Hyperspectral-guided renal surgery: Real-time RGB and oxygenation saturation imaging in a porcine model

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Objectives of the technology

- Provide **real-time, label-free tissue oxygenation (StO_2)** information during laparoscopic and open renal surgery
- **Reduce risk** of renal ischaemia-reperfusion injuries in transplant/aortic surgery

How we do it

- Our **hyperspectral imaging (HSI) system** can sense far richer spectral information from tissue, allowing surgeons to **go beyond human vision**
- Using **Hypervision Surgical's advanced software**, StO_2 information can be extracted and displayed to the surgeon in **real-time** alongside conventional RGB vision
- System capabilities demonstrated in an **HSI-guided live porcine** laparoscopic surgical occlusion of the renal artery **(Figure 1)**

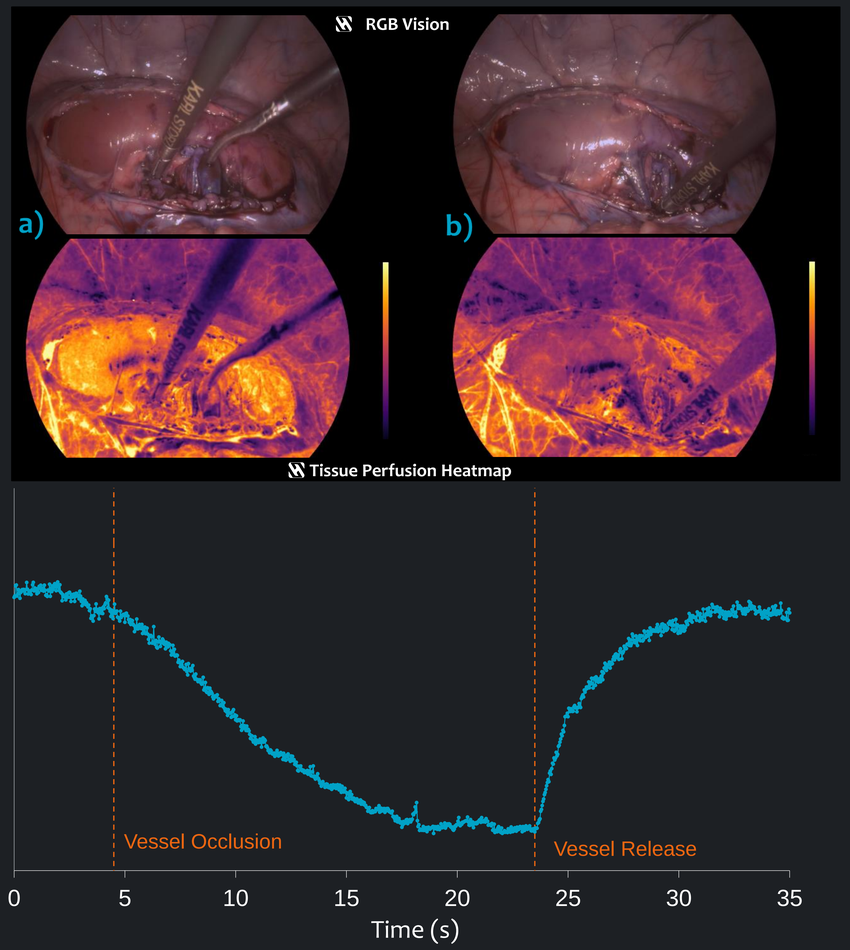


Figure 1: Pre **a)** and post **b)** renal artery occlusion during live porcine abdominal surgery, demonstrating clear reduction in StO2

Validation

- Temporal changes over a wide range of oxygenation levels can be induced in **liquid tissue phantoms** of fixed but tunable optical properties.
- Measurements taken with our HSI system and gold standard dissolved oxygen probe
- Temporal changes recorded and plotted **(Figure 2)**

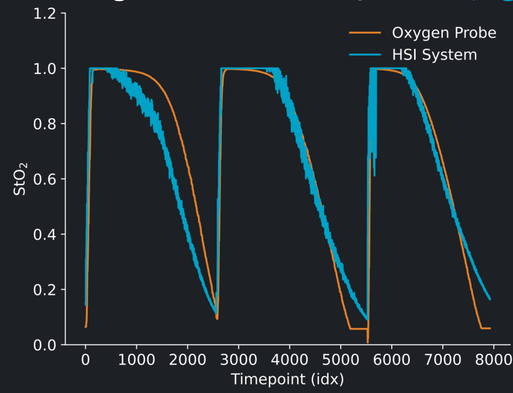


Figure 2: Known oxygenation concentrations measured with industry standard StO_2 probe and our HSI system**, using our novel liquid tissue phantom model**

Conclusions

Surgeons can use our laparoscopic HSI system to perform abdominal surgery using RGB colour imaging with the added capability of detecting and displaying real-time intraoperative changes in StO2