

Clinical Interview with John Casey

Date: 20/11/2014 **Time:** 15.00-16.30 **Present:** A Alazmani, M Bryant, W Stokes, S king

John Casey took us to an examination room and we mainly discussed about 4 technologies that he uses in his practice:

1. Ano-rectal Manometry Catheters:

He uses 8 channel, 3.9mm Albynmedical single-use gastrointestinal manometry catheters. This is water perfused at a very low rate controlled by a pump.



Observations:

- The catheter comes with different end-tip configurations. The one that we saw had 8 channels which were radially positioned.
- Markings on catheter each 1cm from radial ports
- Pulling is manually controlled by the operator
- Very easy to insert, not much lubrication needed!

Challenges:

- The principle of this measurement is in a digital form with no means to record the position/speed of the catheter. We were told that there are some other technologies available but basically they have more sensors, so basically they have a higher resolution by adding more channels.
- No means for centralisation of the catheter in the canal and therefore not 100% reliable measurements (especially considering that patients are on their sides).
- It'd be good to characterise the mechanical properties of the tissue, e.g. using biosensing or maybe variable perfusion rate, while recording the manometric information.
- Patients are asked to lie on their left side (if possible). Some find this challenging. The best would be standing up position; it has been tried in literature but again not the best position for these patients.
- There is no control over the amount of squeeze. It'd be good to quantify this or make it more consistent between trials or even between patients.

2. Ano-rectal Response Pressure Catheters:

He uses 14Fr Mediplus catheters. This can be used in conjunction with the above.

Observations:

- In healthy subject, 20ml-40ml air in the balloon will trigger the urge to evacuate. If it is above 40mm, it is called depressed. <20ml is not normal.

Challenges:

- Some patients even get the urge at 0ml by only the thickness of the catheter (~4mm), however

when used in conjunction with manometry, no pressure increase is observed in the anal canal.

- b. Air is compressible and not a close representative of faeces
- c. Balloon does not inflate spherically

3. Ultrasound Probe:

He uses a probe ~15mm in diameter with a single circular crystal at the end.

Observations:

- a. Single crystal means the operator has to move the probe to get a 3d volume of the canal.
- b. The length of the measured area is around 60mm.
- c. There is a probe available called BK which uses a nut-screw mechanism to move the crystal within the probe. The location information is then linked to the acquired image and can be used in post processing to get a more accurate result. See challenges...

Challenges:

- a. Main challenge here is the movement of the probe.
- b. When it is manual, obviously this adds a lot of error to the measurements and it is all back to the experience of the operator. All images are recorded continuously so it is very important to have a smooth motion with a constant speed!
- c. To solve this problem, BK2 was designed. Due to some issues the oil used for the nut-screw mechanism in the first probe used at LTHT a probe from an alternative manufacturer is now used.
- d. Having a flexible, portable, and inexpensive arm/guide for the probe with linear encoder, etc will be very useful. This has been tried before but using industry grade robotic arm with rigid joints/arms and not really user friendly.

4. Pudendal Stimulation/Recording:

He uses St. Mark's Pudendal Electrode for combined stimulation and recording.

Observations:

- a. The electrode is mounted onto an examining glove using adhesive tabs at the tip and centre of the electrode.



Challenges:

- a. Main challenge here is the finger! Ali suggested soft robot for this and will explore the options (summer project!!).
- b. Adhesive tabs are sharp and often not very comfortable for the patients.
- c. Most patients manage the test with a little discomfort it but it can be challenging due to limited penetration in some.
- d. Locating the pudendal nerve at times can be difficult and in some cases can put considerable strain on the operators fingers.
- e. While most find PNTML useful there is some evidence within the literature to suggest that the results from it alters the management in only 4% patients.