Welcome

Welcome to the July 2016 edition of NewWave.

If you have any relevant articles of papers that you would like to be included in future editions, please email them to steve.perring@poole.nhs.uk

Look out for some reminiscences of the early years of the life of AGIP in the next edition in September

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Committee News

Barbara Unsworth has stepped down from involvement in the AGIP Committee as the Education Secretary. We would like to take this opportunity to thank Barbara for her commitment and contribution to the work of AGIP and in particular its role in the training of new members.

We also have two new members on the Committee in the new role of AGIP IQIPS Assessor Representative. This is reflecting AGIP’s commitment to IQIPS as the appropriate quality standard for GI physiology services.

At the AGIP Annual Meeting at last month’s British Society of Gastroenterology Annual Meeting in Liverpool the following statement was made:

“AGIP wish to officially inform its members that there is an expectation that GI Physiology units start the IQIPS accreditation process within a 2 year time period”

Accredited Independent Practitioners of the Association of GI Physiologists: CPD 2016

The deadline has passed for submitting your CPD forms for the period 2014-2016. Well done if you have submitted successfully.

don’t forget to keep your CPD records up-to-date

If you have not submitted your CPD forms and received a confirmation letter that your CPD has been accepted then you can no longer call yourself an accredited independent practitioner!

If you have not completed your CPD forms and want to apply retrospectively, details are still available in the March 2016 edition of NewWave. You will also have to pay a fine for late submission.
Portable, Easy and Affordable
- Cost-efficient solution for treating patients suffering with incontinence or chronic constipation
- Portable, wireless system eliminating the need for a cart and dedicated room
- Ability to view anal and rectal pressures simultaneously
- Contains visual biofeedback for patient participation
- Utilises anorectal manometry for detailed results
- Runs four comprehensive tests for pelvic floor retraining

Pelvic floor retraining can be an option for both women and men suffering from Faecal/urinary incontinence and chronic constipation. Performing pelvic floor exercises can help strengthen the muscles under the uterus, bladder, and bowel to directly assist with bowel control and urinary leakage. The mcompass gives patients an option to retrain their pelvic floor muscles without the need for more invasive treatments. For patients that do require surgery, pelvic floor retraining may help them maximise their potential to stay continent.

Developed at the world renowned Mayo Clinic, Mcompass from Medspira is the first ever simple to use Anorectal Manometry device that makes testing of pelvic floor function easy, fast and flexible. This portable System doesn’t even need a dedicated room so is ideally suited to the practical needs of both NHS and Private Practice.

Background to the Biofeedback development
The mcompass System, with the Biofeedback therapy software, was recently selected by the National Institute of Child Health and Human Development (NICHD) Pelvic Floor Disorders Network to be used in the CAPABLE study (Controlling Anal Incontinence by Performing Anal exercises with Biofeedback or Loperamide). The goal of this randomised placebo-controlled trial, involving seven research institutions, is to learn more about medication and pelvic muscle training treatments for faecal incontinence (accidental bowel leakage). Specifically, this study will compare Pelvic muscle training with drug treatments for faecal incontinence to see if one treatment or both together are better than usual care at improving this condition. The team at Medspira learned a lot about what is necessary for both the clinicians and patients relating to anorectal manometry and biofeedback using manometry.
<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
<th>Details</th>
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<td>15th-16th Sept 2016</td>
<td>Emerging concepts in the management of faecal incontinence</td>
<td>Barts and London For further details contact Mark Scott (<a href="mailto:m.scott@qmul.ac.uk">m.scott@qmul.ac.uk</a>)</td>
</tr>
<tr>
<td>6th October, 2016</td>
<td>HRM &amp; Impedance/pH Study Day</td>
<td>Life Science Centre, Newcastle <a href="mailto:rachel@ardmorehealthcare.com">rachel@ardmorehealthcare.com</a></td>
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<tr>
<td>15th - 19th Oct 2016</td>
<td>United European Gastroenterology (UEG) Week</td>
<td>ACV, Vienna, Austria For further details go to:</td>
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<tr>
<td></td>
<td></td>
<td><a href="https://www.ueg.eu/week/past-future/ueg-week-2016/">https://www.ueg.eu/week/past-future/ueg-week-2016/</a></td>
</tr>
</tbody>
</table>
Introduction: To compare anal sphincter pressure parameters using water-perfused (WP) and a solid-state (SS) HRAM catheter in healthy volunteers using a standardised protocol to provide normal values.

Methods: 60 asymptomatic volunteers were studied (20M/40F). WP HRAM single-use ano-rectal catheters (ARC), 10channels, external diameter 14Fr (MUI Scientific, Canada) and SS HRAM multi-use ARC, 8 channels placed 0.8cm apart, external diameter of 12Fr, 16Fr at sensors (UniSensor AG, Switzerland) both distributed by Ardmore Healthcare, UK. Studies were performed consecutively in a randomised order with the volunteers in the left-lateral position with knees & hips flexed. After a 3minute familiarisation period, the following test manoeuvres were performed according to a standardised protocol1, Rest- subject relaxed and lying still, anorectal pressures measured for 1minute. Cough- asked to cough once maximally. Squeeze- asked to squeeze maximally for 5seconds. Cough & squeeze manoeuvres were repeated twice. Sensation of maximum rectal capacity was assessed by gradual inflation of the balloon at a rate of 2ml/sec using an automated pump.

Results: Normal values (5th-95th percentile) for parameters of ano-rectal function in males & females:
Females:                      SS HRAM                  WP HRAM
Anal canal length (cm)        1.9-4.2                  1.7-3.5
Resting pressure (mmHg)       25.6-94.5                33.4-101.9
Cough Increment (mmHg)        43.3-259.5               27.8-136.3
Squeeze Increment (mmHg)      34.5-332.8               27.2-188.5
Max tolerated volume (ml)     87.6-236.4               80.2-233.4

**Conclusion:** Significant differences between the two systems were observed for maximum squeeze increment and maximum cough increment in males & females (p<0.001). There was no significant difference between the two catheter types in relation to anal canal length, resting pressure or maximum tolerated volume. This study utilised the same manometry system to record and analyse results, making it the first study to directly compare the impact of catheter choice on HRAM in normal volunteers.

Method: High Resolution Oesophageal Manometry (HRM) was performed in 121 patients, 61 of whom presented primarily with unexplained respiratory symptom (Group A). An age and sex matched control group was chosen from patients presenting with dyspepsia (Group B). The HRM findings of 61 patients (38 female), mean age 56, range (18-81) with respiratory symptoms were compared with the those of 60 suspected gastrooesophageal reflux disease (GORD) patients (39 female), mean age 57, range (19-81). Respiratory patients complained predominantly of chronic cough (50), or breathlessness (11).

Results: Mean LOS and UOS resting pressures were similar between the two groups. There was a significant difference in the number of intact peristaltic swallows with a larger number of intact swallows in Group B (58% vs 43%, P=0.03) than in Group A. Intraoesophageal pressure was significantly lower during inspiration in group A (-11.5mmHg vs -8.7, p=0.001). Consequently, a significantly higher GOPG was found in group A (46mmHg vs 33mmHg, p<0.01).

Conclusion: Using HRM, we have demonstrated a higher prevalence of oesophageal dysmotility in patients with unexplained respiratory symptoms than those with typical manifestations of GORD - a group in which reduced oesophageal motility is already widely documented. As well as this, we have shown that those with unexplained respiratory symptoms exhibit higher inspiratory GOPGs. Theoretically, our findings support the hypothesis that oesophageal dysmotility and an increased inspiratory GOPG could encourage both acid and non-acid aspiration and thus provoke respiratory symptoms such as cough and breathlessness.

A plea for more space!

While the AGIP sessions were very successful, the sessions were blighted by small rooms and poor facilities. On one session there were nearly as many people outside the room waiting to gain access than there were seats in the room!
We would encourage all who attended to make the case forcefully in conference feedback for larger capacity rooms and other facilities e.g. technical support in the room.
Motility and Oesophageal Clearance in Barrett’s Oesophagus
Talk presented by Rami Sweis (Gi Physiology Unit, University College London Hospital, London, United Kingdom) in the joint Neuro-gastroenterology and AGIP Free papers symposium.
Report by Philip Waudby (Hull & East Yorkshire Hospitals)

Introduction: It is not clear if Barrett’s is a consequence of excessive reflux only or reduced clearance of refluxed materials. This study compares oesophageal reflux over 24 hours and High Resolution Manometry (HRM) response to solids in Barrett’s with non-Barrett’s reflux (NBR).

Methods: Reports for 19 consecutive patients with ≥2cm Barrett's during 2015 were compared with 25 patients with NBR and 13 patient controls with normal physiology/endoscopy. All had at least one typical symptom of heartburn, regurgitation or chest pain. All had HRM with the intention of completing 10x5cc water and 5x1cc bread. Contractile vigour was measured with the Distal Contractile Integral (amplitude x length x contraction time); DCI>450mmHg.cm.s and breaks in peristalsis of <5cm were considered the lower limit of normal contraction as per Chicago Classification Version 3. Standard reflux and impedance parameters were assessed. 11/19 Barrett’s were on while all NBR were off treatment.

Results: Lower oesophageal sphincter pressure was lower in Barrett’s (8 vs. 14mmHg). Compared to NBR, patients with Barrett’s (2-10cm) had significantly reduced DCI for both 5ml water (318 vs. 650mmHg.cm.s) and solid (1096 vs. 2002mmHg.cm.s). On the other hand, the likelihood of measuring a DCI of >450 was significantly reduced in Barrett’s only with solids (69% vs. 100%); not water (32% vs. 54%). Peristaltic effectiveness based on HRM was also reduced only for solids (44% vs. 65%). All reflux parameters were similar between the two groups: total, upright and supine reflux, symptom index, symptom association probability and total number of reflux events. On the other hand, bolus clearance time (BCT) was significantly prolonged for Barrett’s (13 vs. 10s) solely due to prolonged supine BCT (14 vs. 10s). Bolus exposure time (BET) was significantly prolonged for Barrett’s due to both daytime (4.49% vs. 1.73%) and nocturnal BET (0.75% vs. 0.24%). Comparing those with prior endoscopic Barrett’s therapy (n=6) with treatment naïve (n=13), there was no difference in any motility or pH monitoring parameter apart from BET which was greater in those who received therapy (5.87% vs. 1.99%).

Conclusion: Solids were superior to water swallows in demonstrating ineffective contractility in Barrett’s. This was associated with reduced nocturnal oesophageal clearance and increased exposure to refluxate during the day/night. These findings contribute to the theory of impaired contractility and reduced clearance despite acid-reducing medication in Barrett’s.
Dysphagia Patients with Normal Oesophageal High Resolution Manometry: Assessing the Diagnostic Value of Bread Swallows
by Jafar Jafari (Guy’s & St Thomas’ NHS Trust, London, United Kingdom) in the joint Neurogastroenterology and AGIP Free papers symposium.
Report by Warren Jackson (Hull & East Yorkshire Hospitals)

The talk started by mentioning that High Resolution Oesophageal Manometry (HRM) is the gold standard technique to investigate oesophageal motility in patients with dysphagia. However, with routine HRM and use of the Chicago Classification, a group of patients with dysphagia are considered as being normal and dysphagia remains unexplained. Mentioning ‘The World Gastroenterology Organisation’ guidelines that stipulate that if oesophageal motility studies are normal it is ‘functional’, this lead to asking the audience, do we tell those patients with a normal motility study...‘You think you have dysphagia so you have function dysphagia’?!

The aim of their study was to assess the diagnostic value of solid bolus swallows in patients with dysphagia and normal HRM. Those patients having dysphagia and normal HRM studies (72 patients) during January – October 2015 were selected. Solid bolus of bread (1cm3 single bread swallows) performed after the standard water swallows. Patients were categorised to symptomatic and asymptomatic groups based on having dysphagia reproduced on bread swallows.

In the asymptomatic groups, 7/22 patients showed abnormality on bread swallows and in the symptomatic group, 45/50 showed abnormal motility (P= 0.0001).

He concluded that performing solid swallows on HRM can convert significant numbers of functional dysphagia to dysphagia with an organic cause and is readily available without extra costs or risks.

I would like to add that for the bulk of AGIP GI Physiologists we already undertake bread swallows and other ‘non-routine’ swallows as part of our daily ‘normal routine HRM’ in line with the ‘Agreed AGIP guidelines for Oesophageal High Resolution Manometry’:

http://www.bsg.org.uk/sections/agip-general/related-documents.html
Anthony reminded us all of the paucity of training in GI physiology in specialist registrar training in the UK, with no requirement for such training in gastroenterology SpR training and minimal in the equivalent for surgery. He emphasised the need for clinicians to understand the purpose of tests and what the results mean in order to serve patients well and approach them holistically.

He emphasised the importance of referral pathways agreed between prospective referrers and the GI physiology services and reiterated the vital role of multi-disciplinary meetings in maintaining an effective service. With many units now looking to IQIPS accreditation and AGIP recommending that all units take steps in this direction, he reminded us that one of the requirements of IQIPS is that there is regular feedback from the users of the service.

Anthony advocated the use of combined manometry and impedance assessment for assessment of oesophageal motility. His argument was that where manometry indicates poor peristalsis, contemporaneous impedance gives clarity as to whether bolus clearance is adequate in spite of that poor motility or not.

He also emphasised the utility of hydrogen/ methane breath testing as a technique for assessing functional bowel symptoms. In particular he advocated for wider assessment of small bowel bacterial overgrowth. He discussed the preparations required, the different criteria used for abnormal breath levels and the importance of accompanying symptoms, including changes in abdominal girth.

Budding Reviewers

If you attend a meeting and wish to review a presentation at that meeting in a future edition of NewWave, please contact the NewWave editor (steve.perring@poole.nhs.uk)

Help-out the rest of us who did not manage to get to the meeting
The risk of mis-diagnosis of Achalasia using conventional manometry

By Ishmail Miah

Introduction
Oesophageal manometry is currently the gold-standard assessment tool for diagnosing Achalasia. The introduction of High Resolution Manometry (HRM) along with the Chicago Classification has revolutionised diagnostic manometry testing thus making the Achalasia diagnosis simpler and easier than previously with using conventional manometry (CM). However, some GI Physiology Units continue to use the CM system with the point sensor based catheter and using graphical line plot pressure software for analysis.

In this study we review HRM diagnosed Achalasia cases in the CM monitoring platform and discuss when and how Achalasia patterns are nullified in individual swallows and more importantly, if this changes the overall diagnosis of Achalasia.

Method
This is a retrospective audit of untreated Achalasia patients who attended the oesophageal laboratory from December 2015 to February 2016. The patient report files and manometry files were loaded from the Guy's & St Thomas' Oesophageal Laboratory trust drive and patients were selected based on the following criteria:

1. Patient diagnosed with untreated Achalasia on HRM using the Chicago Classification (version 3).
2. Patients performed multiple rapid swallows (MRS) with 10mls of water which demonstrated incomplete lower oesophageal sphincter (LOS) inhibition with abnormal or absent post MRS contraction
3. Patients performed a second MRS study with 200mls of water that showed incomplete LOS inhibition with significant retention of liquid bolus
4. Patient undergone complementary testing that showed features of Achalasia eg in upper endoscopy or barium swallow study

The total number of patients recruited was 10 with each patient performing ten standard 5ml water swallows, thus, generating 100 swallows to screen and compare between CM monitoring and HRM monitoring. In the CM monitoring, one single point sensor was positioned in the stomach (≥5cm below the LOS), one single point sensor were positioned at the mid level of the LOS (found during the 30s resting phase), four point sensors were positioned in the oesophageal body (4-5cm apart) and one sensor was positioned at the mid level of the upper oesophageal sphincter (UOS).

In the CM monitoring, the LOS pressure was determined during the maximum exhalation pressure (when diaphragm is relaxed) relative to the corresponding gastric pressure which was captured within the 30 seconds resting phase without patient swallowing or any oesophageal activity occurring. The HRM landmark frame was positioned in this location with placing LOS borderline markers at proximal and distal margins and the sleeve markers were extended additional 1cm above the proximal LOS margin and 1cm below LOS distal margin. This allowed direct comparison of the LOS resting pressure (LOSP) screening in the same plane and location between HRM and CM monitoring which was easily performed by switching the display mode. This technique was also applied to each of the 5ml standard water swallow frame by viewing between CM and HRM monitoring by switching display mode. The LOS relaxation on CM monitoring was manually calculated by finding the lowest LOS pressure occurring within the 7 seconds period after a 5ml water swallow had been performed and subtracting this pressure from the corresponding gastric pressure to determine the residual pressure (RP). The LOS relaxation (LOSR) was then denoted as the traditional relaxation percentage by the inserting into the formula \[100-(RP/LOSP)x100\]. A relaxation percentage between ≥50% and <90% was considered as partial LOS relaxation. In the HRM screening, the LOS relaxation was measured using the integrated relaxation pressure (IRP) parameter that calculates the mean summation of the lowest pressures relative to the corresponding gastric pressures for four seconds following a 5ml standard water swallow within the 7 seconds swallow frame. IRP readings <15mmHg during a standard swallow is indicative of adequate LOS relaxation.
The patients in study were seen by a single physiology practitioner and the manometry was performed using the Sierra Scientific Instruments; the hardware included ManoScan 360 [Model A100] with 36-channel solid-state HRM catheter and the software used ManoView (ESO 3.0.1).

**Results**

The overall impact on the diagnosis of Achalasia on HRM and CM monitoring in terms LOS relaxation from the overall residual pressure screening during swallows show that 8 of the 10 patients demonstrated having non-relaxing LOS on HRM monitoring whereas on CM screening 8 of the 10 patients demonstrated having normal LOS relaxation (p=0.0230). Two Achalasia patients already had LOSP less than 15mmHg on HRM monitoring. When inspecting the difference of LOSR from LOSP on HRM screening, none of the patients fulfilled to the level of partial relaxation (see Table 1) whereas 5 of the 10 patients demonstrated LOS relaxation at least to the level of partial relaxation on CM monitoring which exclude the diagnosis of Achalasia in these patients (p=0.0325).

**Discussion**

At least half of the patients would be excluded of Achalasia on CM monitoring either due to partial LOS relaxation (as interpreted from traditional methods) or from seeing normal residual LOS pressure during swallows (see Table 1). Screening the individual swallows on CM monitoring revealed 26 swallows with partial LOS relaxation and further 23 of the swallows demonstrated complete LOS relaxation (>90% relaxation) which is suggestive of LOS relaxation pressure being approximate to the gastric pressure during a swallowing phase. This level of LOS relaxation, observed in one swallow, would completely reject the diagnosis of Achalasia. These LOS pseudo-relaxation are perceived as normal LOS relaxation on CM monitoring which occurred during oesophageal shortening, belching and head/neck movement during swallows.

### Table 1: LOSP and RPS screening in CM plots and HRM topography

<table>
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<tr>
<th>Patient number</th>
<th>Conventional Manometry</th>
<th>High Resolution Manometry</th>
<th>p-value (CM residual vs. HRM residual)</th>
<th>Is CM diagnosis different from HRM?</th>
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<tr>
<td></td>
<td>LOS (mmHg)</td>
<td>RP (mmHg)</td>
<td>LOSR (%)</td>
<td>LOS (mmHg)</td>
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<td>16.1</td>
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Oesophageal Shortening

Oesophageal shortening is the shrinking of the oesophagus possibly to aid bolus transport to the stomach. In the HRM monitoring, the LOS plane temporarily shifts upwards from its natural landmark position and in the current study 60% of Achalasia patients displayed oesophageal shortening either during swallowing events and/or non-swallowing phase. In the CM monitoring, the oesophageal shortening cannot be detected and if present during swallows, the LOS pressure is recorded to decrease as gastric pressure is in fact being measured. As a result, LOS residual pressure and relaxation percentage measured is perceived as normal which would exclude Achalasia diagnosis. In the current
study, HRM had detected oesophageal shortening associated with 16 swallows which resulted in partial LOS relaxation and complete LOS relaxation in respectively 1 and 15 swallows. The maximum oesophageal shortening in this study was 3.3cm drift from the natural landmark location which equates to 13.2-16.5% shortening of an adult oesophagus.

Belching After Swallow
Belching immediately seconds after swallowing is strongly suggestive of supragastric belching phenomenon which was found in 40% of the Achalasia patients in this study. There is no literature reporting supragastric belching found in Achalasia patients. However HRM has detected 25 belching events occurring within 4 seconds of swallowing 5ml water and UOS relaxation is present with the opening in the distal UOS. The consequence of immediately belching after swallow has shown temporal LOS relaxation on CM monitoring during swallows, such that, partial LOS relaxation and complete LOS relaxations was seen in 16 and 5 swallows respectively.

Head/Neck Movement
Head/neck movement manoeuvre during swallows is a habitual behaviour found in 20% of the Achalasia patients in this study. There is no evidence in the literature suggesting head/neck movement during swallows helps aiding bolus transport. In HRM monitoring head/neck manoeuvre is typically seeing UOS and LOS plane drifting from natural landmark location occurring specifically during the manoeuvre. On CM monitoring, there was reduction of the LOS pressure during swallows when head/neck movement was present which is presumably owing to catheter displacement and the sensor reading LOS pressure plane moved into the stomach and was measuring gastric which was perceived as LOS relaxation. In the current study, there were 11 swallows associated with head/neck manoeuvres and on CM monitoring, 4 and 2 swallows were respectively perceived as partial LOS relaxation and complete LOS relaxation.

The findings of this study shows discrepancy between CM and HRM monitoring for screening Achalasia and in the present study at least 50% of the patients being excluded of Achalasia is a direct result from the different LOS relaxation screening method; in the CM traditional manual calculation technique was employed whereas HRM topography used a complex IRP parameter measured during 4s period. The IRP measuring parameter has demonstrated to be a superior and more accurate assessment of LOS relaxation which is not interrupted by the oesophageal shortening, belching or head/neck movement during swallows. IRP measurement also seems to be consistent with the findings of other tests in our cohort of Achalasia patients, such as, upper endoscopy findings (e.g. dilated oesophagus, residual bolus despite fasting, scope difficult to pass GOJ) and/or barium swallows (e.g. dilated oesophageal, barium hold-up, beak like GOJ, tertiary contractions etc.). Our cohort of patients also underwent comprehensive manometric testing including standard water testing benchmarked against Chicago classification which revealed Achalasia and also underwent advanced testing with performing MRS to assess the function of excitatory and inhibitory nerves and the muscular contractility of the oesophagus, in which, all the patients demonstrated having impaired neuromuscular integrity and insufficient oesophageal bolus clearance suggestive of outflow obstruction. These findings are in keeping with the physiological patterns of Achalasia and the symptoms patients reported.

Conclusion
At least half of Achalasia cases would be missed on CM monitoring as a consequence of perceiving LOS pseudo-relaxation contributed by undetectable factors including oesophageal shortening, belching and head/neck movement occurring during swallows. These factors are, however, detectable during HRM monitoring and have no impact on the IRP measurements.