Continued Aspirin Use and Bleeding Risk After Endoscopic Submucosal Dissection of Gastric Neoplasms: A Meta-Analysis

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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 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 3.6.2 to conduct the statistical heterogeneity. Between the included studies was analyzed using the inconsistency index (I²) statistics. Publication bias was assessed using funnel plots and Egger’s regression tests.

**Results:**
We identified 1,250 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% ± 0.024 (95% CI: 15.29%-24.68%; I² = 98.6%) (figure 1a). Subgroup analysis amongst studies from North America (n = 7) showed a contamination rate of 6.01% ± 0.011 (95% CI: 3.83%-8.15%; I² = 89.5%) (figure 1b). I² indicated high heterogeneity. Egger’s regression test indicated no significant publication bias for both groups (Egger’s test of publication bias: p = 0.0351 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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**Abstracts**

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Don’t Blame the Duodenoscope Elevator, the Channels Are Contaminated as Well: A Systematic Review and Meta-Analysis

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Jiannis Anastasiou, MD, DMSc, FEBGH3, Nikolaj B. Larsen, MSc5, Lotte Ockert6, Hemant Goyal, MD, PGDCA (MBA)1, Sara Larsen, MSc2, Abhilash Perisetti, MD3, Aman Ali, MD4, Sven Adamson, MD7, Benjamin Tharian, MD, MRCP, FRACP3, Nirav Thosani, MD, MHA8.

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**Introduction:** The elevator mechanism has been suggested as the main reason for multiple outbreaks associated with contaminated reusable patient-ready duodenoscopes. The elevator is difficult to clean even with all precautions, and specially designed brushes are recommended for proper cleaning. However, the narrow channels of the duodenoscope might pose a risk of contamination since they are prone to scratches by the insertion of various accessories creating space for microbes to hide. Our aim is to estimate the contamination rate beyond the elevator of duodenoscopes based on currently available literature.

**Methods:** We searched PubMed, Web of Science, and Embase from January 1, 2010, until October 10, 2020, for studies investigating contamination rates of channels beyond the elevator mechanism. 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 3.6.2 to conduct the statistical heterogeneity. Between the included studies was analyzed using the inconsistency index (I²) statistics. Publication bias was assessed using funnel plots and Egger’s regression tests.

**Results:** We identified 1,250 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% ± 0.024 (95% CI: 15.29%-24.68%; I² = 98.6%) (figure 1a). Subgroup analysis amongst studies from North America (n = 7) showed a contamination rate of 6.01% ± 0.011 (95% CI: 3.83%-8.15%; I² = 89.5%) (figure 1b). I² indicated high heterogeneity. Egger’s regression test indicated no significant publication bias for both groups (Egger’s test of publication bias: p = 0.0351 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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**Continued Aspirin Use and Bleeding Risk After Endoscopic Submucosal Dissection of Gastric Neoplasms:** A Meta-Analysis

Hemant Goyal, MD, PGDCA (MBA)3, Somal Sachdeva, MBBS4, Abhikind Perisetti, MD3, Mark M. Aloysius, MD, PhD5, Saurabh Chandan, MD, Benjamin Tharian, MD, MRCP, FRACP3, Nirav Thosani, MD, MHA8.

1Wright Center for Graduate Medical Education, Scranton, PA; 2Boston University Medical Center, Boston, MA; 3University of Arkansas for Medical Sciences, Little Rock, AR; 4Creighton University School of Medicine, Omaha, NE; 5University of Texas Health Science Center, Houston, TX.

**Introduction:** With the development of endoscopic technologies, the detection rate of early gastric cancer (EGC) and precancerous lesions is gradually increasing. As an effective minimally invasive therapy, endoscopic submucosal dissection (ESD) has been accepted as a standard treatment for EGC and dysplasia. However, postprocedural bleeding is one of the most common complications of ESD, with a reported incidence of 5.1%. Moreover, the effect of continued low-dose aspirin (LDA) on bleeding during the peri-ESD period is not clear.

**Methods:** We searched the OVID/Medline and Google Scholar databases through June 2021 to find studies relating to continued LDA use in patients undergoing ESD. Studies reporting bleeding rates in patients undergoing ESD with and without continued LDA were included. Postoperative bleeding rates were compared between those who continued LDA during the procedure and those who did not; a random-effects model was used to calculate pooled odds ratios for bleeding risk with continued LDA use. A p-value < 0.05 was considered statistically significant.

**Results:** The initial search identified 2033 studies, after excluding duplicates, review articles, and studies not meeting inclusion criteria, 9 studies (all were retrospective observational studies) were finally included in the analysis. The total number of patients undergoing ESD procedure was 7978, out of which 703 continued LDA during the procedure. Pooled analysis comparing the post-operative bleeding rates between people with and without continued use of LDA revealed that aspirin use during ESD translated into higher postoperative bleeding rates compared to those who did not. (Pooled OR 1.720 , 95%CI: 1.121-2.641, P = 0.01). No interstudy heterogeneity was observed (I² = 0).

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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 1. Baseline Characteristics of Included Studies.

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Country/Region</th>
<th>Study Design</th>
<th>Sample size</th>
<th>Continued LDA use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cho</td>
<td>2012</td>
<td>South Korea</td>
<td>Retrospective Cohort study</td>
<td>514</td>
<td>19</td>
</tr>
<tr>
<td>Lim</td>
<td>2012</td>
<td>South Korea</td>
<td>Retrospective Cohort study</td>
<td>1503</td>
<td>172</td>
</tr>
<tr>
<td>Matsumura</td>
<td>2014</td>
<td>Japan</td>
<td>Retrospective Cohort study</td>
<td>425</td>
<td>21</td>
</tr>
<tr>
<td>Sanomura</td>
<td>2014</td>
<td>Japan</td>
<td>Retrospective Cohort study</td>
<td>78</td>
<td>28</td>
</tr>
<tr>
<td>Tonu</td>
<td>2015</td>
<td>Japan</td>
<td>Retrospective Cohort study</td>
<td>385</td>
<td>14</td>
</tr>
<tr>
<td>Igarashi</td>
<td>2016</td>
<td>Japan</td>
<td>Retrospective observational study</td>
<td>2104</td>
<td>33</td>
</tr>
<tr>
<td>Oh</td>
<td>2018</td>
<td>South Korea</td>
<td>Retrospective Observational study</td>
<td>215</td>
<td>57</td>
</tr>
<tr>
<td>Harada</td>
<td>2019</td>
<td>Japan</td>
<td>Retrospective observational study</td>
<td>597</td>
<td>95</td>
</tr>
<tr>
<td>Horiike</td>
<td>2019</td>
<td>Japan</td>
<td>Retrospective observational study</td>
<td>293</td>
<td>52</td>
</tr>
<tr>
<td>Nam</td>
<td>2019</td>
<td>South Korea</td>
<td>Retrospective Observational study</td>
<td>1864</td>
<td>212</td>
</tr>
</tbody>
</table>

Conclusion: The results of our meta-analysis demonstrated that LDA continuation significantly increased the risk of post-ESD bleeding. Therefore, the physicians should individualize the decision of continuing LDA in patients undergoing ESD based on their thrombotic risk.

Table 1. Product Recalls for Duodenoscopes and Accessories.

<table>
<thead>
<tr>
<th>Product</th>
<th>Manufacturer</th>
<th>Model</th>
<th>Service Design</th>
<th>Event Type</th>
<th>Event Date</th>
<th>Start Date</th>
<th>End Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Olympus</td>
<td>Olympus</td>
<td>GIF-UC260</td>
<td>Flat Flexible Tip</td>
<td>2015-06-16</td>
<td>2015-06-16</td>
<td>2015-06-16</td>
<td>D2</td>
<td>Recalled due to the possibility of the endoscope tip being damaged during use.</td>
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<td>Olympus</td>
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<td>Flat Flexible Tip</td>
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</tr>
<tr>
<td>Pentax</td>
<td>Pentax</td>
<td>ENF-P190i</td>
<td>Flat Tip</td>
<td>2015-06-16</td>
<td>2015-06-16</td>
<td>2015-06-16</td>
<td>F10</td>
<td>Recalled due to the possibility of the endoscope tip being damaged during use.</td>
</tr>
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<td>Pentax</td>
<td>Pentax</td>
<td>ENF-P190i</td>
<td>Flat Tip</td>
<td>2015-06-16</td>
<td>2015-06-16</td>
<td>2015-06-16</td>
<td>F10</td>
<td>Recalled due to the possibility of the endoscope tip being damaged during use.</td>
</tr>
<tr>
<td>Fujifilm</td>
<td>Fujifilm</td>
<td>EG-260</td>
<td>Flat Tip</td>
<td>2015-06-16</td>
<td>2015-06-16</td>
<td>2015-06-16</td>
<td>F10</td>
<td>Recalled due to the possibility of the endoscope tip being damaged during use.</td>
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Conclusion: The results of our meta-analysis demonstrated that LDA continuation significantly increased the risk of post-ESD bleeding. Therefore, the physicians should individualize the decision of continuing LDA in patients undergoing ESD based on their thrombotic risk.