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Editorial

Fluorescence-guided lymphadenectomy in colon cancer. The tool called to adjust the radicality of surgery?☆



Linfadenectomía guiada por fluorescencia en el cáncer de colon ¿La herramienta llamada a ajustar la radicalidad de la cirugía?

Colon cancer is the most frequent in our country. The treatment with the greatest guarantee of cure today is surgical resection with free margins (and adequate lymph node sampling). In said resection, the excision of the mesenteric/lymphoganglionic tissue,¹ which hypothetically could be affected by the dissemination of the primary lesion depending on its location, takes on a crucial value with importance in the cure, staging and consequently the prognosis and treatment of the patient.²

In the last decade there has been a revolution in terms of lymph node cancer radicalism and surgical quality standards in colon cancer. The term complete excision of the mesocolon that started this revolution by the team of Professor Werner Hohenberger of the University of Erlangen, defines the dissection of the mesocolic embryological plane and the central or proximal ligation of the main vascular structures related to the tumor as a standard.³ On the other hand, and in a more heterogeneous and recent manner, D3 lymphadenectomy or that which includes the highest lymph node station is defined (such as the right mesocolic candle and the trunk of the right superior colic vein in right colectomy), defended by some authors who mainly find support in their defense in tumors with positive adenopathies in the described territories.⁴ The quality of the available evidence, and the difficulty in universalizing them due to the technical and logistical demands they require, place the issue of mesocolon resective radicality in the spotlight of the controversy regarding the standard surgical treatment of colon cancer.^{2,4–7}

Similarly, the concept of fluorescence-guided surgery has been growing exponentially in the last almost 10 years in coloproctology. The basis of this concept is the infusion of a fluorescent dye such as indocyanine green (ICG), its stimula-

tion through the application of infrared light, and the capture of a fluorescent signal that is translated by a switch and displayed on a screen that translates the continent anatomy of said dye. The most developed use of this technology, and which is progressively gaining evidence, is the intraoperative translation of the intravascular space, fundamental in the evaluation of the correct perfusion of structures such as the colon in performing anastomoses.⁸ Other less widespread uses, but with lines of development in colorectal surgery, are the identification of ureters, primary tumors, locoregional recurrences, metastatic lesions and nerve structures. All the utilities of fluorescence-guided surgery are based on the arrival of a dye by different routes to a physiological or pathological structure. And the translation of it, by means of a fluorescent image, in the context of the specific anatomy of our patient.⁹ Technology turns the imperceptible into perceptible to the human eye and to the computer itself.

In this sense, fluorescence-guided surgery has also been developing for years in the field of lymph node delimitation for oncological colon resections. The objective is to define a curative colorectal surgery adjusted to each patient with the least possible aggression. In 2012, the group of Professor Neil J. Mortensen in Oxford shows the first series in this regard.¹⁰ Since then, several works have been published that use different doses (0.2–5 ml) and concentrations of ICG (0.5, 2.5, 5 mg/ml). As well as multiple places (subserosal (Fig. 1), submucosal and both) and times (preoperative, intraoperative and both) of dye infusion and waiting (4–25 min) for its correct evaluation (Fig. 2). The peritumoral subserosal choice for the injection site seems to be the most effective based on the currently available evidence.^{11,12} Published studies have found value in identifying mesocolic lymph nodes associated with

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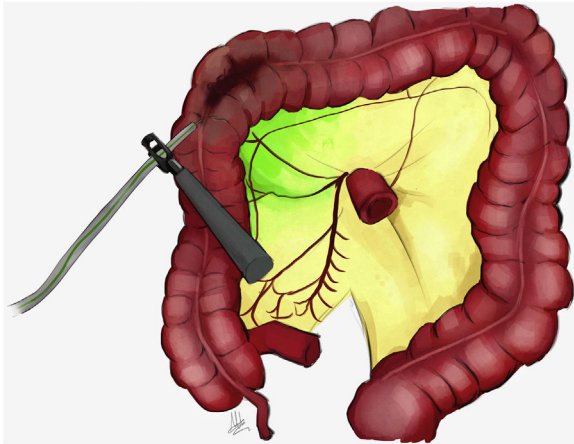


Fig. 1 – The illustration shows the moment of subserosal peritumoral intraoperative injection of indocyanine green.

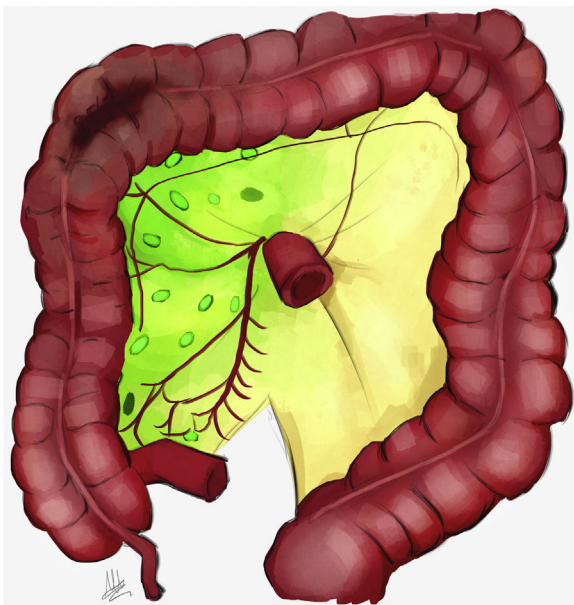


Fig. 2 – The illustration shows the diffusion of the dye showing the lymphoganglionic distribution of the lesion.

tumor drainage; however, no standardized technique supported by a robust diagnostic accuracy study has been described. A systematic review of 12 studies with 248 patients reported that the pooled sensitivity and specificity rates were 71% and 84.6%. However, the review included colon and rectal cancer and demonstrated heterogeneity in reported data. The authors concluded that fluorescence-guided surgery is a promising technique for lymph node detection in colorectal cancer, although its oncological utility is unknown.¹³ The recent consensus paper presented by the EAES suggested further work needed to be carried out before it could be recommended for routine use.

In 2020, the first article to perform a histological translation of the lymph nodes removed by fluorescence-guided surgery in 72 patients with colon cancer located in the splenic flexure

was published from Japan. The authors argue that a high percentage of lymph nodes occupied by tumor cells did not show fluorescence and attributed it to an obstruction/destruction of the lymphatic drainage for this reason. Therefore, they fail to recommend an exclusively fluorescence-guided lymphadenectomy in these cases.¹⁴

But technological and biological development continue. The first in search of algorithms based on a multitude of data and artificial intelligence mainly. And the second in the line of markers and dyes with specific anatomical affinity. The sum and development of these factors probably represent the path to a more guided, simplified surgery with a translation into oncological benefit at the lowest cost of invasion.^{9,15}

In conclusion, with the currently available evidence, the controversial balance in the nodal radicality of colon cancer cannot yet be answered by fluorescence-guided surgery. But with standardization of technique, development of novel, more specific fluorophores which can reach lymph nodes with greater precision and improvement in camera systems, we may yet find a method to be more tailored in our approach to lymphadenectomy. Therefore, the question formulated in the title remains open with great expectations and lines of research to give a future answer, in which colorectal surgeons must continue working in search of evidence.

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