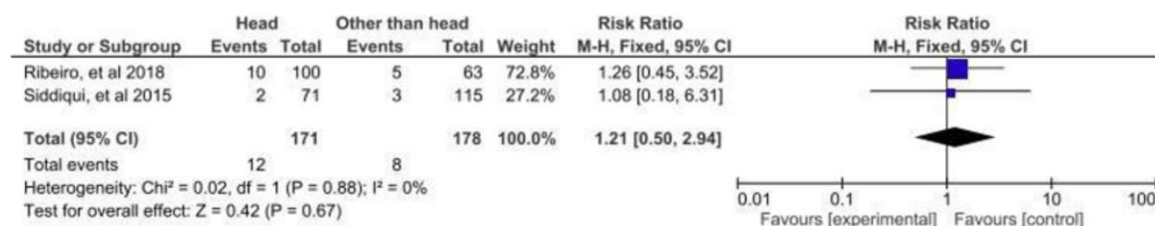


Figure 4. Forest plot of the association between FNA location (pancreatic head versus other locations) and the risk of post-EUS pancreatitis

Taken together, none of the three analyzed factors (sex, history of pancreatitis, or FNA location) showed a statistically significant association with the risk of pancreatitis following EUS.

Discussion

Across the five studies included in this review, the reported incidence of pancreatitis following EUS-guided sampling of the pancreas ranged from 0.29% in the multicenter survey of 4,909 solid-mass FNAs by Eloubeidi et al. (2004) to 9.2% in the prospective cohort of Ribeiro and Goel (2018), which was restricted to needle paths traversing 5 mm or more of normal parenchyma or the pancreatic duct. Pooled analyses of sex, history of pancreatitis, and FNA location showed no significant associations; however, each comparison was based on only two studies. These null results indicate insufficient data rather than evidence of procedural safety.

The variation in incidence appears attributable to differences in study denominators and design rather than to differences in the inherent risk of the procedure. In the survey by Eloubeidi et al. (2004), the two centers that tracked complications prospectively reported a rate of 0.64%, compared with 0.26% in the retrospective cohort, a difference attributed to under-reporting in retrospective series. Ribeiro and Goel (2018) constructed their high-risk cohort by selecting needle paths expected to carry the greatest risk; their low-risk arm, sampled through less than 5 mm of parenchyma, had a rate of 0.18%, consistent with Eloubeidi et al. (2004) and with the matched case-control series of Yu et al. (2021), which reported 0.75% across 2,008 procedures. The cohort of Siddiqui et al. (2015), which was not selected by needle path, reported rates of 2.6% for cysts and 0.36% for solid lesions. Collectively, these data describe a single procedure evaluated across a risk gradient rather than conflicting estimates of a uniform background rate.

A recent episode of acute pancreatitis emerged as the strongest predictor at the individual-study level. In the logistic regression of Ribeiro and Goel (2018), it was the only independent predictor of post-EUS pancreatitis, with an odds ratio of 9.48. Siddiqui et al. (2015) also identified a previous history of acute pancreatitis as significant in multiple regression analysis ($p = 0.02$), despite a non-significant univariate comparison, a pattern suggestive of confounding by cyst type in the simpler analysis. In contrast, Yu et al. (2021) reported that none of the 15 patients who developed pancreatitis had a history of acute or chronic pancreatitis. This discrepancy likely reflects differences in case mix: the cohort of Yu et al. (2021) was unselected and included more malignant lesions, whereas that of Ribeiro and Goel (2018) was predominantly benign and focused on parenchymal traversal,

a context in which a recently inflamed gland is more susceptible. Mechanistically, edematous or friable parenchyma is more prone to tearing during needle passage, and leakage from the duct or its branches can initiate the same inflammatory cascade observed after ERCP (Eloubeidi et al., 2004; Iglesias-Garcia et al., 2014). Ribeiro and Goel (2018) cite a recommendation to wait up to eight weeks after an acute episode before biopsy, while noting that suspicion of malignancy can make this delay impractical.

Anatomical factors provided the most consistent findings. In the series of Ribeiro and Goel (2018), puncture of the pancreatic duct was associated with the highest crude rate (17.6%), and traversal of at least 5 mm of normal parenchyma separated a 9.2% rate from a 0.18% rate. Increasing the depth beyond this threshold did not further increase the risk; patients sampled through more than 10 mm had outcomes similar to those sampled through less. Trauma to even a small amount of normal gland, rather than the extent of injury, appears to trigger pancreatitis, possibly in combination with an individual predisposition (Ribeiro & Goel, 2018; Sharbidre et al., 2020). The findings of Siddiqui et al. (2015) support this view: SB-IPMN was associated with a pancreatitis rate of 8% compared with 1.3% for other cysts (OR 6.4), which the authors attributed to direct communication between the cyst and the main pancreatic duct, exposing the duct to similar injury. Although the two studies disagree on whether solid or cystic lesions carry the greater risk, the disagreement resolves when duct communication and parenchymal traversal, rather than lesion type, are considered the primary variables.

Needle gauge and the number of passes did not appear to influence outcomes. Ribeiro and Goel (2018) observed no difference between 22-gauge and 19-gauge needles, and Yu et al. (2021) identified no factor, including the number of passes, that distinguished cases from matched controls. Pharmacological prevention remains unproven in this setting: although rectal indomethacin reduces the risk of pancreatitis after ERCP (Abdelfatah et al., 2020; Thiruvengadam et al., 2016), no trial has evaluated its efficacy after EUS-FNA.

The five studies reviewed differ in design, ranging from a multicenter survey to a single case report, and each pooled comparison in this review was based on no more than two studies. A prospective multicenter study that uses a standardized definition of post-EUS pancreatitis and has sufficient power to examine individual risk factors, rather than relying on study-level subgroups, is needed to overcome the limitations of the current pooled estimates.

CONCLUSIONS AND RECOMMENDATIONS

Pancreatitis is an uncommon but clinically relevant complication of EUS-guided pancreatic sampling, and its reported incidence varies with patient selection and procedural characteristics. In the pooled analysis, no statistically significant associations were found between sex, history of pancreatitis, or FNA location and post-EUS pancreatitis. These findings should be interpreted cautiously because each pooled analysis was based on only two studies. Recent pancreatitis and procedural factors involving pancreatic duct puncture or parenchymal traversal may represent clinically relevant risk factors and warrant further evaluation in prospective multicenter studies.

REFERENCES

- Abdelfatah, M. M., Gochanour, E., Koutlas, N. J., Hamed, A., Harvin, G., & Othman, M. O. (2020). Rectal indomethacin reduces the risk of post-endoscopic retrograde cholangiopancreatography pancreatitis in low-risk patients. *Annals of Gastroenterology*, 33(4), 405–411. <https://doi.org/10.20524/aog.2020.0492>
- Ardengh, J. C., Venco, F., Micelli-Neto, O., Taglieri, E., Teixeira Orsini, E., Kemp, R., Dos Santos, J. S., & Valdivia López, K. A. (2019). A rare case of recurrent acute pancreatitis after EUS-FNA in a patient with pancreatic intraepithelial neoplasia type 2. *Revista de Gastroenterología del Perú*, 39(2), 183–186.
- Eloubeidi, M. A., Gress, F. G., Savides, T. J., Wiersema, M. J., Kochman, M. L., Ahmad, N. A., Ginsberg, G. G., Erickson, R. A., Dewitt, J., Van Dam, J., Nickl, N. J., Levy, M. J., Clain, J. E., Chak, A., Sivak, M. V., Wong, R., Isenberg, G., Scheiman, J. M., Bounds, B., . . . Wilcox, C. M. (2004). Acute pancreatitis after EUS-guided FNA of solid pancreatic masses: A pooled analysis from EUS centers in the United States. *Gastrointestinal Endoscopy*, 60(3), 385–389. [https://doi.org/10.1016/S0016-5107\(04\)01714-6](https://doi.org/10.1016/S0016-5107(04)01714-6)
- Iglesias-Garcia, J., Lariño-Noia, J., & Domínguez-Muñoz, J. E. (2014). When to puncture, when not to puncture: Pancreatic masses. *Endoscopic Ultrasound*, 3(2), 91–97. <https://doi.org/10.4103/2303-9027.123007>
- Kamata, K., Kitano, M., Omoto, S., Kadosaka, K., Miyata, T., Minaga, K., Yamao, K., Imai, H., & Kudo, M. (2016). New endoscopic ultrasonography techniques for pancreaticobiliary diseases. *Ultrasonography*, 35(3), 169–179. <https://doi.org/10.14366/usg.15042>
- Katanuma, A., Maguchi, H., Yane, K., Hashigo, S., Kin, T., Kaneko, M., Kato, S., Kato, R., Harada, R., Osanai, M., Takahashi, K., & Nojima, M. (2013). Factors predictive of adverse events associated with endoscopic ultrasound-guided fine needle aspiration of pancreatic solid lesions. *Digestive Diseases and Sciences*, 58(7), 2093–2099. <https://doi.org/10.1007/s10620-013-2590-4>
- Lee, K. H., Kim, E. Y., Cho, J., Kang, D., Bang, S., Kim, H. K., Kim, G. H., Choi, H. J., Han, J.-H., Jeon, S. W., Ryu, J. K., Moon, J. S., Lee, T. H., Cho, J. W., Kim, T. H., Cheon, Y. K., Park, C.-H., Lee, J. K., Moon, J. H., & Cho, C. M. (2017). Risk factors associated with adverse events during endoscopic ultrasound-guided tissue sampling. *PLOS ONE*, 12(12), Article e0189347. <https://doi.org/10.1371/journal.pone.0189347>

-
- Magahis, P. T., Chhoda, A., Berzin, T. M., Farrell, J. J., Wright, D. N., Rizvi, A., Hanscom, M., Carr-Locke, D. L., Sampath, K., Sharaiha, R. Z., & Mahadev, S. (2024). Risk of pancreatitis after endoscopic ultrasound-guided fine-needle aspiration of pancreatic cystic lesions: A systematic review and meta-analysis. *The American Journal of Gastroenterology*, 119(11), 2174–2186. <https://doi.org/10.14309/ajg.0000000000002942>
- Ribeiro, A., & Goel, A. (2018). The risk factors for acute pancreatitis after endoscopic ultrasound guided biopsy. *The Korean Journal of Gastroenterology*, 72(3), 135–140. <https://doi.org/10.4166/kjg.2018.72.3.135>
- Sharbidre, K. G., Galgano, S. J., & Morgan, D. E. (2020). Traumatic pancreatitis. *Abdominal Radiology*, 45(5), 1265–1276. <https://doi.org/10.1007/s00261-019-02241-7>
- Sheth, S. G., Machicado, J. D., Chalhoub, J. M., Forsmark, C., Zyromski, N., Thosani, N. C., Thiruvengadam, N. R., Ruan, W., Pawa, S., Ngamruengphong, S., Marya, N. B., Kohli, D. R., Fujii-Lau, L. L., Forbes, N., Elhanafi, S. E., Desai, M., Cosgrove, N., Coelho-Prabhu, N., Amateau, S. K., . . . Qumseya, B. J. (2024). American Society for Gastrointestinal Endoscopy guideline on the role of endoscopy in the management of chronic pancreatitis: Summary and recommendations. *Gastrointestinal Endoscopy*, 100(4), 584–594. <https://doi.org/10.1016/j.gie.2024.05.016>
- Siddiqui, A. A., Shahid, H., Shah, A., Khurana, T., Huntington, W., Ghumman, S. S., Loren, D. E., Kowalski, T. E., Laique, S., Hayat, U., & Eloubeidi, M. A. (2015). High risk of acute pancreatitis after endoscopic ultrasound-guided fine needle aspiration of side branch intraductal papillary mucinous neoplasms. *Endoscopic Ultrasound*, 4(2), 109–114. <https://doi.org/10.4103/2303-9027.156728>
- Thiruvengadam, N. R., Forde, K. A., Ma, G. K., Ahmad, N., Chandrasekhara, V., Ginsberg, G. G., Ho, I. K., Jaffe, D., Panganamamula, K. V., & Kochman, M. L. (2016). Rectal indomethacin reduces pancreatitis in high- and low-risk patients undergoing endoscopic retrograde cholangiopancreatography. *Gastroenterology*, 151(2), 288–297.e4. <https://doi.org/10.1053/j.gastro.2016.04.048>
- Yu, A., Kumar, S., Coronel, M., Coronel, E., Ge, P. S., Bhutani, M. S., Weston, B. R., Ross, W. A., & Lee, J. (2021). Acute pancreatitis after endoscopic ultrasound guided sampling of pancreatic lesions [Abstract]. *Gastrointestinal Endoscopy*, 93(6, Suppl.), AB252. <https://doi.org/10.1016/j.gie.2021.03.544>
- Zhu, H., Jiang, F., Zhu, J., Du, Y., Jin, Z., & Li, Z. (2017). Assessment of morbidity and mortality associated with endoscopic ultrasound-guided fine-needle aspiration for pancreatic cystic lesions: A systematic review and meta-analysis. *Digestive Endoscopy*, 29(6), 667–675. <https://doi.org/10.1111/den.12851>