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How “Dirty” Are the Endoscope Channels? A Systematic Review and Meta-Analysis of Reprocessed Endoscopes

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Abstracts

S988 Presidential Poster Award Winner

Risk Factors for Readmissions in Patients Undergoing Endoscopic Therapy for Peripancreatic Fluid Collections

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Introduction: Pancreatitis-related peripancreatic fluid collections (PPFCs) are associated with significant healthcare burden. Despite advancements in endoscopic therapy, recovery may be prolonged and require multiple hospital admissions. We evaluated the rate of unplanned readmissions, and risk factors for readmission, among patients undergoing endoscopic therapy for PPFCs.

Methods: We performed a retrospective study at a single academic medical center of patients undergoing cystogastrostomy with an electrosurgery enhanced lumen apposing stent for PPFCs from June 2016 – May 2021. All patients had cross-sectional imaging reviewed by a single radiologist to characterize collections per the Revised Atlanta Classification for Acute Pancreatitis. Patient demographics, treatment data, and clinical course were obtained from review of the electronic medical record. Unplanned readmissions were defined as subsequent, unscheduled admissions following prior endoscopic therapy.

Results: Ninety-nine patients (60/61% walled off necrosis (WON) and 39/39% pseudocyst) underwent 414 endoscopic procedures. Post-index cystogastrostomy, patients had a mean of 3.2 (SD ±1.4) endoscopic interventions, including 16 (16%) with multi-transluminal gateway strategy and 26 (25%) with direct endoscopic necrosectomy. Eighteen patients had adjacent percutaneous drainage (18%) Clinical success was achieved in 83/88 (94%) patients with sufficient follow-up data available. Forty-two (14%) unplanned readmissions occurred over 300 encounters following index therapy. The most common reasons for readmission were sepsis (n=18; 43%), abdominal pain (n=10; 24%), gastrointestinal bleeding (n=10; 24%), and post-procedural observation (n=9; 12%). Twenty-two (52%) readmission events required endoscopic intervention. Factors associated with readmissions were antiplatelet therapy (60% vs. 10%, P < 0.01), nutritional support requirements (40% vs. 16%, P < 0.01), and index paracolic gutter extension (80% vs. 17%, P < 0.01). Readmission events required endoscopic intervention. Factors associated with readmissions were antiplatelet therapy (60% vs. 10%, P < 0.01), nutritional support requirements (40% vs. 16%, P < 0.01), and index paracolic gutter extension (80% vs. 17%, P < 0.01). Multivariable analysis demonstrated paracolic gutter extension (OR 2.06 95% CI 1.15 - 3.86) as the only independent risk factor for readmission.

Conclusion: Unplanned readmissions are common in patients undergoing endoscopic drainage for peripancreatic fluid collections, with increased risk in those with paracolic gutter extension, antiplatelet use, or requiring nutritional support. Further investigation is needed to identify interventions that may reduce readmission rates.

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Mid-Term and Long-Term Outcomes of Peroral Endoscopic Myotomy for the Treatment of Achalasia: A Systematic Review and Meta-Analysis

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Introduction: Current evidence has shown that peroral endoscopic myotomy (POEM) had a satisfactory short-term clinical response in treatment of patients with achalasia. Data are limited on the long-term durability of POEM in achalasia patients. The aim of this study was to determine the mid-term and long-term outcomes of patients undergoing POEM.

Methods: We searched the Embase, Cochrane, and PubMed databases from inception to January 2021 using the designed search strategy. Data on technical and clinical success, adverse events, Eckardt score, lower esophageal sphincter (LES) pressure, and integrated relaxation pressure (IRP) were collected. The pooled event rates and mean differences (MD) were calculated.

Results: A total of 21 studies with 2,698 achalasia patients were included. Overall, the pooled technical success and adverse events rate of POEM were 98.6% (95% confidence interval [CI], 97.9% to 99.0%) and 16.3% (95% CI, 11.4 % to 22.8%). The pooled results of clinical success rates for 2-, 3-, and 4-, and 3-year follow-ups were 90.9% (95% CI, 88.2% to 93.1%), 90.4% (95% CI, 88.1% to 92.2%), 89.9% (95% CI, 83.6% to 93.9%) and 82.2% (95% CI, 76.6% to 86.7%), respectively. During the follow-up, the mean Eckardt score was significantly decreased by 5.90 points (95% CI, 5.40 to 6.41; p< 0.001, I² = 91%).

Conclusion: POEM is a highly safe and effective treatment for esophageal achalasia with favorable long-term outcomes.

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The Scientific Progresses and Prospects of Artificial Intelligence in Digestive Endoscopy: A Comprehensive Bibliometric Analysis

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Introduction: A growing number of studies have reported artificial intelligence (AI) has been developed for diagnosis and outcome prediction in clinical practice. Furthermore, AI in digestive endoscopy has attracted much attention, which has shown promising and stimulating results. Our study aimed to visualize the articles to determine the trends and hotspots of AI in digestive endoscopy.

Methods: Publications on AI in digestive endoscopy research were retrieved from the Web of Science Core Collection (WoSCC) on March 14, 2021. Microsoft Excel 2016, VOSviewer 1.6.11.0, and Citeseer V were used to assess and plot the research output.

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S991 How “Dirty” Are the Endoscope Channels? A Systematic Review and Meta-Analysis of Reprocessed Endoscopes

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Introduction: The duodenoScope elevator mechanism has been considered a culprit for multiple outbreaks from contaminated reusable patient-ready duodenoscopes. These outbreaks necessitated FDA to issue various Safety Communications and recommend endoscopy units to transition to duodenoscopes with innovative designs that ease or eliminate reprocessing. However, numerous...
studies have documented microbes in the channels of reprocessed gastrointestinal (GI) endoscopes, including duodenoscopes and linear echoendoscopes. Our aim is to estimate the channel contamination rate of patient-ready reprocessed GI endoscopes based on the currently available data.

Methods: We searched PubMed, Web of Science, and Embase from January 1, 2010, until October 30, 2020, for studies investigated contamination rates of channels of patient-ready flexible GI endoscopes by following the PRISMA guidelines. A random-effects model based on the proportion distribution was used to calculate pooled total contamination rate. A subgroup analysis was carried out for studies originating from North America (USA and Canada). We used the meta-package (metafor) in RStudio version 3.8-2 to conduct the statistical analysis. Heterogeneity between the included studies was analyzed using the inconsistency index (I^2) statistics. Publication bias was assessed using funnel plots and Egger’s regression test.

Results: We identified 1,230 peer-reviewed studies after duplicates were removed. Finally, 20 studies fulfilled the inclusion criteria, including 1,059 positive cultures from 7,903 samples. The total weighted contamination rate was 19.98% ± 0.24% (95% CI: 13.59%–24.48%; I^2=98.6%) (figure 1a). Subgroup analysis amongst studies from North America (n=7) showed a contamination rate of 6.01±0.01 (95% CI: 3.88%-8.15%; I^2=98.5%) (figure 1b). I^2 indicated high heterogeneity. Egger’s regression test indicated no significant publication bias for both groups (Egger’s test of publication bias: p=0.0531 and p=0.0655).

Conclusion: Our analysis demonstrates that 19.98% of reprocessed patient-ready GI endoscopes may be contaminated. The contamination rate was lower amongst US studies, which may be attributed to the actions taken in the US to overcome this issue. However, our findings highlight that the elevator mechanism is not the only obstacle when reprocessing endoscopes. More studies are needed to fully determine the role of contaminated endoscope channels in the cross-transmission between the patients.

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**Table 1. Study characteristics of included studies.**

<table>
<thead>
<tr>
<th>Study year</th>
<th>Study design</th>
<th>Country</th>
<th>Sampled procedure</th>
<th>Positive cultures</th>
<th>Sample size</th>
<th>Type of investigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>Prospective randomized controlled study</td>
<td>USA</td>
<td>Working channel</td>
<td>9</td>
<td>756</td>
<td>N/A</td>
</tr>
<tr>
<td>2018</td>
<td>Prospective randomized controlled study</td>
<td>Netherlands</td>
<td>Biliary channel, second channel</td>
<td>9</td>
<td>285</td>
<td>N/A</td>
</tr>
<tr>
<td>2017-2018</td>
<td>Prospective randomized controlled study</td>
<td>USA</td>
<td>Working channel</td>
<td>24</td>
<td>1960</td>
<td>N/A</td>
</tr>
<tr>
<td>2020</td>
<td>Descriptive study</td>
<td>USA</td>
<td>Working channel</td>
<td>25</td>
<td>2305</td>
<td>N/A</td>
</tr>
<tr>
<td>2019</td>
<td>Descriptive study</td>
<td>Taiwan</td>
<td>Working channel</td>
<td>41</td>
<td>135</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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**Figure 1.** Forest plot of gastric neoplasm studies with and without continuation of low-dose aspirin.

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**Table 2.** Pooled estimates of contamination rates beyond the elevator of reprocessed duodenoscopes. CI. confidence interval; prop. proportion.

<table>
<thead>
<tr>
<th>Study year</th>
<th>Events</th>
<th>N</th>
<th>Rate</th>
<th>95% CI weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>51</td>
<td>390</td>
<td>0.02</td>
<td>[0.010, 0.031]</td>
</tr>
<tr>
<td>2018</td>
<td>47</td>
<td>324</td>
<td>0.09</td>
<td>[0.050, 0.139]</td>
</tr>
<tr>
<td>2019</td>
<td>61</td>
<td>500</td>
<td>0.12</td>
<td>[0.071, 0.193]</td>
</tr>
<tr>
<td>2020</td>
<td>138</td>
<td>1000</td>
<td>0.14</td>
<td>[0.094, 0.208]</td>
</tr>
</tbody>
</table>

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**Figure 2.** Figure 1. Pooled estimates of contamination rates beyond the elevator of patient-ready duodenoscope. CI. confidence interval; prop. proportion.

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**Figure 3.** Figure 2. Forest plot of gastric neoplasm studies with and without continuation of low-dose aspirin.

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**[0992]**

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