Welcome

Huge congratulations to the four ladies who have recently qualified with a BSc (Hons) degree in Clinical Physiology. These recently qualified Clinical GI Physiologists now join the GI physiology community, employed at the following Trust's:

Harriet Bolton  
Leeds Teaching Hospitals NHS Trust  
Jennifer Burke  
Hull and East Yorkshire Hospitals NHS Trust  
Nadine Deschamps  
Guys and St Thomas NHS Foundation Trust  
Rachael McGee  
University Hospitals Bristol NHS Foundation Trust

Treatment of PPI refractory GORD

Andrés Vales, Angela Anggiansah, Guiping Sui, Terry Wong

Studies have shown that between 10-40% of gastro-oesophageal reflux disease (GORD) patients fail to have partial or complete symptom improvement to standard proton pump inhibitor (PPI) dosage which corresponds to a large number of referrals from primary and secondary care for patients who still seek symptom resolution.¹ This is an excellent indication for this group of patients, particularly those with negative endoscopic results, to undergo oesophageal physiological investigations including catheter pH, pH + impedance or prolonged Bravo® wireless pH tests to establish the diagnosis of GORD and to evaluate the reasons for the lack of response to therapy. A 96 hour Bravo® wireless pH study is particularly useful in catching those missed by the 24 hour catheter pH studies.²
Sifrim and Zerbib (2012) have proposed that refractory GORD be defined as a lack of sufficient symptom improvement to twice daily PPI over a period of 12 weeks treatment. Symptoms should be specific to GORD (heartburn/regurgitation) and should occur at least 3 times a week for the last 3 months. Once PPI failure has been established in patients with proven GORD and the patients’ symptoms are indeed caused by reflux, the treatment pathway may involve the use of both conservative and invasive options.

![Figure 1: The rules for GORD conservative management.](image)

The five Ds of conservative management are simple measures that can provide significant improvements yet are not attempted by some patients.

**Dosage:** the majority of patients are known to take PPI medication suboptimally (Fig 2). Low dose twice daily PPIs can provide close to 24 hours of acid suppression and can be optimised when taken 15-60 minutes before meals. This way when the proton pumps are activated the plasma levels of the PPIs will be at their highest point and therefore provide the greatest suppression of intragastric pH.

![Figure 2: A dose timing breakdown of suboptimal dosers.](image)
Decreasing weight: it has been shown that the chances of a person suffering from GORD symptoms are greater in those with higher BMI. Interestingly the same study also revealed that if participants lost or gained weight during the study that their odds ratio would decrease or increase respectively. In terms of actual measured reflux, obesity has also been demonstrated to exacerbate GORD. Increases in patient BMI and waist circumference were seen to be directly proportional to increases in oesophageal acid exposure time (AET) and number of refluxes (Fig 3).

Dinner: the timing of the evening meal may also help to alleviate symptoms with evidence to show a reduction of more than 1/3 in AET if the patient retires to bed more than two hours after dinner. This study also helped to establish that nocturnal reflux occurred mostly during the first half of the night.

Diet: the contents of the meal are also important with a study using 96 hour Bravo® wireless pH monitoring by Fox et al (2007) revealing that those on low fat / low calorie diets suffered significantly less symptoms and less AET than those on high fat / high calorie diets. Interestingly it was also noted that calorie density determines the severity of AET after meals; however the percentage fat content of the diet has important effects on the frequency of reflux symptoms suggesting that fat may affect oesophageal sensitivity. Another note worthy study has also shown that chewing a piece of sugar-free gum for half an hour after meals can reduce postprandial reflux.

Placing the bed in a Downward slope: studies by Hamilton et al (1988) and Khan et al (2012) revealed that the use of wedges or raising the head of the bed by 20cm was able to reduce nocturnal AET with Khan et al showing that symptoms were also reduced.
Patients on PPI's who continue to experience symptoms such as cough, heartburn, regurgitation and chest pain often are difficult to diagnose using traditional acid (pH) monitoring approaches. In fact, a recent study states that physicians using only acid (pH) monitoring for diagnostics, lack the capability of accurately diagnosing GORD in 35% of their patients*. The ZepHR® Impedance/pH Reflux Monitoring System employs impedence to detect ALL reflux activity and uses pH to categorize each episode as acid or nonacid for Total Reflux Monitoring. Comprehensive analysis quantifies all reflux patterns and symptom associations in patients studied on or off acid suppression medication.

Having introduced impedence/pH monitoring to the G.I. market, Sandhill continues to evolve this unprecedented technology...delivering all the information you need for a precise, comprehensive assessment of acid and nonacid reflux as well as the correlation between reflux and symptoms.

**Indications for combined impedence/pH testing**
- Persistent symptoms while on acid suppressive therapy
- Primarily postprandial symptoms
- Reflux symptoms and frequent meal ingestion (i.e., infant)

**Small size... Big Performance**
Small BUT powerful! Your patients will appreciate the large, easy to understand controls including our well known symptom buttons that make reporting as easy as 1-2-3.

**Treatment Conclusions**
- Patients with non acid reflux identified by impedence/pH whose symptoms have not responded to PPI therapy may benefit from the use of other medications.
- Clinical trials have established that non-acid reflux can be associated with GORD symptoms. In addition, ZepHR® provides a true negative study by identifying patients with no reflux association.
- Positive symptom index for nonacid or acid reflux using impedence/pH predicts successful response to Laparoscopic Nissen Fundoplication.

* An Analysis of Persistent Symptoms in Acid Suppressed Patients Undergoing Impedence-pH Monitoring:
Sharma, Agrawal, Freeman, Vela & Castell; Clinical Gastroenterology and Hepatology 2008;5:19x.
Once conservative measures have been implemented the type of medical therapy is also important with Esomeprazole shown to provide increased symptom relief over other PPIs.\textsuperscript{14,15} Several studies show improved gastric acid control and up to 41% symptom improvement when twice daily PPIs are used in combination with H\textsubscript{2} receptor antagonists (H2RA) (Fig 4).\textsuperscript{16,17,18} Conversely however the benefit of prokinetic agents has been less well studied and they may produce a placebo effect.\textsuperscript{19} The GABA-B agonist Baclofen is now known to decrease the number of transient lower oesophageal sphincter relaxations (TLOSR) by helping to reduce acid and non-acid reflux.\textsuperscript{20} Benefits have been seen with patients that are refractory to PPIs but the limiting factor has been the number of side effects where dizziness, drowsiness and nausea are common.

Figure 4: Median % time gastric pH > 4 for patients on PPI twice daily and PPI twice daily + H2RA.\textsuperscript{16}

Figure 5: Normalisation of reflux parameters after EsophyX or laparoscopic fundoplication.\textsuperscript{22}

In terms of invasive therapy several antireflux endoscopic procedures exist but most fail to show significant benefit in the few randomised and sham controlled studies that were produced. In the past two popular techniques were the use of radio frequency ablation in the Stretta® procedure to help tighten the LOS, and the EsophyX® full thickness per oral fundoplication. The Stretta® was able to improve quality of life but there was little difference in the 24 hr pH studies for AET before and after the procedure.\textsuperscript{21} The EsophyX® procedure
did provide improvement in the number of refluxes and AET but was unable to match the effectiveness of the laparoscopic fundoplication\textsuperscript{22} (Fig 5). Recently the LINX Reflux\textsuperscript{®} Management procedure uses a magnetic ring with a view to reduce the side effects of dysphagia and gas bloating over fundoplication (Fig 6). A recent study revealed that there was normalisation of AET in 58\% but that dysphagia was still an issue and some patients did require the LINX to be removed.\textsuperscript{23}

![Figure 6: The magnetic beads of the LINX attract to keep the LOS closed whilst the force of a swallow opens the beads.\textsuperscript{24}](image)

At present the laparoscopic Nissen fundoplication remains the reference standard for invasive therapy, however the majority of studies are based on patients who responded well to PPIs. Complications do exist, most commonly due to dysphagia or gas bloating which occasionally require revision.\textsuperscript{25} When considering treatment pathways in patients who are refractory to PPIs there are only a few studies available. Those who have been diagnosed with an acid sensitive oesophagus (normal AET but positive symptoms indices on 24 hour pH monitoring) can be shown to benefit from fundoplication.\textsuperscript{26}

Overall PPI refractory symptoms are common. Conservative measures do help but optimal use of PPIs is important and they can be aided with the use of additional H2RAs. Invasive procedures can be useful for PPI refractory patients where the laparoscopic fundoplication remains the reference standard.

Sifrim, D., Zerbib, F. Diagnosis and management of patients with reflux symptoms refractory to proton pump inhibitors. \textit{Gut}. 2012; 61:1340-1354


Frazzonli, M., Conigliaro, R., Manta, R., Melotti, G. Reflux parameters as modified by EsophyX or laparoscopic fundoplication in refractory GERD. *Aliment Pharmacol Ther*. 2011; 34(1):67-75


Profiles of three of our newly qualified physiologists

Jennifer Burke
Clinical Physiologist - Hull and East Yorkshire Hospitals NHS Trust

I completed my training at Hull and East Yorkshire Hospitals NHS Trust - a Physiologist lead unit where I have recently obtained a first class degree in Clinical Physiology. I have now been fortunate to be employed as a permanent member of staff within the department.

The BSc course in clinical physiology at De Montfort University from which I have recently graduated provided a comprehensive overview of the major physiological systems, which offered a base for more detailed modules specifically focused on Gastroenterology. Specialist GI block weeks held at the Northern General Hospital in Sheffield and The Royal Salford Hospital were particular highlights of the course. These weeks involved an assortment of tutorials with a wide range of professionals from the field of gastroenterology such as nurse specialists, clinical scientists and surgeons, as well as other GI physiologists. This multidisciplinary arrangement
allowed us to see the ways in which the outcomes of the investigations we undertake influence the patient journey, as well as introducing us to other investigations and techniques within the field.

During my final year I completed a research project entitled: ‘High Resolution Anorectal Manometry: Establishing Normal Values in Healthy Volunteers’. The project was successful in providing normal values for our area, and the values now feature on our departmental clinical reports. I was delighted when the findings of the study were accepted for poster presentation at the United European Gastroenterology Week in Amsterdam at the end of last year.

Nadine Deschamps  
Lower Gastrointestinal Physiologist – Guys and St Thomas NHS Foundation Trust

I work in the London based St Thomas Hospital, in the Pelvic Floor Department as a Lower Gastrointestinal Physiologist. In my role I undertake anorectal physiology, endoanal and pelvic floor ultrasound. The department offers Proctography and Biofeedback in addition, and all investigations and consultations are discussed in a weekly multi-disciplinary team meeting.

As part of my training I completed a university certificate of continued professional development (UCCPD) in Gastrointestinal Physiology at De Montford University in Leicester. This was in addition to my first degree of Biomedical Sciences which I studied in King’s College London. During my degree program I specialised in anatomy, physiology and neuroscience and hence was able to complete a UCCPD to finish my training as a Gastrointestinal Physiologist.

The course was originally a 4 year degree program but my course tutors and work based mentor enabled me to complete the UCCPD in 3 years. The course delivery was via distance learning and block week placements once a year for 2 years. I had to complete a combination of coursework, written examinations, work based assessments and build a professional portfolio within the 3 years.

The course enabled me to access the full extent of gastrointestinal physiology, from both the colorectal and gastroenterologists point of view. I was able to learn, not only about the tests which were performed in my own department, but also about oesophageal high resolution manometry, pH studies, impedance monitoring, bravo, smart pills, endoscopy, colonoscopy and ERCP manometry. I was also able to complete a professional portfolio of the clinical experience I had obtained in the tests commonly performed in the gastrointestinal unit. The course also enabled me to meet my fellow colleagues across the country who were training to specialise like myself, and allowed me to visit other units to observe each individual set up.

Throughout my training I gained confidence in the area of gastrointestinal physiology.
relevant to both my job and to gastrointestinal physiology as a whole. I feel competent not only to perform anorectal physiology studies but also to perform common oesophageal assessment tests as well. The course has allowed me to network and form connects with colleagues across the country and has given me experience of departments which are set up differently to my own. I am also aware of the common disorders, management and treatment of diseases related to my field.

**Rachael McGee**  
*Clinical Physiologist - University Hospitals Bristol NHS Foundation Trust*

I completed my training at the Royal Devon and Exeter NHS Foundation Trust, working in a multi-disciplinary department that comprised of Clinical Scientists, Clinical Physiologists and Nurse Specialists which provided me with an appreciation of the different roles in Physiological Measurements. The degree at De Montfort helped to underpin the theoretical knowledge of the clinical work I was working in and I’m proud to say I obtained a first class degree in Clinical Physiology! Input from Upper GI Surgeon, Mr Saj Wajed, who has begun to pioneer the LINX surgery for patients who do not usually qualify for traditional anti-reflux surgery, has helped improve my knowledge further, this combined with my dissertation into the wireless pH device (Bravo) has given me a solid understanding into upper GI physiology, pathology and consequently treatment.

The Royal Devon and Exeter also allowed me to incorporate Gastrointestinal training with Urodynamics training and clinics. This enhanced my overall knowledge of the pelvic floor and further developed my clinical skills that I have been able to carry on with me to my new post at University Hospitals Bristol, a department that has a more involved role into lower GI, allowing me to further enhance and cement my skills and knowledge post-qualification. Although my new role does not directly involve urodynamic studies, I am pleased I completed this training alongside my degree.
Forthcoming Events:

We hope to publicise forthcoming meetings and educational events. We would like to invite interested parties to contact the NewWave editor (warren.jackson@hey.nhs.uk) to have their details included in future issues.

Oct - Dec 2013

Medical Measurement Systems (MMS) web seminar schedule for 2013:

22nd Oct 2013
Anorectal manometry (HRAM) & Colonic manometry

24th Oct 2013
Interactive HRM Case Interpretation

6th Nov 2013
Paediatric Impedence-pH Studies

19th Nov 2013
Impedance-pH studies

4th Dec 2013
Paediatric High Resolution Manometry (HRM)

Each session is FREE of charge:
www.mmsinternational.com/int/1599/mms-education-web-seminars-2013

30th Sept – 2nd Oct ‘13
Short Course in Upper GI Physiology
Newcastle University

For more information, please email: lynne.smith@sth.nhs.uk

12th - 16th Oct 2013
United European Gastroenterology (UEG) Week
ICC Berlin, Germany

Website: www.ueg.eu/week

6th - 8th Nov 2013
Sandhill Scientific Clinical Training Seminars
Charing Cross Hotel, The Strand, London

Introduction to Impedance/pH Reflux Testing (6th Nov)
High Resolution Impedance Manometry (7th Nov)
Impedance / pH Reflux Testing, Advanced; Adults (8th Nov)

Registration: www.synmed.co.uk/news_sandhill_training_nov_2013.htm

18th Nov 2013
High Resolution GI Manometry Study Day
University College Hospital, London

For more information, please email: rachel@ardmorehealthcare.com
(or call 01494 721820)

21st – 22nd Nov 2013
Capsule Endoscopy in Clinical Practice Autumn 2013
Lumley Castle Hotel, County Durham

For more information, please email: info@digamed.co.uk

23rd January 2014
High Resolution Manometry Training Day
Charing Cross Hotel, The Strand, London

For more information, please email: info@digamed.co.uk