# Clinical translation of a novel, dye-free perfusion imaging technique in minimally invasive surgery

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## Introduction

Anastomotic leakage of the GI tract remains one of the main challenges in general surgery and is considered to be of multifactorial origin. We focussed on the risk factors that are within the span of control of the surgical team. We hypothesized that many of these risk factors have a final common pathway; hypoperfusion. By introducing a perfusion visualization tool to minimally invasive surgery named PerfusiX-Imaging, the surgeon can place the anastomosis at the most optimal site thereby possibly reducing the occurrence of anastomotic leakage.

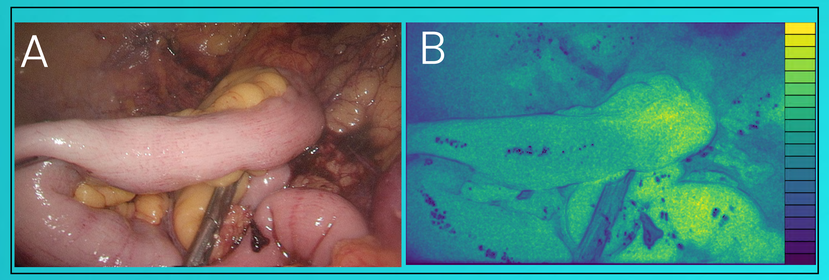



*Figure 1. A: No perfusion deficit visible using whitelight laparoscopy. B: PerfusiX-Imaging derived blood flow perfusion maps indicate a clear perfusion deficit.*

## Methodology

PerfusiX-Imaging users **Laser Speckle Contrast Imaging** to measure blood flow using standard laparoscopic equipment. Several pre-clinical and clinical studies were performed to validate PerfusiX-Imaging for blood flow measurements of the GI-tract.

N=64 colon
N=30 upper GI
(ongoing)

- Feasibility and safety of device
- Effect on clinical decision making
- Comparison to ICG-fluorescence

## PerfusiX-Imaging concept

- Dye free perfusion imaging
- Instantaneous imaging ready at all times
- Continuous imaging without time limitation
- Non-contact imaging method
- Full field perfusion imaging
- "Plug-and-play" with most common laparoscope
- No change to the surgeons experience

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*Figure 2. PerfusiX-Imaging is designed to be compatible with most commercially available laparoscopic systems as part of the video stack.*

## Results

- **Perfusion visualization** in concordance with surgeons expectations
- **1 in 5 surgeries** indicated a change in location of the anastomosis
- **1.3 centimeters** average change in location of the anastomosis
- **2 minutes 30 seconds** added surgery time for 4 measurements

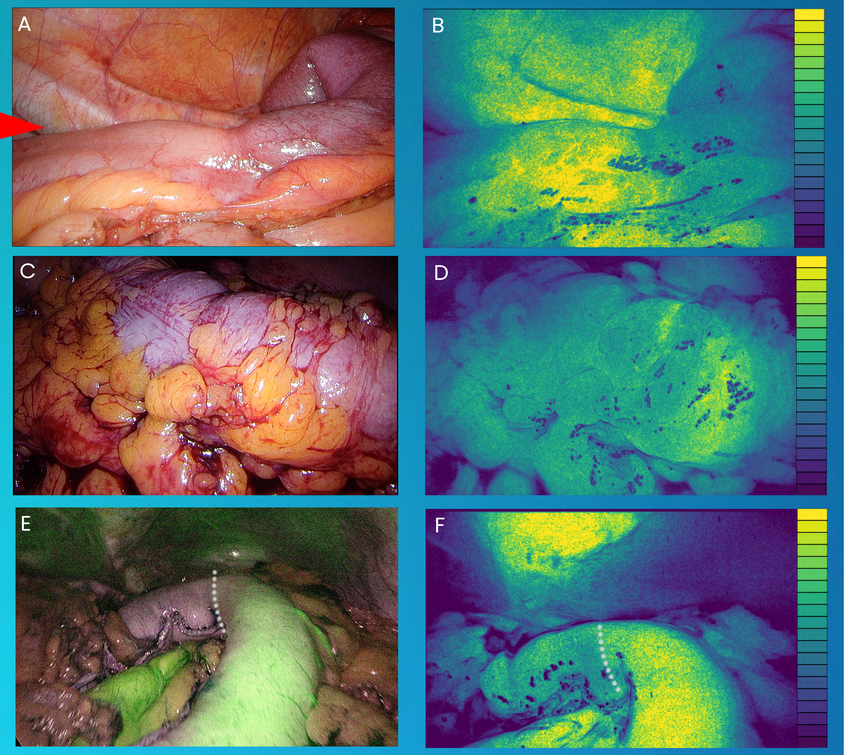



*Figure 3. A: Perfusion deficit visible in whitelight. B: Perfusion deficit confirmed by PerfusiX. C: whitelight image of colon. D: Perfusion difference visible using PerfusiX. E: ICG imaging of gastric conduit. F: PerfusiX imaging of gastric conduit.*

## Conclusion

PerfusiX-Imaging enables dye free tissue perfusion visualization of the GI tract. The "plug-and-play" design results in no change in the surgeons' experience.

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