Fluorescence angiography with indocyanine green for low anterior resection in patients with rectal cancer: a prospective before and after study

Emilie Papillon-Dion, MD – **Alexis Legault-Dupuis**, MD – **Sébastien Drolet**, MD, FRCSC MHSc - **François Letarte**, MD, FRCSC MHSc

Department of Colorectal Surgery, CHU de Québec Université Laval, Québec, Canada

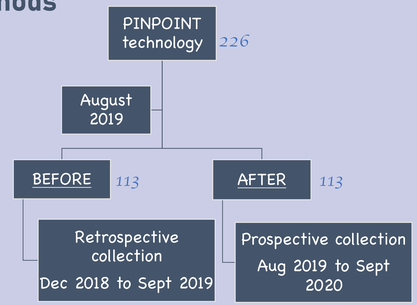
Background

Many factors have been associated with increased rates of anastomotic leaks including inadequate proximal bowel perfusion. New innovations are needed to assess the bowel perfusion.

Aim

The objective was to assess the impact of the use of fluorescence angiography (FA) Indocyanine green (ICG) in patients undergoing a low anterior resection (LAR) for rectal cancer.

Methods



Prospective cohort study with a «before and after» design

- All consecutive patients over a year respectively before and after the addition of PINPOINT technology
- December 2018 to September 2020
- CHU de Québec

Inclusion criteria

- Age ≥18 years
- LAR for rectal cancer
- ≤ 15 cm from the anal margin at the manual rectoscopy

Exclusion criteria

- Previous allergy or reaction to ICG
- Pregnant or breastfeeding women
- Permanent colostomy

Primary outcome

- The rate of change in the surgical plan related to the site of proximal resection.

Secondary outcomes

- The rates of anastomotic leak (AL) and postoperative complications

Intervention

- 1688 AIM 4K platform with integrated fluorescence imaging capabilities
- PINPOINT technology
- ICG = 3 cc (2,5mg/cc)



Table 1 – Patient characteristics

Variable	ICG - Before (n = 113)	ICG + After (n = 113)	P-value
Age, mean (SD)	63 (11)	7 (6.2)	0.1146
BMI, mean (SD)	27.07 (4.9)		
ASA status, mean			0.8137
1	26 (23)	30 (27)	
2	77 (65)	73 (65)	
3	10 (9)	10 (9)	
4	0 (0)	0 (0)	
Sex			0.3757
Female	35 (31)	29 (26)	
Male	78 (69)	84 (74)	
Neoadjuvant radiotherapy	57 (50)	55 (49)	0.8942
Smoking	13 (12)	9 (8)	0.1772

→ No difference between the two groups

Table 2 – Change in the surgical plan

Variable	ICG + After (n = 113)	%
Sucess rate of FA + ICG	113/113	100
Change in surgical plan	12/113	10,6
Type of surgery		
LAR	6/79	7.6
Handswen	6/34	17.6
Distance	2.8 ± 5.22 (95% CI : 0.09; 3.31)	-
Anastomotic leak	0/12	0

→ Change in the surgical plan up to **10.6%**

→ **No AL** in those patients

Table 3 – Anastomotic leak at 30 days

Variable	ICG - Before n = 113	ICG + After n = 113	P-value
AL	15 (13.3)	7 (6.2)	0.1146
Type of resection			
LAR	4	2	0.6728
Hadswen	11	5	0.1861
Anastomosis height	4.10 ± 2.45 (95% CI : 3.55; 4.66)	4.48 ± 2.52 (95% CI : 3.81; 5.16)	0.3142
Post-operative intervention	9	7	0.0434

→ **53.3%** decrease in AL incidence with ICG and PINPOINT technology

Table 5 – Postoperative surgical complications

Variable	ICG - Before n = 113 (%)	ICG + After n = 113 (%)	P-value
Overall complications	25 (22.1)	16 (14.2)	0.106
AL at 30 days	15 (13.3)	7 (6.2)	0.115
Hemorrhage	6 (5.3)	4 (3.5)	0.748
Seroma	1 (0.9)	0 (0)	1.000
Hematoma	1 (0.9)	3 (2.7)	0.622
Wound infection	1 (0.9)	2 (1.8)	1.000

Conclusion

Our study suggest that ICG may have an impact on reducing AL in LAR for oncologic patient. Its use in this specific population should be considered.