



Fluorescence angiography for a safer anastomosis during transanal total mesorectal excision

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We read with great interest the article recently published by Mizrahi *et al.* about the use of fluorescence angiography using indocyanine green during transanal total mesorectal excision (TaTME) to reduce the incidence of anastomotic leakage (1).

Several studies already (2-7) showed this technique as effective and safe to evaluate bowel perfusion prior to anastomosis hence, in theory, to prevent ischemia-related leaks (2,3).

The main aim of the article “Transanal total mesorectal excision for rectal cancer with indocyanine green fluorescence angiography” is to evaluate the impact of fluorescence angiography on any change in the proximal resection margin and anastomotic leak after TaTME for rectal cancer (1).

The authors performed a retrospective cohort analysis of 54 patients who underwent elective hybrid transabdominal laparoscopic low anterior resection and TaTME for rectal cancer with colorectal or coloanal anastomosis (<10 cm from the anal verge) in two different institutions, over a period of two years [2015–2017]. In all patients, fluorescence angiography was used to assess colonic perfusion of the planned proximal resection margin before bowel transection and after construction of the anastomosis evaluated by intraoperative proctoscopy. High ligation of the inferior mesenteric artery and vein was routinely performed, defined as proximal to the left colic vessels. Thirty out of 54 (55%) patients received neoadjuvant chemoradiation and 46 patients (85%) had a loop ileostomy.

The proximal resection margin was modified in 10 patients (18.5%) after fluorescence angiography and anastomotic leakage was reported in 2 patients (3.7%). In both of these patients, splenic flexure mobilization was not performed during the index surgery and transanal specimen extraction was performed.

Extensive review of the literature on the use of fluorescent angiography is also presented (3-11) confirming the trend of reduction of anastomotic leakage rate with the use of this technique as described in two recent meta-analysis and systematic reviews by Blanco-Colino *et al.* (12) and van den Bos *et al.* (13).

Notably, with all the limits of a retrospective analysis of the data, Mizrahi *et al.* reported an extremely low percentage of anastomotic leakage (3.7%) once compared with results of other authors performing TaTME, even lower of most of the reported results of standard anterior resection (14,15). Indeed, the rate of anastomotic leakage in literature after TaTME is between 5.43% and 15.7%. The international TaTME registry including 1,594 cases reported an overall 15.7% anastomotic failure rate (16).

Another multicentre prospective audit of the ESCP (European Society of Coloproctology) group, including 2,579 patients, reported a higher anastomotic leak rate in TaTME (12.9%, 45/311 patients) than non-transanal TME (8.9%, 135/1,520 patients), with a significant difference on univariate analysis (17).

Other meta-analysis and systematic reviews, including smaller sample size, reported lower anastomotic failure rate

for this technique with non-significant difference when compared with non-transanal resections. The transanal resection was associated with 6.1% anastomotic failure rate by Ma *et al.* (194 patients), 5.43% failure rate by Rubinkiewicz *et al.* (331 patients), 9.8% leakage rate by Xu *et al.* (162 patients) and 11% leakage rate by Hasegawa *et al.* (226 patients) (18-21).

Detering *et al.* (22) recently published a study reporting results of a 3-year experience in rectal surgery comparing TaTME (416 patients) and laparoscopic TME (3,361 patients). The transanal technique was associated with 16.5% anastomotic leak rate that is remarkably higher than 3.6% of the current study.

It is difficult to advocate only to the use of fluorescence angiography the reasons of such difference, but it is at least interesting that in the Mizrahi's study there was a change of strategy (level of anastomosis) very similar to the leak rate reported by Detering *et al.*

Furthermore, these findings are similar of those reported for laparoscopic anterior resections comparing standard and fluorescence groups.

We published a case-matched study comparing a group of laparoscopic anterior resections (42 patients) with the use of fluorescent angiography with a control group, reporting 0% and 5.4% anastomotic leakage rates, respectively (6). Jafari *et al.* reported 6% anastomotic failure rate after robotic rectal surgery with fluorescent angiography (16 patients) and 18% rate in the control group (22 patients) (7).

The creation of a tension-free colorectal or coloanal anastomosis is one of the factors that could influence the correct healing of intestinal anastomosis. In the present study the two patients who leaked did not have splenic flexure mobilization and this could also be a factor for developing of anastomotic leaks.

Transanal specimen extraction has also been indicated as one of the possible causes of leaks during TaTME: the mesentery of the descending colon (to be used for the anastomosis) could be accidentally damaged during the passage thorough the anal canal leading to complete or partial ischemia. Nevertheless, since Mizrahi *et al.* checked bowel perfusion both before and after anastomosis in their experience this possibility should be overcome, although one of the major limitations of fluorescence angiography is that the evaluation is done by a subjective surgeon's visual judgement.

Some authors employed an objective manner to quantify fluorescence angiography signal in their paper. Kudsus

et al. (4) reported their use of method IC-Calc, while Wada *et al.* (5) used a software named ROIs to quantify fluorescence intensity. Son *et al.* (23) reported their experience in quantitative analysis of colorectal and coloanal anastomosis perfusion with indocyanine in laparoscopic colorectal surgery. The authors defined three categories of colon perfusion patterns as fast, moderate or slow and demonstrated that slow perfusion was an independent factor for anastomotic complication (P=0.002).

In conclusion, anastomotic leakage is a multifactorial complication and adequate blood supply is one of the main factors influencing anastomotic healing. According to available literature, intraoperative indocyanine green fluorescence angiography is associated with a lower risk of anastomotic leakage in colorectal surgery. Further studies are needed to define a reproducible quantitative assessment of anastomotic perfusion.

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Footnote

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