Closure of gastric incision with a barbed suture after needlescope-assisted hybrid NOTES

Provision of safe peritoneal access without organ injury and guaranteeing secure transluminal closure are two challenging goals in natural orifice transluminal endoscopic surgery (NOTES) [1]. Minilaparoscopically assisted natural orifice surgery (MANOS) is a hybrid NOTES technique that could enable performance of more complex procedures and that can help to avoid the disadvantages of a purely NOTES approach, while minimizing the invasiveness of the laparoscopic procedure [2].

This is a preliminary ex vivo study of a gastrotomy closure method – safe scarless gastric laparoscopic closure (SSGLC) – carried out during a modified MANOS procedure in porcine stomach (Video 1). For this technique, two percutaneous needlescopic instruments (MiniLap Clutch Grasper; Teleflex, Morrisville, North Carolina, USA) were combined with the rigid laparoscopic optics (Fig. 1). Under laparoendoscopic guidance, the penetrating tip of the MiniLap was inserted into the previously insufflated gastric lumen and used to grasp the guidewire of the balloon dilator, pulling it through the gastric wall and ensuring safe entry of the gastroscope (Fig. 2). For gastrotomy closure we used the knotless, self-anchoring surgical suture V-Loc (Medtronic/Covidien; Minneapolis, Minnesota, USA), introduced percuta-
neously under laparoscopic surveillance (Fig. 3). The total median (interquartile range [IQR]) time for gastric closure was 16.7 (10.05 – 23.3) min (Fig. 4). Stomachs were inflated up to a pressure of 20 mmHg, using a carbon dioxide laparoscopic insufflator under electronic control; the maintenance of this pressure suggested the absence of gas leaks. Also, no air leaks were detected when the stomachs were submerged in water. A total of 6 experienced laparoscopic surgeons evaluated the procedure: 4/6 (67 %) considered SSGLC to be a safe and useful alternative to conventional laparoscopic suture, and 6/6 (100 %) gave the maximum score for SSGLC feasibility and reproducibility. In addition, 2/6 (33 %) considered it to be as difficult to perform as conventional laparoscopic suturing, while 2/6 (33 %) found it easier (2/6 after adequate practice with a simulation trainer.

A gastric suture with serosal apposition [3], the incisionless and scarless features of needlescopic instruments [4], the safety of barbed sutures [5], and the ease of performance are the main advantages of this closure technique for hybrid NOTES.

Endoscopy_UCTN_Code_TTT_1AO_2AN

Competing interests

None
The Authors

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References


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DOI http://dx.doi.org/10.1055/s-0043-103408
Endoscopy 2017; 49: E138–E140
© Georg Thieme Verlag KG
Stuttgart · New York
ISSN 0013-726X

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Fig. 4 Total and partial median times taken to perform safe scarless gastric laparoscopic closure (SSGLC) procedure.

<table>
<thead>
<tr>
<th>SSGLC steps time, min</th>
<th>1st stomach</th>
<th>2nd stomach</th>
<th>3rd stomach</th>
<th>Total time, min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastroentry (endoscope entry)</td>
<td>7.5</td>
<td>5.3</td>
<td>3.72</td>
<td>5.3 (3.72 – 7.5)</td>
</tr>
<tr>
<td>Gastroentry closure</td>
<td>15.8</td>
<td>11.4</td>
<td>6.33</td>
<td>11.4 (6.33 – 15.8)</td>
</tr>
<tr>
<td>SSGLC total time</td>
<td>23.3</td>
<td>16.7</td>
<td>10.05</td>
<td>16.7 (10.03 – 23.3)</td>
</tr>
</tbody>
</table>

SSGLC steps time, min

- Total and partial median times taken to perform safe scarless gastric laparoscopic closure (SSGLC) procedure.