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Research Letter

# Surgery vs endoscopy for chronic pancreatitis: Long-term outcomes in a propensity-matched Chinese cohort

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Chronic pancreatitis (CP) is a progressive fibro-inflammatory disorder characterized by recurrent abdominal pain and irreversible pancreatic functional decline [1]. Current therapeutic strategies include endoscopic and surgical interventions, aiming to alleviate ductal obstruction and restore physiological drainage [2]. The efficacy of these two strategies in pain relief had been compared in several studies; however, no consistent conclusions have been reached [3,4]. Furthermore, the long-term efficacy of these two approaches, particularly regarding functional preservation and healthcare burden, remains contentious. The present study aims to evaluate the long-term outcomes of endoscopic versus surgical treatment, concentrating on the following three indicators: long-term pain relief, pancreatic function preservation, and hospitalization-related metrics.

This study was conducted based on a large, prospective cohort from a major, high-volume CP referral center in China. Patients diagnosed with CP and underwent endoscopic or surgical treatment between 2010 and 2021 were enrolled. To minimize selection bias, a 1:2 nearest-neighbor propensity score matching (PSM) was applied, adjusting for key baseline characteristics. This process yielded a final cohort of 116 endoscopy-treated and 58 surgery-treated patients with well-balanced demographics. The median follow-up duration was 6 years (Enrollment flowchart see Fig. 1, Baseline characteristics before and after PSM see Supplementary Table 1). The endoscopic treatment protocol, primarily involving extracorporeal shock wave lithotripsy (ESWL) and endoscopic retrograde cholangiopancreatography (ERCP), was performed as previously described [5]. All surgical procedures were carried out by experienced pancreatic surgeons, and the

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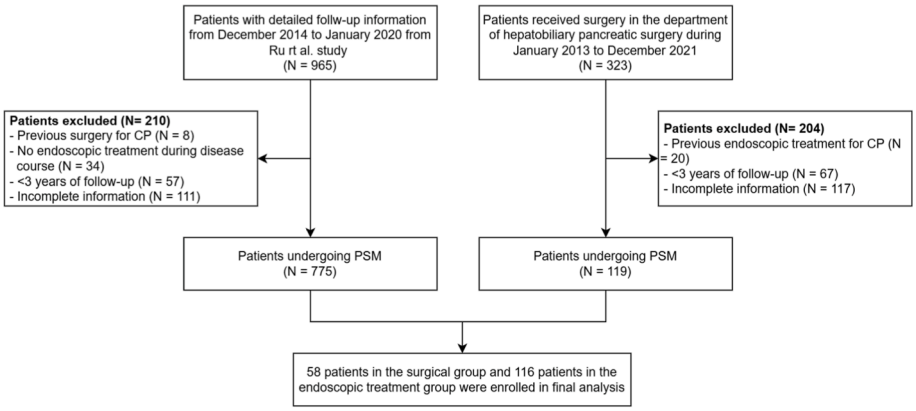


**Fig. 1.** Enrollment flowchart.

choice of surgical method for each patient was determined based on the patient's anatomical pathology and the surgeon's clinical judgment. Detailed descriptions of the endoscopic and surgical treatments, as well as procedure-related adverse events, are summarized in Supplementary Table 2,3 and 4. During follow-up period, all subsequent endoscopic and surgical procedures occurring at our institution were documented in detail (Supplementary Table 5). Data on procedures performed was extracted from electronic medical records. Patient follow-up data were systematically collected via structured telephone interviews or scheduled outpatient visits at least once a year.

As shown in Table 1, pain relief at the end of follow-up was observed in 55 of 58 patients (94.8 %) in surgical group and in 107 of 116(92.2 %) in endoscopic group, with no significant difference ($P = 0.249$). Endoscopic treatment was associated with superior preservation of pancreatic function. This was evidenced by a significantly lower incidence of new-onset steatorrhea (14.7 % vs. 22.4 %; $P = 0.033$) and a numerically lower, though not statistically significant, incidence of new-onset diabetes (25.0 % vs. 32.8 %; $P = 0.336$). During follow-up, 60.3 % of patients in the endoscopy group required repeat ERCP and/or ESWL, which contributed to a significantly higher mean number of hospital admissions (2.8 vs. 1.2; $P < 0.001$). In contrast, the total length of hospital stay (19.7 vs. 15.8 days; $P = 0.056$) and overall hospitalization costs (60,474 vs. 57,049 CNY; $P = 0.885$) were comparable.

Pain alleviation is regarded as the primary treatment goal for CP, considering that almost all patients may report pain over time. Although a higher rate of complete pain relief was observed in surgical group, the overall pain outcomes were comparable between the two groups, which was inconsistent with the previous studies [3,6]. This discrepancy may be attributed to variations in follow-up duration and patient etiology. Our cohort consisted predominantly (>60 %) of patients with idiopathic CP, whereas earlier studies mainly enrolled those with alcoholic CP. The latter is often characterized by progressive calcifications and ductal strictures [7], which may be more amenable to surgical drainage in the short term. In contrast, idiopathic CP patients, with relatively mild disease course [8], might derive sustained benefits from minimally invasive endoscopic therapies. Furthermore, the median follow-up period of 6 years in our study allowed for the observation of "catch-up" efficacy in endoscopic treatment, as repeated interventions could incrementally address recurrent obstructions, whereas surgical benefits might plateau over time. From a safety perspective, although the incidence of procedure-related complications was comparable between the two groups (22.4 % vs. 15.5 %, $P = 0.296$), surgical complications included severe events like pancreatic fistula, while all endoscopic adverse events were managed conservatively. These observations further highlight the safety advantage of endoscopic treatment.

While the pain-related outcomes might be doubted for potential placebo or sham effects associated with invasive procedures [9], this study also focused on objective functional indicators—specifically, new-onset diabetes and steatorrhea. These metrics are less susceptible to placebo effects and provide a

**Table 1**
Outcomes of surgical and endoscopic treatment at end of follow-up.

| Categories | Surgery (N = 58) | Endoscopy (N = 116) | RR/Cliff's Delta (95 %CI) | *P* value |
|---|---|---|---|---|
| Pain relief -n (%) | 55 (94.8) | 107 (92.2) | 0.994 (0.726–1.360)[a] | 0.249[b] |
| Partial | 11 (19.0) | 34 (29.3) | | |
| Complete | 44 (75.9) | 73 (62.9) | | |
| DM-n (%) | 26 (44.8) | 42 (36.2) | 1.238 (0.852–1.800)[a] | 0.350[c] |
| New onset | 19 (32.8) | 29 (25.0) | 1.323 (0.826–2.120)[a] | 0.336[c] |
| Steatorrhea-n (%) | 31 (53.5) | 24 (20.7) | 2.629 (1.713–4.034)[a] | <0.001[c] |
| New onset | 13 (22.4) | 17 (14.7) | 2.137 (1.147–3.984)[a] | 0.033[c] |
| Length of hospital stay-days | 15.8 (10.2–16.8) | 19.7 (10.8–24.2) | −0.178 (−0.345-0.000)[d] | 0.056[e] |
| Hospitalization cost- RMB | 57049.3 (38136.5–61306.1) | 60473.5 (32876.6–82632.7) | 0.014 (−0.156-0.182)[d] | 0.885[e] |
| Hospital admission during follow up period-n | 1.2 ± 0.5 | 2.8 ± 2.1 | 0.419 (0.321–0.540)[a] | <0.001[f] |

*DM* diabetes mellitus, *RR* rate ratio, *CI* confidence interval.
[a] RR value.
[b] Fisher's exact test.
[c] Pearson's Chi-squared test.
[d] Cliff's Delta value.
[e] Mann-Whitney *U* test.
[f] Poisson regression.

more robust basis for evaluating long-term therapeutic efficacy. Our data demonstrated higher rates of both new-onset diabetes and steatorrhea in the surgical group, with the difference in steatorrhea reaching statistical significance. This divergence underscores the critical importance of pancreatic parenchymal preservation. Surgical intervention inevitably involves the removal or disruption of pancreatic tissue and alters gastrointestinal anatomy, predisposing patients to pancreatic insufficiency. In contrast, endoscopic therapy achieves ductal decompression without substantial parenchymal sacrifice, which may explain the lower rates of steatorrhea observed in our cohort. These findings are consistent with prior evidence that ductal decompression, whether endoscopic or surgical, can provide durable symptomatic relief and help retard functional decline in selected patients [10]. Collectively, our results support an endoscopy-first strategy for appropriately selected individuals, with surgical resection reserved for cases of endoscopic failure or unfavorable ductal anatomy [3].

This study has limitations. First, it was conducted at a single tertiary center, and pain was evaluated using visual analogue scale rather than the multidimensional Izbicki score. Second, biochemical confirmation of steatorrhea was not available for all suspected cases, which may have led to underestimation of exocrine insufficiency. Third, systematic genetic testing was performed only in the endoscopic cohort, and hereditary CP in the surgical group was defined clinically, introducing the possibility of etiologic misclassification. Finally, part of the follow-up was conducted by telephone, potentially limiting granularity in functional assessments.

In this propensity-matched cohort with long-term follow-up, endoscopic therapy achieved pain outcomes comparable to surgery while better preserving pancreatic function. Although associated with more admissions, cumulative hospitalization burden and overall costs remained similar. These findings support an endoscopy-first strategy in appropriately selected patients, with surgery reserved for refractory disease. Further etiology-stratified and methodologically standardized studies are needed to refine individualized treatment algorithms.

## Author contributions

Concept and design: Li G and Zou WB; acquisition, analysis, or interpretation of data: Ma CT, Chen JY, Shi TY, Liang JR, Zhang C, Wang Z, Hu JY and Huang ZR; drafting of the manuscript: Ru N, Ma CT, Wang YC; critical revision of the manuscript for important intellectual content: all authors; study supervision: Li G and Zou WB. All the authors approved the final manuscript.

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## Conflict of interest declaration

The authors declare that they have no affiliations with or involvement in any organization or entity with any financial interest.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.pan.2026.01.008.

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