

Background

Knowledge about tissue vascularisation is fundamental to the colorectal surgeon as a tool to achieve good outcomes. After ligation of the inferior mesenteric artery, the perfusion of the colon is done via the marginal artery. The proximal half of a colorectal anastomosis is terminally perfused by the marginal artery which runs along the mesenteric margin of the colon. The colonic segment further away from the artery (on the antimesenteric side) is theoretically at risk of lower perfusion.

This relationship has not been formally assessed in the literature. We aim to compare the tissue oxygen saturation of the colon in the mesenteric and antimesenteric segments.

Methods

Patients submitted to elective colorectal resection at a tertiary referral centre were recruited. A multispectral camera was used to record the reflectance spectra of the colonic tissue after inferior mesenteric artery ligation and specimen extracorporealisation as shown in figure 1. The emission spectra were converted to tissue oxygen saturation at the pixel level.

Areas of the serosal surface of the colon were selected and assigned to mesenteric and antimesenteric groups in each case. Tissue oxygen saturation was sampled from the pixels in the area of interest. Spearman’s correlation coefficient was calculated in each case and a p_ value under 0.05 was considered statistically significant.

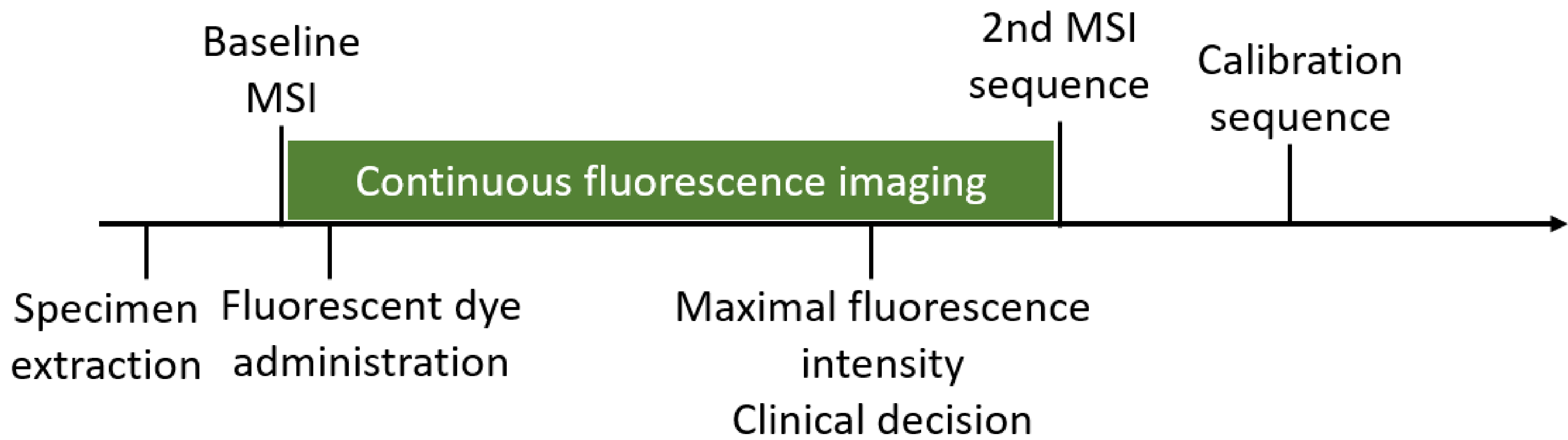


Figure 1 – Data collection timepoints

Results

9 patients were recruited. It was possible to segment the proximal colon in mesenteric and antimesenteric segments in 7 cases. Figure 2 shows an example of the sampling strategy.

The overall correlation coefficient for all cases combined was 0.529, which was statistically significant, showing a fair overall correlation. Of note, in 3 cases, the individual correlation coefficient failed to reach statistical significance.

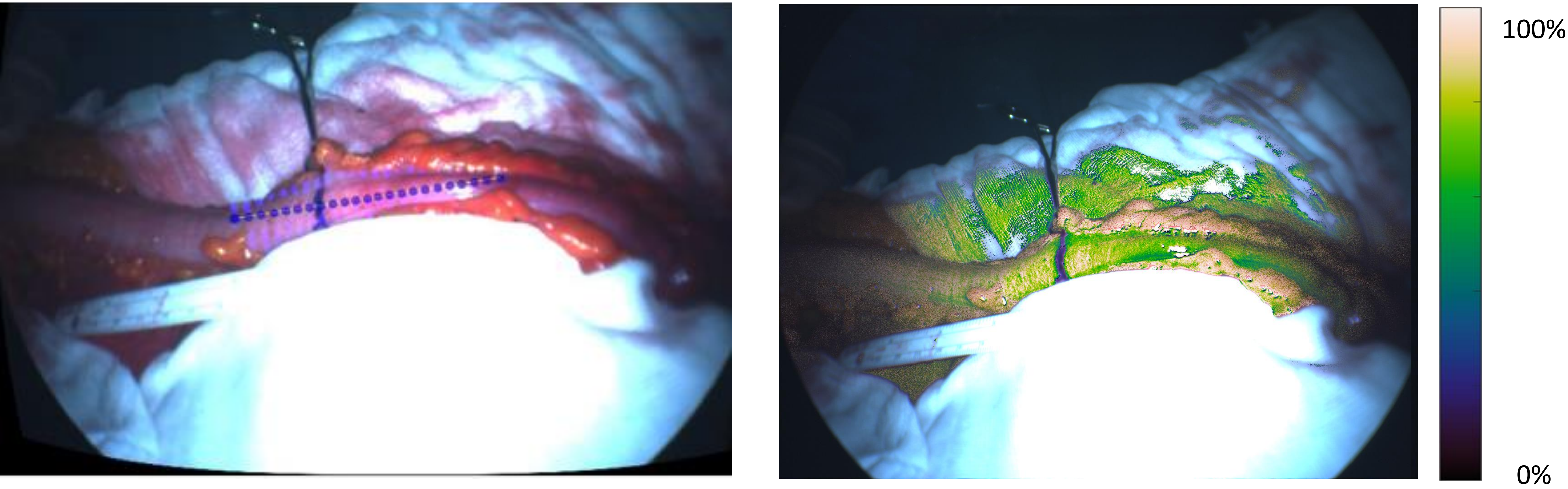


Figure 1: Left - Strategy for region of interest selection in the colon (line) and respective mesenteric segment (blue shaded area) in RGB colour space
 Right - MSI image with corresponding tissue oxygen saturation (sidebar)

Conclusion

This mechanistic study has shown that tissue oxygen saturation of the mesenteric and antimesenteric regions studied is not significantly different overall. However, some cases **could** be presented which did not reach statistical significance. This implies that tissue oxygen saturation in mesenteric and antimesenteric segments is independent in some cases.

These findings should be confirmed in a larger patient sample and factors for this variation studied in more detail