

COMMENTARY

Open Access



Optimal site for fluoroscopic tracer injection for laparoscopic lymphadenectomy

Fernando A. M. Herbella*  and Marco G. Patti

Keywords: gastric cancer, lymphadenectomy, laparoscopic gastrectomy, indocyanine green, fluorescence, submucosal injection, subserosal injection

Background

The adequate extent of lymphadenectomy in gastric cancer was a controversial topic when Asian authors tried to show benefits of this approach to their Western peers, as the data came mostly from low evidence-based retrospective series. The first randomized clinical trial conducted in the West failed to show benefits, therefore increasing the controversy [1]. These studies were lately criticized, long-term results reviewed, and new trials came out showing real benefits of lymphadenectomy, making gastrectomy with extended lymphadenectomy the standard treatment for gastric cancer today [2]. After the value of lymphadenectomy was accepted, authors focused on how perform it better. Both the laparoscopic and the robotic approach proved to be similar to open surgery in the number of harvested lymph nodes, while providing the advantages of minimally invasive operations [3, 4].

Indocyanine green has been used to guide lymphadenectomy in gastric cancer cases since the beginning of the century, with the purpose of identifying sentinel lymph nodes [5], a tactic that never proved to be very useful. With open surgery, indocyanine was only a vital dye that colored the lymph nodes in green. With minimally invasive surgery, indocyanine became a fluorescent marker that glitters under near-infrared light. This has

been shown to enable the retrieval of a higher number of lymph nodes as demonstrated by the same group from China [6], although we have questioned how indocyanine helps: does it illuminate smaller lymph nodes or increase the area of dissection? [7]

Main text

Chen et al. [8] went beyond the question of the safety and utility of indocyanine green for gastric lymphadenectomy to try to evaluate the best site to inject the dye, either via the submucosal or subserosal route. The authors randomized 259 patients to either have an endoscopy to inject the tracer the day before the operation (submucosal group) or having the tracer injected during laparoscopy 20 minutes before the beginning of the lymphadenectomy (subserosal group). The number of retrieved lymph nodes was not different between groups (49.8 vs. 49.2, $p=0.713$). This shows that the diffusion of the tracer is the same irrespective of the technique. The drug is probably injected in the same layer, by either technique. It is surprising that the drug injection time was not an influence on the number of retrieved lymph nodes. The authors concluded that submucosal injection is more costly and associated with decreased patient satisfaction, due to the necessity to do an endoscopy before the operation. The authors recommend that the submucosa injection should not be abandoned as it is still important when dealing with small tumors when a preoperative endoscopy is needed to locate and mark the tumor.

This comment refers to the article available at <https://doi.org/10.1186/s12916-021-02125-y>.

* Correspondence: herbella.dcir@epm.br

Department of Surgery, Federal University of Sao Paulo, Escola Paulista de Medicina, Rua Diogo de Faria 1087 cj 301, Sao Paulo 04037-003, Brazil



© The Author(s). 2021 **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.

Conclusion

There are still some questions to be answered and we hope this group working extensively on the topic will be able to teach us more. We are curious to know if other markers are better than indocyanine, and if a different marker will be able to distinguish metastatic lymph nodes from normal ones.

Acknowledgements

None

Authors' contributions

FP: Conception and design, Acquisition of data, analysis and interpretation of data, drafting the article. MGP: Conception and design, review for intellectual content, approval of the final version.

Funding

None

Availability of data and materials

Not applicable

Declarations

Ethics approval and consent to participate

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Received: 27 September 2021 Accepted: 27 September 2021

Published online: 27 October 2021

References

1. Strong VE, Yoon SS. Extended lymphadenectomy in gastric cancer is debatable. *World J Surg.* 2013;37(8):1773–7. <https://doi.org/10.1007/s00268-013-2070-1>.
2. Smyth EC, Nilsson M, Grabsch HI, van Grieken NC, Lordick F. Gastric cancer. *Lancet.* 2020;396(10251):635–48. [https://doi.org/10.1016/S0140-6736\(20\)31288-5](https://doi.org/10.1016/S0140-6736(20)31288-5).
3. Zhu Z, Li L, Xu J, Ye W, Zeng J, Chen B, et al. Laparoscopic versus open approach in gastrectomy for advanced gastric cancer: a systematic review. *World J Surg Oncol.* 2020;18(1):126. <https://doi.org/10.1186/s12957-020-01888-7>.
4. Herbella FAM, Del Grande LM. Commentary on: Robotic surgery for gastric cancer in the west: A systematic review and meta-analyses of short-and long-term outcomes. *Int J Surg.* 2020;84:51–2. <https://doi.org/10.1016/j.ijsu.2020.10.009>.
5. Hiratsuka M, Miyashiro I, Ishikawa O, Furukawa H, Motomura K, Ohgashi H, et al. Application of sentinel node biopsy to gastric cancer surgery. *Surgery.* 2001;129(3):335–40. <https://doi.org/10.1067/msy.2001.111699> PMID: 11231462.
6. Chen QY, Xie JW, Zhong Q, Wang JB, Lin JX, Lu J, et al. Safety and Efficacy of Indocyanine Green Tracer-Guided Lymph Node Dissection During Laparoscopic Radical Gastrectomy in Patients With Gastric Cancer: A Randomized Clinical Trial. *JAMA Surg.* 2020;155(4):300–11. <https://doi.org/10.1001/jamasurg.2019.6033>.
7. Patti MG, Herbella FA. Indocyanine Green Tracer-Guided Lymph Node Retrieval During Radical Dissection in Gastric Cancer Surgery. *JAMA Surg.* 2020;155(4):312. <https://doi.org/10.1001/jamasurg.2019.6034>.
8. Chen QY, Zhong Q, Li P, Xie JW, Liu ZY, Huang XB, et al. Comparison of submucosal and subserosal approaches toward optimized indocyanine green tracer-guided laparoscopic lymphadenectomy for patients with gastric cancer (FUGES-019): a randomized controlled trial. *BMC Med.* 2021; Article in press.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Ready to submit your research? Choose BMC and benefit from:

- fast, convenient online submission
- thorough peer review by experienced researchers in your field
- rapid publication on acceptance
- support for research data, including large and complex data types
- gold Open Access which fosters wider collaboration and increased citations
- maximum visibility for your research: over 100M website views per year

At BMC, research is always in progress.

Learn more biomedcentral.com/submissions

