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OP-1 ARTIFICIAL OESOPHAGUS ENGINEERING IN A 3D DYNAMIC CULTURE

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Repair of long-gap oesophageal atresia still remains a clinical challenge. Several acquired conditions such as tumours and gastro-oesophageal reflux require surgical removal of the affected portion and a suitable oesophageal replacement.

Taking into account the urgent clinical need, tissue engineering is emerging as an alternative strategy to autografts in order to restore digestive continuity.

This field aims to create imitations of the native tissue through the combination of appropriate biomaterials and stem cells. Natural matrices represent ideal scaffolds since they maintain native matrix composition, morphology and mechanical features fostering *in vivo* vascularization and functionality.

Engineering the oesophageal muscle layer appear to be a pivotal factor in promoting scaffold integration and motility, but it has not been established yet. Our approach aims to build an oesophageal muscularis externa combining natural matrix with smooth muscle precursors, in a dynamic 3D tissue culture.

Primary cells were seeded into the muscle wall of oesophageal template and cultured in dynamic versus static conditions. A bioreactor provided optimal nutrient exchange, oxygenation and pulsatile stimulation, resembling the peristaltic movement that the smooth muscle cells experience *in vivo*.

Seeded cells displayed both engraftment and migration through the scaffold. An optimized culture protocol allowed cell expansion and differentiation towards muscle fibres. Dynamic culture was also associated with increased scaffold thickness, which is possibly due to matrix remodelling and could potentially lead to a faster engraftment process *in vivo*.

In conclusion, we identified a promising method for effective reconstruction of oesophageal muscle wall. Future work will include maximization of cell differentiation in order to obtain a fully engrafted scaffold supporting *in vivo* peristaltic movement.

OP-2 THE DIAGNOSTIC VALUE OF RADIOLOGICAL COLONIC TRANSIT STUDY COMPARED WITH HIGH-RESOLUTION COLONIC MANOMETRY.

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Background: Chronic constipation is one of the most common chronic disease in children. Most of cases are functional, however some has problem of organic myopathic or neuropathic colon. Colonic transit study with oro-anal transit markers is the basic diagnostic tool for colonic dysmotility in clinical practice, colonic manometry is the recommended investigation in the next step. Nevertheless, the colonic manometry is considered more invasive, expensive and also unavailable in many countries. The aim of this study is to assess the diagnostic value of conventional method as colonic transit study compared with the novel high-resolution colonic manometry in diagnose colonic abnormalities.

Methods: Fifty constipated children in Great Ormond Street hospital were retrospectively reviewed in demographic data and investigation result. The diagnosis of constipation was based on history and physical examination which followed Rome III criteria. All of enrolled patients received colonic manometry investigation before colonic transit study in order to reduce the bias. For colonic transit protocol, patients had to ingest a 10-markers capsule on 3 consecutive days and an abdominal x-ray was obtained on day 4. The cut-off values for abnormal segmental and total colonic transit time (CTT) were based on Arhan et al publication.

Results: Fifty constipated children with the mean age of 9.77 years (1.15–17.32) were included. Of all, 39 (78%) patients had colonic abnormality detected by colonic manometry while 38(76%) patients had abnormal CTT.

The sensitivity, specificity, and positive predictive value (PPV) of colonic transit study for abnormal total CTT were 46.2%, 72.7% and 85.7%, respectively. In aspect of abnormal segmental CTT, the sensitivity, specificity and PPV of right colon are 66.7%, 63.6% and 20%; left colon are 16.7%, 72.7% and 7.69%; and rectosigmoid colon are 29.4%, 68.8% and 66.7%, respectively.

Conclusions: Colonic transit study seemed to have satisfied posttest probability to diagnose total colonic abnormality. However, for segmental CTT, this test might be invalid and the consideration to use as predictor of segmental abnormality was not recommended.

OP-3 THE PROTECTIVE ROLE OF LACTOBACILLUS RHAMNOSUS GG-DERIVED FACTORS AGAINST LPS-INDUCED DAMAGE OF HUMAN COLONIC SMOOTH MUSCLE CELLS.

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Background: Impaired gut barrier function has been reported in some functional gastrointestinal (GI) disorders. Evidences suggest that gut microbiota affects GI motility in particular *Lactobacillus* species elicits anti-inflammatory activity and exerts protective effects on damage induced by pathogen Gram negative-derived lipopolysaccharide (LPS). LPS produced an oxidative imbalance in human colonic smooth muscle cells (SMC) that persists after LPS-washout and contributes to SMC morphofunctional alterations. The aim was to evaluate if supernatants harvested from LGG cultures protect SMC from LPS-induced myogenic damage. **Methods:** *L. rhamnosus* GG (ATCC 53103 strain) was grown in MRS medium and samples were collected from bacterial cultures in middle exponential phase, in early, in middle and late stationary phase (overnight). Supernatants were recovered, filtered and stored at -20 °C. Highly pure human SMC culture was then exposed for 24h to highly purified LPS (1 µg/ml) of *E. coli* (O111:B4) in the absence and presence of the supernatants. Their effects were evaluated on LPS-induced SMC morphofunctional alterations and pro-inflammatory IL-6 production. Data are expressed as mean ± SE ($P < 0.05$ significant).

Results: LPS induced persistent significant $20.7\% \pm 1.2$ cell shortening and $35.2\% \pm 2.6$ decrease in contraction of human colonic SMC. These alterations were paralleled to a $238.5\% \pm 82.5\%$ increase in IL-6 production. These effects disappeared in the presence of LGG-supernatants, following a progression related to LGG growth curve phases. Supernatants collected in the middle exponential phase already significantly partially restored LPS-induced cell shortening by $43.4\% \pm 10.2\%$ and IL-6 increase by $47.6\% \pm 13.1\%$, but had no effect on LPS-induced inhibition of contraction. Supernatants collected later, in the early and middle stationary phase, further counteract LPS-induced damage, including inhibition of contraction. Maximal protective effects were observed with supernatants of the late stationary phase where LPS-induced cell shortening was reversed by $86\% \pm 4.7\%$, inhibition of contraction by $98.2\% \pm 1.8\%$, and IL-6 basal production by $91.3\% \pm 0.6\%$.

Conclusions: LGG-secreted products are substances/byproducts able to directly protect human SMC from LPS-induced myogenic damage. Novel insights are then provided about the possibility that LGG-derived products could reduce the risk of progression to a post-infective motor disorder.

OP-4 ADVANCES IN TISSUE ENGINEERING TO REGENERATE THE INTESTINAL EPITHELIUM

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Introduction: Irreversible intestinal failure (IF) due to anatomical or functional loss is a devastating condition is associated with significant morbidity and mortality. Patients referred for intestinal transplantation suffer low survival rates due to the high graft-rejection rate and sepsis as a consequence long-term immunosuppression. These clinical challenges reveal an urgent need for research into new treatments for IF. Here, we present recent advances in our work on intestinal tissue engineering.

Methods: Ethical approval is in place to collect intestinal tissue from patients at Great Ormond Street Hospital. Intestinal crypts were isolated and organoids were cultured as previously described. Decellularization of whole intestinal sections was performed using 2 cycles of the Detergent Enzymatic Treatment (DET) as previously reported. Organoids were cultured on the epithelial surface of the acellular matrix in vitro for 10 days. Cell survival was analysed by histology, immunofluorescence, immunohistochemistry and electron microscopy techniques.

Results: Intestinal crypts from the small intestine and colon were successfully isolated from endoscopic biopsies and cultured in order to generate 3 dimensional organoids. The presence of goblet cells and enterocyte cells were confirmed on immunohistochemistry. Whole sections of intestine of varying lengths were successfully decellularized and assessed using H&E staining and scanning electron microscopy. Organoids were seeded onto the epithelial surface of the acellular intestinal matrices and allowed to engraft for a period of 10 days in vitro. The formation of a neo-epithelium with evidence of a microvillus brush border was evident after 10 days in culture. Furthermore, the cells had successfully migrated into the crypt domains of the matrix.

Conclusions: We demonstrate the potential of tissue engineering for intestinal failure by combining organoid cultures with decellularization expertise. Our results confirm human intestinal organoids to be the ideal source of progenitor cells to regenerate the intestinal epithelium, with potential clinical applications for transplantation.

OP-5 INTEROBSERVER VALIDITY OF THE REFLUX FINDING SCORE FOR INFANTS (RFS-I) IN FLEXIBLE VERSUS RIGID LARYNGOSCOPY.

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Background: The Reflux Finding Score for Infants (RFS-I) was developed to objectively assess signs of laryngopharyngeal reflux (LPR). Based on review of flexible

laryngoscopic videos, only moderate inter- and highly variable intraobserver reliability was found. We hypothesized that examination of the infant larynx with rigid laryngoscopy would provide better agreement. AIM: to assess the validity of the RFS-I in the detection of LPR-related findings using flexible versus rigid laryngoscopy.

Methods: Thirty consecutive infants underwent flexible and rigid laryngoscopy. Based on the recorded videos, RFS-I was scored by 4 otorhinolaryngologists, 2 otorhinolaryngology fellows, and 2 inexperienced observers. Videos were presented in a randomized order, blinded for clinical profile and findings during initial examination. Observers were provided an instruction sheet prior to evaluation. For categorical data, agreement was calculated using Cohen's kappa (2 observers) and Fleiss' kappa (>2 observers). For ordinal data the intraclass correlation coefficient (ICC) was used.

Results: Of 30 included patients (17 M; median age 7.5 (0–19.8) months), main reasons for referral were: stridor ($n = 15, 50\%$), ALTE/apneas ($n = 7, 23.3\%$), follow-up of laryngeal abnormalities ($n = 6, 20\%$), aspiration ($n = 5, 16.7\%$), and other indications ($n = 7, 23.3\%$). Overall interobserver agreement of the RFS-I was *moderate* for both flexible (ICC = 0.60, [95%CI 0.44–0.76]) and rigid (ICC = 0.42, [95%CI 0.26–0.62]) laryngoscopy. There were no significant differences in agreement on overall RFS-I scores and individual RFS-I items for flexible versus rigid laryngoscopy. We did observe higher overall agreement amongst the 2 inexperienced observers for rigid (ICC = 0.40, [95%CI 0.03–0.67]), compared to flexible (ICC = 0.11, [95%CI 0.17–0.41]) laryngoscopy, albeit not significant. Comparing RFS-I results for flexible versus rigid laryngoscopy *per* observer, agreement ranged from *no* to *substantial* agreement ($k = -0.16$ – 0.63 , mean $k = 0.22$) and the observed agreement (not adjusted for chance) was 0.08–0.35%.

Conclusions: Interobserver agreement of the RFS-I was only moderate and did not differ between flexible and rigid laryngoscopy. This indicates that the RFS-I should not be used with flexible, nor rigid laryngoscopy to detect signs of LPR.

OP-6 INTRAGASTRIC PRESSURE MEASUREMENT DURING NUTRIENT INTAKE: A NOVEL MINIMALLY INVASIVE METHOD TO MEASURE GASTRIC ACCOMMODATION IN FUNCTIONAL DYSPEPSIA.

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Background: Functional dyspepsia (FD) in pediatrics is defined as the presence of upper abdominal symptoms for at least 2 months in the absence of organic or metabolic disease likely to explain the symptoms. The main proposed pathophysiological mechanisms are visceral hypersensitivity, impaired gastric accommodation (GA) and delayed gastric emptying. At present, the gastric barostat is the gold standard to measure GA. However, this procedure is perceived as very invasive and it might alter the normal gastric physiology. Recently, we proposed the intragastric pressure (IGP)

measurement during nutrient intake as a potential alternative for assessing GA in adults. This technique uses a thin manometry catheter that measures the IGP over the entire length of the stomach. By means of this study we aim to introduce the HRM as new minimally invasive technique to measure GA and nutrient tolerance in children.

Methods: After the manometry probe and a second infusion catheter were positioned through the nose into the stomach, the IGP was measured 30 minutes before and during intragastric infusion of nutrient drink (300 Kcal, 60 ml per minute). The patients were asked to score hunger and satiation and 6 epigastric symptoms (fullness, nausea, belching of air, cramps in the abdomen, bloating and pain) at 5-minute intervals. The experiment ended when the volunteers scored maximal satiation at 1-minute intervals by using a graphic rating scale that combines verbal descriptors on a scale graded from 0–5 (1, threshold; 5, maximum satiety).

Results: For this study 13 FD pediatric patients (92% female, 14.8 ± 0.8 years old, BMI: 19.5 ± 0.8) and 12 young adult volunteers (100% female, 22.2 ± 0.4 years old, BMI: 21.2 ± 0.3) were recruited. The Rome III questionnaire showed that FD patients suffered mainly from postprandial fullness (75%), epigastric pain (58%), bloating (50%), nausea (50%) and early satiation (42%). In both groups, intragastric infusion of nutrient drink induced a rapid drop in proximal stomach IGP. The average AUC change from baseline was -44.7 ± 11.0 mmHg in patients and -48.4 ± 25.2 mmHg in healthy subjects. Patients tended to score maximal satiation at lower volumes compared healthy subjects (433.8 ± 64.2 ml and 600.0 ± 67.6 mL respectively, $p = 0.1$). All FD patients and healthy subjects tolerated the catheters and could finalize the study.

Conclusions: The IGP measurement during intragastric nutrient drink infusion is a promising minimally invasive alternative to the gastric barostat method to assess GA and nutrient tolerance. Future studies need to increase the patient numbers and compare the measurements in different subsets of pediatric FD (e.g. weight loss vs. no weight loss, present or absent early satiation, etc.).

OP-7 THERAPEUTIC EFFECTS OF DOMPERIDONE ON ABDOMINAL PAIN-PREDOMINANT FUNCTIONAL GASTROINTESTINAL DISORDERS: RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED TRIAL

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Introduction: The therapeutic effect of domperidone on abdominal pain-predominant functional gastrointestinal diseases (AP-FGIDs) was assessed on children in 5–12 year age group at the Gastroenterology Research Laboratory of Faculty of Medicine, University of Kelaniya, Sri Lanka.

Methods: Children fulfilling Rome III criteria for AP-FGIDs were recruited from the out-patient clinic of the University Paediatric Unit, North Colombo Teaching Hospital, Ragama, Sri Lanka, after obtaining parental consent. They were randomized in to 8 weeks of placebo or Domperidone (Motillium 10 mg, 3 times per day, before meals) groups, using computer generated random numbers. Placebo was a specially prepared dummy tablet without any active ingredients, had the same colour, size, shape and taste of domperidone tablet and were packaged similarly. Primary outcomes defined were cure (abdominal pain less than 25 mm on the visual analogue scale and no impact on daily activities) and improvement (pain relief and sense of improvement recorded on global assessment scale). Secondary outcomes were significant improvement in symptoms, gastric motility, quality of life (QoL) and family impact. Both patients and investigators who assessed primary and secondary outcomes before and after intervention were blind to interventions administered. Symptom severity was recorded on a validated 100 mm visual analogue scale. Translated and validated PedQL Generic Score Scale version 4.0 and Family Impact Module were used. Gastric motility was assessed using a validated ultrasound method.

Results: One hundred children were enrolled and 89 completed the trial [Placebo 42 (22 girls), Domperidone 47(33 girls)]. While comparing primary outcomes, domperidone group had significant improvement [37 (78.7%) vs. 25 (59.5%) in placebo group, $p=0.04$], while no such difference was observed in cure. When assessing secondary outcomes, domperidone group reported significant reduction in abdominal pain severity (70.84% vs. 48.18% $p=0.03$) and improvement in motility index (29.3% vs. 8.6% $p=0.04$) after intervention. No such difference was seen in improvement of QoL and family impact ($p > 0.05$).

Conclusions: Domperidone has a favorable therapeutic effect on improvement AP-FGIDs in children aged 5–12 years. It causes significant reduction in abdominal pain and improvement in motility of the gastric antrum. However, it has no significant effect on improvement of QoL and family impact.

OP-8 SOCIAL CONCERNS IN CHILDREN BEING INVESTIGATED FOR CHRONIC INTESTINAL PSEUDO-OBSTRUCTION

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Background And Aims: Fabricated induced illness (FII) is recognised amongst children presenting with suspected Chronic Intestinal Pseudo-Obstruction (CIPO) (Hyman 2012). We aimed to investigate the presence, nature and potential causes of social concerns in children being referred to our national centre with possible CIPO.

Methods: All patients accepted into the CIPO diagnostic pathway over 3 years (April 2012-April 2015) were reviewed. Acceptance criteria included all of the following (1) referral from a paediatric gastroenterologist or surgeon suspecting a diagnosis of CIPO, (2) mechanical obstruction of the intestine excluded and 3) reliance on specialised enteral or parenteral feeding. The presence and nature of social concerns were recorded pre- & post-assessment along with associated characteristics pertaining to the referral, family situation as well as child protection. Comparison was made to referrals to the IBD service within the department.

Results: Of 78 accepted children (mean 5.2 years, 42F) 57 were diagnosed with CIPO, 53 (4.2yrs 31F) by abnormal antroduodenal manometry (ADM) and 4, unsuitable for ADM, by clinical picture. Of the remaining 21 patients (5.8yrs 12F) with normal ADM, 8 were found to have FII; 4 driven by a parent and 4 by the patient (teenage girls). The remaining 13 patients had non-CIPO diagnoses. Of those with normal ADM 17/21 had social concerns; 10 with formal child protection or FII and 7 with concerns over treatment compliance and ambiguity of symptoms. Of those with CIPO 18/57 had social concerns including 2 formally listed as child protection for neglect/parenting concerns and 1 with possible FII. The remaining CIPO cases had a variety of concerns mainly around ambiguity and reliability of reporting. Comparison with a newly diagnosed IBD cohort (161 patients) during the same period revealed only 7 with social concerns. Recurrent themes in those with social concerns, particularly CIPO, included consumerism, internet and media involvement (Facebook, fundraising and celebrity events), resistance to positive news and pain predominant clinical picture.

Conclusions: Social concerns (including safeguarding and child protection) in children thought to have CIPO are prevalent (45%) and approximately 10-fold higher than seen in IBD (4.3%). Although commoner in non-CIPO patients, social concerns are also prevalent in those proven to have CIPO (32%). These concerns should be explored and addressed along with an emerging 'profile' of associated risk factors such as use of multi-media, medical consumerism and a pain predominant clinical picture.

OP-9 MODULATION OF THE RECTOANAL INHIBITORY REFLEX IN PATIENTS WITH MYELOMENINGOCELE WITH AND WITHOUT BLADDER AUGMENTATION

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Introduction: Some patients with myelomeningocele need bladder augmentation (augmentation cystoplasty). The aim of this study was to evaluate the relationship between the bladder augmentation and the rectoanal inhibitory reflex (RAIR) modulation in patients with myelomeningocele. The modulation of the anorectal inhibitory reflex in accord the use of oxybutynin chloride was also evaluated.

Methods: It is a cross-sectional and comparative study. We studied a convenience sample consisting of 24 children and adolescents with myelomeningocele aged between 4 and 18 years. Ten of these 24 patients had surgery to expand the bladder. Anorectal manometry of perfusion were performed with 8-channel radial catheter (Dynamed®) in latex free protocol. The evaluation of the (RAIR) modulation was determined by inflating the balloon with 20 mL of air in rectal. The RAIR modulation was determined by duration (seconds) and amplitude (% relaxation) of RAIR.

Results: RAIR was present in all the patients. The duration of the RAIR (seconds) with 20 mL and 40 mL was similar in the both groups, with or without bladder augmentation (27.11 ± 11.95 ; 27.37 ± 9.29 ; $p = 0.953$ and 30.32 ± 7.30 ; 32.08 ± 10.13 , $p = 0.653$). The RAIR amplitude with 20 mL and 40 mL was lower in the patients with bladder augmentation than in patients without bladder augmentation (63.87 ± 24.58 ; 82.31 ± 15.94 , $p = 0.036$ and 68.06 ± 14.80 ; 88.93 ± 16.31 , $p = 0.004$). The patients who used oxybutynin chloride presented higher amplitude (% relaxation) in relation those did not used this drug, with 20 mL (80.91 ± 15.37 and 65.21 ± 25.73 ; $p = 0.074$) and 40 mL (85.78 ± 15.96 and 73.05 ± 19.29 ; $p = 0.084$), however, the statistic evaluation did not reach significance.

Conclusions: The RAIR modulation is different between patients with and without bladder augmentation. The use of oxybutynin chloride also appears to interfere in the RAIR, increasing its amplitude.

OP-10 EFFICACY AND SAFETY OF ENEMAS ADMINISTERED HIGH IN THE RECTUM FOR FECAL DISIMPACTION IN CHILDREN.

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Aim: Efficacy and safety of enemas administered high in the rectum for fecal disimpaction in children was evaluated by a retrospective cohort study.

Methods: Between January 1, 2012 and January 1, 2014 all procedures were evaluated. All enemas were administered, using a standardized in-house protocol, so all procedures were performed in the same way. An enema high in the rectum was considered effective, if stool production exceeded the amount of stools that is regarded normal for the age and weight of the patient, and if the patient felt relieved after the production of stools.

A qualitative scale was used by the nursing staff to estimate the amount of stools produced by the patient ('none', 'little', 'normal', 'many'). Stool consistency was scored, using Bristol Stool Scale. Total stool production within 12 hours after enema was scored. Literature review was performed on efficacy and safety of enemas high in the rectum.

Results: N = 77 procedures were evaluated in which all data were documented. Enemas were administered in N = 75 children (36 girls/39 boys: mean age: 9.8 yr (3.6 - 19) (range)). Fecal impaction was present, defined as:

palpable mass in abdomen or in rectum and a history of low stool frequency. N = 25 children were treated with more than one enema during the studied period. 68 % of enemas were effective for acute disimpaction. In 30 (45%) procedures, many stools were evacuated, in 15 (23%) procedures the amount was normal; in 18 (27%) procedures there was little stool production and in 3 (5%) procedures no stools were produced. In N = 11 procedures the amount of stools produced was documented insufficiently. Procedure-related complications were not seen. In literature no data were found on the efficacy or on safety of enemas administered high up in the rectum. Literature shows equal efficacy of high dose (oral) macrogol as compared to standard rectal enemas (not high up).

Conclusions: Enemas administered high up in the rectum are safe in all, and effective in a majority of patients for the management of fecal impaction in children. Prospective studies are needed to evaluate efficacy of enemas high up in the rectum as compared to high doses of macrogol for fecal disimpaction in children.

OP-11 DO TRAUMATIC LIFE EVENTS PREDISPOSE CHILDREN TO DEVELOP CONSTIPATION?

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Background: The aetiology of functional constipation (FC) in children is not been fully understood. Exposure to physical, emotional and sexual abuse are known to predispose children to develop FC. No paediatric study has evaluated traumatic life events other than abuse as a potential predisposing factor for FC in children. We aimed to assess the association between traumatic life events and development of FC in children.

Methods: We conducted a cross sectional, school based study. Children aged 13–18 years were selected from four semi-urban schools in the Gampaha district, Sri Lanka. A validated, self-administered questionnaires were used for collect data on functional gastrointestinal disease and traumatic life events. FC was defined using the Rome III criteria.

Results: A total of 1792 children were included in the analysis [males 975 (54.4%), mean age 14.4 years, SD 1.3 years]. Out of them, 138(7.7%) had FC. Prevalence of FC was significantly higher in those exposed to traumatic life events compared to controls (53.6% vs.32.9%. $p < 0.0001$). Traumatic life events such as parents living separately (13.4% vs. 7.12%, $p = 0.038$), living in a boarding house (10.1% vs. 1.6%, $p = 0.049$), liquor abuse by parents (14.8% vs. 6.3%, $p < 0.0001$), witnessing a murder (16.7% vs. 3.9%, $p = 0.002$), child labour (13.9%vs. 7.3%,

$p = 0.02$) and ill-treated by parents (27.5% vs. 7.3%, $p < 0.0001$) were shown to predispose children to develop FC. Parental substance abuse (12.8% vs. 7.4%), domestic violence (14.8 vs. 7.5%) were not associated with FC ($p > 0.05$).

Conclusions: FC is associated with childhood traumatic experiences. This provides further insight into how traumatic childhood events are associated with development and perpetuation of FC in children.

OP-12 PREVALENCE OF FUNCTIONAL CONSTIPATION IN INFANTS AND TODDLERS IN SRI LANKA

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Objective: To determine the prevalence of functional constipation (FC) in toddlers in Sri Lanka and to identify risk factors associated with the development of FC, such as demographic features, social and economic factors.

Methods: Children between 7 months and 5 years of age were selected from 14 well baby and vaccination clinics in the Gampaha District, Sri Lanka. Data were collected using a self-administered questionnaire. The questionnaire contained questions regarding the child's bowel habits, socio-demographic characteristics as well as physical and verbal violence against mother and/or child. Functional constipation was diagnosed according to Rome III criteria.

Results: A total of 1151 toddlers were included in the analysis, (female $n = 588$ [50.8%], mean age 21.7 months, standard deviation [SD] 12.5 months). A total of, 92 children (8.0%) fulfilled the Rome III criteria for FC. The prevalence of constipation was significantly and independently associated with first birth order (9.6% vs. 6.5% $p = 0.026$), underweight [$< 2SD$] (15.0% vs. 7.1%, $p = 0.004$) and living in an urban residence (9.5% vs. 5.8%, $p = 0.023$). Odds ratios [OR] and 95% confidence intervals [CI] are were respectively 1.61 (CI; 1.02–2.53), 2.53 (CI; 1.45–4.41), 1.70 (CI; 1.08–2.69). Toddlers being overweight, being subject to violence or with mothers subject to violence illustrated higher prevalence of FC, but p -values were > 0.05 . No association was found with gender, age, parental age, parental education level, shortage in income and quality of relationship between parents.

Conclusions: Functional constipation is a significant health problem in toddlers in Sri Lanka, concerning 8 percent of its population between 7 months and 5 years old. Toddlers being

first born, underweight and living in an urban area show a significant higher risk for FC.

OP-13 REFLUX AND ESOPHAGEAL MOTILITY PATTERNS IN CHILDREN WITH ESOPHAGEAL ATRESIA

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Background: gastroesophageal reflux disease (GERD) and esophageal dysmotility are common in patients with esophageal atresia. The aim of this study was to evaluate GERD and esophageal motility patterns in children with EA using combined pH-impedance (pH-MII) monitoring and high resolution esophageal manometry (HREM) respectively. As a secondary aim the reflux patterns and distal baseline impedance (DBI) demonstrated in MII-pH in EA patients were compared with those of normal children with suspected GERD

Methods: A retrospective chart review was done on 35 patients with EA and 35 age and sex matched normal controls with suspected GERD. All patients underwent a 24 hour pH-MII monitoring. If patients were on proton pump inhibitor (PPI) therapy, it was continued during the study. 8 of the EA patients also underwent HREM. Impedance data were compared between both cohorts. Endoscopy, clinical symptoms and patient demographics data was also collected.

Results: In the EA cohort, the median age was 53 months, with 21 males and the majority (71.4%) had Type C EA. 85.7% of the EA cohort and 40% of the control group were on PPI therapy during the pH-MII study. pH-MII testing showed a total of 1457 retrograde bolus movement (RBM), of which only 14.3% was acidic in the EA cohort. In the control group there were 1482 RBMs of which 46.3% was acidic. There was no significant difference in the total RBMs between the two groups. Acidic RBMs was significantly lower in the EA group (208) compared to the control group (689), $p = 0.0008$, and non-acid reflux index (NA RI) was significantly higher in EA children 1.1(0.0–7.8) compared to controls 0.6(0.0–5.7), $p = 0.0046$. There was no significant difference in total RBM, acid reflux index (ARI), and number of proximal reflux episodes between EA patients with and without fundoplication, long gap, esophagitis on biopsy and those on or off PPI. In EA patients out of total 1183 total symptom occurrences only 335 (28%) were associated with RBM. The mean DBI was significantly lower in EA 1029.6 (410.9SD) Ω compared to controls 2998.2 (1028.8SD) Ω with suspected GERD, $p < 0.0001$. By logistic regression only PPI use had a significant effect on DBI, $p < 0.0001$. None of the GER (ARI, NARI, or RBM) or bolus transit (mean acid clearance time (MACT), and bolus clearance time (BCT)) parameters or age had a significant effect on DBI. HREM was abnormal in all EA patients and demonstrated either aperistalsis, pressurization, weak peristalsis with small or large breaks or only distal peristalsis in those studied. 4 out of 8 EA patients had different peristaltic

patterns for their solid swallows compared to their liquid swallows in HREM.

Conclusions: pH-MII testing allowed increased detection of non-acid reflux events in EA patients which would have been missed with standard pH monitoring alone. NARI was the only reflux parameter which was significantly higher in the EA cohort compared to the control group with suspected GERD, but the clinical significance of NAR in EA patients remains to be determined. Majority (72%) of gastrointestinal symptoms in EA patients were not temporally related to RBM in pH-MII testing. DBI was significantly lower in EA patients compared to controls, however its clinical relevance remains to be determined. Esophageal motility as determined by HREM was abnormal in all EA patients.

OP-14 EFFECT OF TUBE-FEEDING ON BOLUS CLEARANCE TIME IN NEUROLOGICALLY IMPAIRED CHILDREN VERSUS NORMAL CHILDREN

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Aim: Neurologically impaired children are at increased risk of gastro-esophageal reflux disease (GERD). Pathogenic factors that can lead to GERD include transient lower oesophageal sphincter relaxation and impaired oesophageal clearance. Previous studies had suggested that neurologically impaired children have increased bolus clearance time (BCT). The aim of our study is to determine the effect of (nasogastric) tube-feeding on BCT in these children.

Methods: Retrospective review of the multi-channel intraluminal impedance-pH (MII-pH) results of the paediatric population performed from January 2012 to December 2014.

Results: A total of 71 studies were performed. 7 studies were excluded from data analysis as these children had previous fundoplication which is known to alter oesophageal peristalsis. Of the 64 analysed, 33 were in neurologically impaired children and 32 were male. The median (range) age was 1.35 (0.03–18.58) years. 60 (93.75%) children were less than 5 years old at the time of the study.

In our cohort, all the neurologically impaired children were tube-fed. 41 (68.75%) of the children were tube-fed; bolus fed ($n = 30$), continuous nasogastric ($n = 7$) or nasogastric-jejunal ($n = 4$). Based on the MII-pH results, 16 children (25%) were diagnosed to have GERD. 9 of the neurologically-impaired children had GERD while 7 of the neurologically normal children had GERD. There was no difference in the means of the “median BCT” in neurologically impaired versus normal children (10.42 (SD 4.27) vs 9.18 (SD 2.12) seconds, $p = 0.144$), or in those with or without GERD based on MII-pH, regardless of underlying neurological status.

Conclusions: Our data suggest that BCT in neurologically abnormal children who are tube-fed do not appear to be longer than neurologically normal children, or associated with an increased risk of GERD. This suggests that other mechanisms have a greater role in conferring the increased risk of GERD in this population. Of note, “median BCT”

values were also shorter in our population of predominantly young children of age less than 5.

OP-15 FEATURES OF AEROPHAGIA MEASURED WITH MULTICHANNEL PH-IMPEDANCE IN CHILDREN

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Introduction and Aim: Diagnosis of aerophagia is based on clinical symptoms and described in Rome III Criteria. The aim of this study was to estimate the normal and pathological values for air swallows measured with pH-impedance in children.

Material and methods: We analysed features of air swallowing in pH-impedance for patients hospitalized in the Great Ormond Street Hospital in 2008–2014, with the clinical symptoms of aerophagia, who have met the Rome III Criteria. Children with pH-impedance performed due to other gastrointestinal conditions (GORD, Abdominal pain, food allergy and asthma) and had normal studies comprised the control group. The exclusion criteria were: neurological, metabolic or genetic disorders, previous oesophageal surgery including fundoplication, connective tissue disorders and studies lasting less than 16 hours in duration

All studies were re analysed manually, meals were excluded from analysis. Total number of air swallows (in upright and recumbent position); mixed swallows, gastric belching and supragastric belching were counted. The results were presented as total number of episodes and as median number of episodes per hour.

Results: Impedance recording of 10 patients (7 males) with clinical aerophagia and control group of 10 children (7 males) were analysed. Mean age of patients was 10 years (4.5–13.5) and 7 years in control group (4.5–17 years). Mean (\pm SD) recording time for patients 21.3 hrs (\pm 2.3) for control 21.2 hrs (\pm 1.2). Total number of liquid reflux (mean \pm SD) for patients 46.9 (\pm 22.6), control 27.6 (\pm 15.4) $p = 0.028$. The median of total air swallows per hour was 30.35 (IQR: 22.6 to 43.50) in patients with aerophagia and 7.33 (IQR: 5.43 to 9.9) in control group. There were significant differences in total number of air swallows, as well as in supragastric belches between the groups ($p = 0.0001$ and $p = 0.001$, respectively). Both air swallows and gastric belches were significantly more often observed in boys (median for boys 20.92 and 1.06; for girls 7.20 and 0.34; $p = 0.02$ and $p = 0.006$, respectively).

Conclusions: pH-impedance is an important diagnostic tool in the measurement of gas and fluid movement in the oesophagus. Hereby we showed suitability of pH-impedance

in the assessment of children with clinically diagnosed aerophagia.

OP-16 DIETARY INTERVENTION USING THE LOW FODMAP DIET VERSUS THE “MILK, EGG, WHEAT AND SOYA FREE” DIET FOR TREATMENT OF FUNCTIONAL GUT DISORDERS A SINGLE CENTRE EXPERIENCE

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Introduction: The adolescent clinic is a tertiary referral clinic including patients with a wide variety of complex gastroenterology conditions predominantly tertiary referrals from Great Ormond Street Hospital transition clinic.

Purpose: To assess the benefit of the low FODMAP diet versus the “Milk, egg, wheat and soya” (MEWS) free diet for symptom control in patients with functional gut disorders and/or food allergy from June 2013 to June 2015.

Methods: A total of 436 patients were seen during this time period for dietetic advice and the age range varied from 13–21 years old with 43 terms of diagnosis used. These included the broad categories of inflammatory bowel disease, food allergy, functional gut conditions, congenital gut disorders, autoimmune disorders and oncology conditions. For functional gut disorders/food allergy there were 14 terms used which varied from “Functional gut disorder” to “Irritable bowel syndrome” and also included patients with delayed gastric emptying. For patients with food allergy the terms “multiple food allergy” or Eosinophilic Oesophagitis or Colitis were used. A total of 40 patients with functional gut disorders were referred for the MEWS or low FODMAP diet. The efficacy of the diet was measured using a symptom scale pre and post dietary intervention assessing if patients symptoms changed from nil/mild/moderate to significant. The results indicate whether the presenting predominant symptom e.g., bloating, constipation or abdominal pain improved following the dietary intervention.

Results: A total of 29 patients were seen for the “MEWS” free diet. These were 17 functional, 3 food allergy, 6 IBS, 2 Eosinophilic Oesophagitis, 1 oncology patient. The age ranged from 14 to 21 and average age at treatment was 16.6 years old with 11 males and 18 females. 13 patients were referred for the low FODMAP diet. The patients referred for the low FODMAP diet were 7 with a functional gut disorder, 5 Irritable Bowel Syndrome and 1 Eosinophilic Colitis. The age range was 14 to 19 years old with average age at treatment 16.3 years old. There were 6 males and 7 females. The success rate of the MEWS diet measured by reported significant improvement in predominant presenting symptom was 14/29 (48.2%), moderate 4/29 (13.7%) mild 2/29 (6.9%) and 9/29 (31%) nil improvement. For the low fodmap diet 6/13 (46.1%) of patients reported a significant improvement in symptoms, 0/13 (0%) moderate, mild 2/13 (15.4%) and 5/13 (38.5%) had nil improvement.

Conclusions: This review suggests that although there were larger referral rates for the MEWS diet both the MEWS and low FODMAP diet appear to be equally effective dietary approaches for treating patients with functional gut disorders and/or food allergy.

OP-17 INFANT DYSCHIEZIA IN SRI LANKAN CHILDREN: EPIDEMIOLOGY AND RISK FACTORS

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Objectives: Little is known regarding functional gastrointestinal diseases in infants, especially in developing countries. Our aim was to assess the prevalence of infant dyschezia in relation to bowel habits and sociodemographic factors in a representative community sample in Sri Lanka.

Methods: A multicentre cross-sectional study was conducted among mothers of 0–7-month-old infants, attending 14 growth monitoring and immunization clinics in Gampaha District, Sri Lanka. A self-administered questionnaire was used to determine gastrointestinal symptoms, the infant’s bowel habits and sociodemographic characteristics for a total of 1004 infants. The questionnaire was translated to the native language (Sinhala) and pretested. Infant colic and infant dyschezia were diagnosed according to the Rome III criteria.

Results: The prevalence of infant dyschezia in Sri Lanka was 4.3%. An infant was more likely to suffer from infant dyschezia if he or she was formula-fed (9.6% vs. 7.8% in breast fed and 4.2% in those on additional foods, $P = 0.025$) or had a highly educated father (mean years of education 13.5 [SD 4.0] vs. 12.3 [SD 2.6] in unaffected children, $P = 0.005$). No significant association was found between infant dyschezia and age, sex, gestational age, birth order, birth weight, current weight, and presence of domestic violence ($P > 0.05$).

Conclusions: Infant dyschezia is a significant health problem in Sri Lanka affecting approximately 4.3% of healthy infants. Infants with infant dyschezia are more likely to be formula-fed and have a highly educated father.

OP-18 THE COMBINATION OF SCGOS/LCFOS AND FERMENTED INFANT FORMULA SOFTENS STOOLS OF INFANTS COMPARED TO UNFERMENTED INFANT FORMULA WITHOUT SCGOS/LCFOS

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Objectives and study: Hard stools can be commonly observed in formula-fed infants, but rarely in breast fed infants. The effects on stool frequency and stool consistency of a novel infant formula were evaluated in a randomized, controlled, double-blind, multicenter, parallel-group, intervention study on gastrointestinal (GI) tolerance. The novel infant formula (FF+) combined fermented formula (Lactofidus™) with short-chain galacto-oligosaccharides and long-chain fructo-oligosaccharides (scGOS/lcFOS, ratio 9:1, 0.8 g/100 ml).

Methods: Healthy, term infants aged 0–28 days were randomized after parent's autonomous decision to discontinue breastfeeding, to receive either infant formula with scGOS/lcFOS and 30% fermented formula (FF+, n = 95 infants), or infant formula without fermented formula and scGOS/lcFOS (IF-, n = 105 infants). Exclusively breast fed infants (n = 100) were included as a reference group. Parents completed standardized diaries with daily entries on stool consistency and frequency until 17 weeks of age. Stool consistency was rated on a five point scale. Starting at an age of 4 weeks, the distributions of the weekly average of the daily mean stool consistency, and distributions of the daily average number of stools were compared between intervention groups.

Results: Based on low GI symptom-scores and adverse events, the newly-developed infant formula FF+ was well tolerated. The average stool consistency of infants fed with FF+ was closer to the breast fed reference group, and had a significantly softer median stool consistency than IF- fed infants from 4 weeks of age for the remaining study period (Mann Whitney, $p \leq 0.005$). From 9 weeks of age, FF+ fed infants had a significantly higher median stool frequency than IF- fed infants (Mann Whitney, $p \leq 0.05$).

Conclusions: The specific combination of 30% fermented formula with scGOS/lcFOS yielded stool consistencies closer to that of breastfed infants, and significantly softer stools than those of infants fed a standard formula.

Background: Functional abdominal pain (FAP) according to the paediatric ROME III (pRIII) criteria appears to be highly prevalent among school children. The differentiation between organic and functional abdominal pain is a challenge. Indeed, the capacity of the pRIII criteria to identify patients with FAP is still debated.

Aim of the study: In order to select patients presented with recurrent abdominal pain for an interventional study for children with FAP[1] we performed a thorough examination and investigated the applicability of the pRIII criteria.

Methods: Since March 2014, 232 patients (ages 7–12 years) presenting with unexplained cause of recurrent abdominal pain were included from 5 paediatric gastroenterology centres. Following a stepwise approach, medical history, red flags signs, thorough examination, laboratory and extended diagnostics were assessed to rule out organic causes of abdominal pain.

Results: Here we present the first medical screening data of 47 patients (19 boy, mean age 10 years) from one centre. In addition to the assessment of the medical history, red flag signs, blood, urine and stool analysis most children also received abdominal ultrasound and lactose-/fructose testing. Thereafter 40 patients could be classified according to the pRIII symptom clusters in irritable bowel disease (5 (11%)), functional dyspepsia (1 (2%)), functional abdominal pain (19 (40%)) and functional abdominal pain syndrome (15(32%)). In 5 (11%) patients organic, in 6 (13%) combined organic and functional, in 34 (72%) functional, in 1 (2%) spontaneous recovery and 1 (2%) other clinical diagnosis were established. The high burden and psychological stress of this patient group is reflected by the fact, that 49% of the children did not regularly appear class and missed 3.5 school days per month. Red flags were found in 13 children (27%), but only in 3 out of 13 an organic cause could be identified. Two children with organic cause did not present red flag signs. Notably, only 27 patients (57%) were eligible for the interventional study after the medical screening.

Conclusions: First, we would recommend a thorough “standardized” examination of each child with unexplained chronic abdominal pain as we still found organic causes of abdominal pain in our selected cohort of patients supposed to have FAP and referred for a group interventional study. Second, a considerable number of FAP patients also presented red flag signs. Thus, further validation studies of pROME criteria in children are needed to increase the evidence quality and thereby improve paediatric care for FAP.

OP-19 APPLICABILITY OF THE ROME III CRITERIA IN CHILDREN PRESENTED WITH RECURRENT ABDOMINAL PAIN FOR A RANDOMIZED CONTROLLED GROUP INTERVENTIONAL STUDY

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OP-20 THE ASSOCIATION BETWEEN ADVERSE LIFE EVENTS AND ABDOMINAL PAIN-PREDOMINANT FUNCTIONAL GASTROINTESTINAL DISORDERS

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Background: Abdominal pain-predominant functional gastrointestinal disorders (AP-FGIDs) are a common public health problem in children. The precise aetiology of AP-FGIDs is far from clear. Psychological stress and all forms of child abuse are known predisposing factors to develop AP-FGIDs. The main objective of this study is to study the association between adverse life events (ALEs) and development of AP-FGIDs.

Methods: A cross sectional, school based study was conducted in Gampaha district of Sri Lanka. All children aged 13–18 years were recruited from four randomly selected semi-urban schools in the district after obtaining consent from parents, school administration and children themselves. A translated and validated, self-administered questionnaire consisting of four parts was used for data collection. Part I was the Rome III questionnaire for functional gastrointestinal disorders, self-report form for children above 10 years. Part II was a questionnaire on exposure to adverse life events. Part III was the Sinhala (the native language) version of the PedsQL, Pediatric Quality of Life Inventory 4.0 (Generic Core Scales). Part IV was the Child Somatization Inventory. The questionnaire was administered under examination setting to ensure confidentiality and privacy. Research assistant were present during filling the questionnaire for provide assistance and verifications. AP-FGIDs were defined using the Rome III criteria.

Results: A total of 1792 children were included in the analysis (males 975 [54.4%], mean age 14.4 years, SD 1.3 years years). Out of them, 305 (17.0%) had AP-FGIDs. ALEs that showed a significant association with AP-FGIDs include, parental substance abuse (25.1% vs. 16.0% in controls, $p=0.015$) and domestic violence (28.5% vs. 16.1%, $p=0.02$). Children with AP-FGIDs exposed to ALEs have a higher somatization index compared to children not exposed to ALEs (16.9 vs. 13.4, $p=0.003$), and a lower overall health-related quality of life (HRQoL) score (81.8 vs. 85.1, $p=0.02$). The scores they obtained for psycho-social (86.4 vs. 92.4, $p<0.0001$) and emotional (72.5 vs. 77.7, $p=0.03$) domains of the HRQoL were also lower than that of children with no such experiences.

Conclusions: Exposure to ALEs predispose children to develop AP-FGIDs. Experience of childhood ALEs deleteriously affects the HRQoL and somatization of children with AP-FGIDs.

OP-21 QUALITY OF LIFE BEFORE AND AFTER BIOFEEDBACK TREATMENT IN MYELOMENINGOCELE PATIENT

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Introduction: Myelomeningocele is the most common birth defect that causes physical disability, causing fecal incontinence and thus preventing the social integration of these children and adolescents since they reach adulthood being incontinent.

Objective: To improve the quality of life and manometric values after biofeedback therapy.

Method: longitudinal, prospective, analytical and experimental study. The study includes children 5 to 15 years with myelomeningocele and fecal incontinence and their parents. After obtaining informed consent and assent, the PedsQMtm generic questionnaire was applied and anorectal manometry and initial biofeedback sessions were then conducted. After treatment completion, the questionnaire was applied again aforementioned. The analysis was done following the Student test and Fisher and Chi square.

Results: A total of 17 patients aged between 5 and 15 years and their parents were included in the study. Initially all the patients presented fecal incontinence using diapers and did not use toilet.

Only 3 children requiring the use of wheelchairs to roam and 2 orthopedic equipment; the remaining 12 (70.6%) walked without any equipment.

After treatment, all patients improved their fecal incontinence and nine of them stop using diaper ($P=0,0005674$). All started the use of the toilet ($P=0,0000001$).

Comparing manometric results to beginning and the end of treatment with biofeedback we improved voluntary contraction and sensitivity With a P value of 0.00002 and 0.004 respectively. With these results we can prove that there is relationship between biofeedback treatment and improvement in the sensivity and voluntary contraction.

As to test quality of life of children and parents at the beginning and end of treatment, statistically significant differences were observed. It follows from this analysis that there is an improvement in the quality of life for both children and parents after the treatment with biofeedback. But this improvement was most noticeable in the parents than children.

Conclusions: Clinical improvement and manometry data provides highly significant values. The improvement in quality of life is more notable in the parents. Perhaps these children have developed strategies and stronger psychosocial skills than their parents, because they were born with the disorder and assume daily as such. Unlike parents who encounter this unexpected situation in their lives.

OP-22 PERCEPTIONS AND KNOWLEDGE ABOUT CONSTIPATION IN ARGENTINE PEDIATRICIANS. RESULTS OF A PRELIMINARY SURVEY.

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Introduction: Constipation is a frequent cause of medical consultation in pediatric practice. However a lack of knowledge about good practice in the management and treatment of these patients is evidenced.

Aim: To evaluate the knowledge, attitudes and current practices of pediatricians with regard to constipation.

Methods: A closed-ended structured questionnaire was implemented in a cohort of pediatricians belonging to a continuous medical education program. Sample size: 123.

Results: 123 doctors were included. Females 70.8%. Age: 60.2% above 40 years. Professional practice: 56.6% more than 15 years with 43% working in both public and private practice. 95.6% ask about bowel habits in their patients, but only 40% know well Rome III criteria. 53.9% make the initial evaluation with abdominal palpation and inspection of the anal region but 76% never make a digital rectal examination on the first visit. The Bristol stool scale was known by 41.3% of doctors and they consider useful 98.1%. Only 19.4% ask additional studies, being the abdominal x-ray the most frequent (95%). Diet with fiber was the first line treatment for constipation (97%). Only 32% use laxatives to treat a constipated child, being lactulose the most used (64.4%). For disimpaction the use of Murphy enema (36.5%) and phosphate enemas (34.4%) were the most frequent. 63% of doctors consider that a diet with adequacy of soluble and insoluble fiber was the best (63%). Psychological assessment was “sometimes” considered in constipated children (64%).

Conclusions: Although Argentine pediatricians ask about bowel habits in pediatric practice only a few know well Bristol stool scale and Rome III criteria. Dietary fiber is the first line treatment. Only one in every three pediatricians indicates laxatives in constipation showing the need to enhance medical education about this problem.

OP-23 FUNCTIONAL DYSPEPSIA IS ASSOCIATED WITH DUODENAL EOSINOPHILIA IN A PEDIATRIC COHORT

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Objectives: Functional dyspepsia (FD) is a highly prevalent gastrointestinal disorder with unknown etiology. We aimed to assess the association between dyspeptic symptoms and duodenal eosinophilia in children referred for upper endoscopy.

Methods: In this retrospective cohort study, all histopathology reports of normal upper endoscopies performed at a single tertiary center between 2010 and 2014 were reviewed. FD was defined as epigastric pain or discomfort for more than 2 months with no response to acid suppressants. Controls were those with non-erosive reflux disease, dysphagia or rumination syndrome. Duodenal biopsies were analyzed by pathologists blinded to indication. Intramucosal eosinophils were counted per mm² on haematoxylin and eosin stained digital imaged sections using Aperio eSlide Manager.

Demographics, clinical variables, family history and histologic findings were compared between cases and controls.

Results: In total, 36 cases and 36 non-matched controls were identified of which 56% and 53% were female ($p = 0.81$). Mean (\pm SD) age was higher in cases compared to controls (13.6 (\pm 3.1) vs. 10.5 (\pm 4.0) years; $p = .001$). Dyspeptic symptoms (epigastric pain 81% and/or upper abdominal discomfort 33%) were food-related in 69% and nocturnal in 31% of cases. Self-reported nausea (64% vs. 17%; $p < .0001$), lethargy (19% vs. 0%; $p = .005$) and a family history of functional gastrointestinal disorders (28% vs. 3%; $p = .003$) were more common in cases than controls. There was a higher but not significantly different rate of atopic history (39% vs. 25%; $p = .21$) and psychological co-morbidity (53% vs. 39%; $p = .24$) in FD cases versus controls. Duodenal intraepithelial lymphocytes per 100 enterocytes were similar in cases and controls (median (IQR) 10 (8–13) vs. 12 (8–18); $p = 0.12$). Duodenal eosinophil counts per mm² were significantly increased in cases compared to controls (151 (118–207) vs. 76 (60–106); $p < 0.001$).

Conclusions: This study confirms recent reports of duodenal eosinophilia in FD. The high rate of atopic and psychological co-morbidity in FD suggests multi-factorial mechanisms and may explain why current therapeutic options aimed at symptom control are largely unsatisfactory. Duodenal eosinophilia in FD should be considered a therapeutic target.

OP-24 ESOPHAGEAL BASELINE IMPEDANCE IN NEUROLOGICALLY IMPAIRED CHILDREN

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Introduction: Dysphagia, feeding difficulties and gastro-oesophageal reflux (GORD) are common complaints in neurologically impaired children. Motor pattern generators localised in the brain stem and CNS reflexes play a key role on controlling oesophageal peristalsis and lower oesophageal sphincter activity. Thus, it is not surprising that brain abnormalities may result in significant oesophageal motor dysfunction. In this prospective study we evaluated the differences in multichannel intraluminal impedance-pH monitoring (MII-pH monitoring) pattern between children with cerebral palsy (CP) and 2 groups of neurologically normal children with normal and abnormal MII-pH monitoring. We mainly focused our attention on oesophageal baseline impedance (BI), which has been proposed as useful parameter in predicting GORD severity.

Methods: Twenty children with CP and 40 neurologically normal children with suspected GORD underwent MII-pH impedance. Classical MII-pH impedance parameters as well as BI values in both proximal and distal oesophagus were analysed. MII-pH monitoring was considered abnormal if acid exposure time (AET) was $>5\%$ and/or SAP was $>95\%$.

Results: Nine CP children had a diagnosis of GORD. Of neurologically normal children, 20 had an abnormal (GR-A) and 20 a normal MII-pH monitoring (GR-B). A significant difference in the proportion of children with abnormal AET was found between CP and GR-A (9/20 vs 17/20; $p < 0.05$). GR-A showed a significantly greater percentage of AET (15.97 [6.4–34.9]) than both CP (8.21 [0–31.9], $p < 0.05$) and GR-B (1.4, [0–4.5], $p < 0.0001$), whereas between the latter groups CP showed a greater AET ($p < 0.05$). Proximal BI values were significantly lower in CP (1759 [691–3133] Ω) than GR-A (2396 [1080–3850] Ω , $p < 0.05$) and GR-B (3385 [2249–4817] Ω , $p < 0.0001$). No difference in distal BI was found between in CP (1106 [279–3098] Ω) and GR-A (1152 [246–2526] Ω), while was lower in CP than in GR-B (2965 [1986–3984] Ω , $p < 0.001$). Considering all patients as a whole group, an inverse correlation was found between distal BI and AET ($r = -0.66$; $p < 0.001$), whereas within groups an inverse correlation was only confirmed in GR-A pts ($r = -0.67$; $p < 0.001$).

Conclusions: Although an abnormal pH-impedance monitoring was detected in almost half of children with CP, no correlation was found between the AET and BI values, suggesting that the latter cannot be used as predictor of reflux severity in this group of patients. The presence of low impedance values in both proximal and distal oesophagus in children with CP supports the view that in neurologically impaired children BI mainly reflects oesophageal motor abnormalities, which have been previously reported.

PP-1 BOWEL HABITS IN SRI LANKAN INFANTS AND TODDLERS, A POPULATION BASED STUDY

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Objective: To obtain knowledge about bowel habits in healthy population of infants and toddlers in Sri Lanka.

Methods: We selected healthy children between 7 months and 5 years of age who visited vaccination and weighing clinics. To achieve data we used a self-administered questionnaire about the child's bowel habits during the previous two months. All subjects were selected in Gampaha district, Sri Lanka. Only those without defecation disorders were used for analysis.

Results: A total of 879 toddlers were eligible for analysis, (female $n = 442$ [50.3%], mean age 21.7 months, standard deviation [SD] 12.5 months). Of them, 595 (69.6%) defecated once a day, 20 (2.3%) had defecation >3 /week and 6 (0.7%) <3 /week. Stool consistency was hard or very hard in 30 (3.4%), 665 (78.9%) had smooth and soft stool and 107 (12.2%) had varying consistency. Straining and painful stool were reported in 560 (64.7%) respectively 194 (23%) of the

sample, stool holding was present in 93 (10.8%) and 44 (4.9%) passed blood with the stool. No children reported fecal incontinence.

Conclusions: This study provides data on normal bowel habits of Sri Lankan toddlers and infants. Bowel habits and disorders related to defecation in Sri Lankan toddlers and children differ from those living in the West probably due to dietary, genetic and environmental variations.

PP-2 ABNORMAL PERSONALITY TRAITS IN CHILDREN WITH AEROPHAGIA

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Objective: The main objective of this study is to study the personality types in children with aerophagia.

Methods: A cross sectional survey was conducted in 8 randomly selected schools in 4 randomly selected provinces Sri Lanka. From each school, all children aged 13–18 years were selected after obtaining written consent from parents, school administration and provincial education office. Assent was obtained from all children recruited. Data were collected using a self-administered questionnaire administered under examination setting to ensure confidentiality and privacy. Questionnaire contained previously translated and validated Rome III questionnaire for functional gastrointestinal diseases (self-administered form for children above 10 years) and childhood personality assessment questionnaire. Trained research assistants were present during filling the questionnaire to provide assistance and to verify doubts. Aerophagia was defined using the Rome III criteria. Severities of individual symptoms were recorded in 100 mm visual analogue scale.

Results: A total of 1069 questionnaires were distributed and all of them were returned and included in analysis [males 508 (47.5%), mean age 15.3 years, SD 1.8 years]. One hundred and thirty six (12.7%) fulfilled Rome III criteria for aerophagia and 933 children without aerophagia were considered as controls. Nineteen (13.8%) children with aerophagia and 71 (7.6%) controls had personality scores above the international cut-off value (105) for abnormal personality ($p = 0.01$). Children with aerophagia had significantly higher scores for different personality traits than controls; including hostility and aggression (13.2 vs. 12.2 in controls, $p = 0.006$), negative self-esteem (11.0 vs. 9.9, $p < 0.0001$), negative self-adequacy (10.6 vs. 9.6, $p = 0.001$), emotional unresponsiveness (10.5 vs. 9.6, $p < 0.0001$), emotional instability (16.9 vs. 15.7, $p < 0.001$), negative world view (10.9 vs. 10.1, $p = 0.02$) and total personality score (92.1 vs. 87.7, $p = 0.01$). In children with aerophagia, scores obtained for severity of bloating correlated with scores obtained for hostility and aggression ($r = 0.22$, $p = 0.02$).

Conclusions: Children with aerophagia has abnormal personality traits and this fact may at least partly responsible for development and perpetuation of symptoms in them.

PP-3 THE UTILITY OF INTEGRATED RELAXATION PRESSURE TO PREDICT ACHALASIA IN CHILDREN

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Background: Esophageal High Resolution Manometry (eHRM) is a widely available technique to evaluate dysphagia symptoms in children. In adults, the 4 second integrated relaxation pressure (IRP4s) has been used to characterize lower esophageal sphincter function and esophageal obstruction. To date, no study has evaluated the utility of the IRP to predict achalasia in children.

Aims: To determine the utility of the IRP4s to predict achalasia in a cohort of children with achalasia.

Methods: Following IRB approval, records at New York Presbyterian Hospital-Weill Cornell Medical College were reviewed for pediatric patients undergoing eHRM. Manometric studies were performed using the Manoscan Eso System (Given Imaging, USA) and solid-state catheters. Children with greater than 80% normal peristalsis and complete esophageal emptying based on barium fluoroscopy, impedance or other clinical criteria were considered control subjects. Children with greater than 20% abnormal peristalsis and evidence of esophageal obstruction by fluoroscopic, impedance or clinical criteria were considered achalasia subjects. Categorical data was evaluated using chi-squared tests. Continuous variables were compared using the Student's t-test. Receiver operator curve (ROC) analysis was used to determine the best IRP4s cut-point to predict achalasia.

Results: 16 children (9 M) were identified as controls and 12 children (8 M) identified as having achalasia. All achalasia subtypes were identified in the cohort: type 1 (n = 3), 2 (5) and 3 (1). Control children were older than achalasia children (13.9 ± 3.6y vs. 9.92 ± 5.0y, p = 0.021), but there was no difference in gender distribution. Mean esophageal length (22.7 ± 2.7 cm vs 20.6 ± 4.6 cm, p = 0.14) and basal LES pressure (23.6 ± 11.7mmHg vs 23.0 ± 12.9mmHg, p = 0.91) were similar between groups. However, the IRP4s was significantly greater in the achalasia group vs. controls (17.9 ± 8.9 mmHg vs 7.0 ± 3.6mmHg, p = 0.0002). ROC analysis predicted an optimal IRP4s cut-point of 12.3mmHg, (empiric AUC = 0.844, sens = 75%, spec = 93.8%, accuracy = 85.7%, PPV = 90%, NPV = 83.3%, LR(+) = 12, LR(-) = 0.27). Based on this cut-point, 3 false negative results occurred in children with achalasia type 2 based on morphologic appearance of eHRM and esophageal obstruction on fluoroscopy. The single false positive case had normal fluoroscopy and 100% peristalsis eHRM morphology.

Discussion: This study suggests that an IRP4s greater than 12.3mmHg is predictive of achalasia in children, particularly when used in conjunction with other clinical signs such as esophageal obstruction on barium fluoroscopy and abnormal peristalsis on eHRM. This finding is limited to studies performed using the Manoscan Eso platform and solid-state eHRM catheters, as adult studies suggest variation in absolute pressure measurements occur among motility platforms and catheter types. While this study reports on a large cohort of children with achalasia, this study may be limited due to its overall small sample size and difference in age ranges between groups.

Conclusions: IRP4s is a useful eHRM measure to aid in the identification of children with achalasia. Multi-center studies will provide additional support for the use of the eHRM measurements best suited to categorize esophageal outlet obstruction in children.

PP-4 ANORECTAL MALFORMATIONS: MOTILITY STUDIES AND RESPONSE TO BIOFEEDBACK THERAPY

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Background: Anorectal malformations (ARM) are infrequent anatomic defects with a prevalence of 1 each 5000 alive newborns. Most of the patients repaired of this illness have some degree of constipation or fecal incontinence. There are few reports about manometric studies and biofeedback treatment in patients with anorectal malformations.

Objectives: To evaluate of our population's anorectal functionality late after surgery by anorectal manometry; To study the response to diet, toilet training, and/or biofeedback.

Methods: Anorectal manometry was done in 39 patients with ARM and 35 of them received combined treatment of diet, toilet training and biofeedback. Age: 6 to 17 years old. Mean age: 8.05 years. Descriptive study. From april 2004 to april 2015. 14 patients had high malformations(36%), 18 had low malformations(46%) and 7 had cloaca(18%). Inclusion criteria: children over 6 years of age with anorectal malformation operated using Peña's technique (postsagittal anorectoplasty). Exclusion criteria: patients with neurological disorders that do not non-compliant with study and treatment indications.

Results: Average resting pressure was 28 mmHg(High level 25,5 and Low level 29,8 mmHg), range between 7 and 51 mmHg. Squeezing pressure between 29 and 120 mmHg(mean:69mmHg). Combined treatment of diet, toilet training, and biofeedback was succesfull to get total continence in 22 patients (4 cloacas, 10 high malformations and 8 low malformations), partial continence in 6(all low) and without response in 3(1 low, 1 high and 1 cloaca); 2 patients archived continence only with toilet training and 2 were lost in follow up(T.Fisher: 0,1). In high ARM 8 had positive(+)

rectoanal inhibitory reflex(RAIR) and 6 negative(−). In cloacas it was (+) in 3, (−) in 3 and doubtful in 1. In low ARM 15(+), 2 (−) and 1 doubtful. Reflex was obtained with 20 to 60cc of air(mean 31,36). The RRAI duration was 10 to 17 seconds(mean: 13 seconds). From 22 total continent, RAIR was (+) in 13, (−) in 7 and hazardous in 2. All 6 partially continent had (+) RAIR; and from 3 incontinent, 2 had (+) RAIR and 1 (−). From successfully treated, 10 showed low resting pressures at the anal channel and 12 had normal pressures. Squeezing pressure was normal in 35 and negative in 4.

Conclusions: 1) RAIR was (+) in most of low malformations, while in high and cloacas only nearly half of them were (+). 2) RAIR and resting pressures at the anal channel were not useful to predict treatment success. 3) Malformation Height was not significant to determine patients outcome. 4) Combined dietary, toilet training and biofeedback therapy was effective for achievement of fecal continence in most of our population.

PP-5 JOINT HYPERMOBILITY SYNDROME/EHLERS-DANLOS SYNDROME HYPERMOBILITY TYPE AND GASTROINTESTINAL SYMPTOMS

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Joint Hypermobility Syndrome/Ehlers-Danlos Syndrome Hypermobility Type (JHS/EDS-HT) is an inherited disorder of connective tissue with heterogeneous clinical manifestations. It was suggested that these patients show an increased prevalence of gastrointestinal disorders, but their relationship with the syndrome has been poorly evaluated in comparison of control subjects.

The aim of this study was to assess the prevalence of gastrointestinal manifestations in a JHS/EDS-HT population and their effects on the quality of life.

Thirty-eight JHS/EDS-HT women (38,6 ± 11,2yrs) of the "Rare disease Office" of the Policlinico Umberto I in Rome, were compared with 35, age matched (40,2 ± 14,4yrs), control women. The diagnosis was established (CF) according with the Villefranche and Brighton criteria. The Italian version of Rome III Questionnaire for gastrointestinal symptoms was administered to patients and controls; in addition, the JHS/EDS-HT patients filled in the SF-36 quality of life questionnaire in relation to intestinal disorders.

All gastro-intestinal symptoms, except vomiting proctalgia fugax, diarrhea and fecal incontinence, were more frequent in JHS/EDS-HT patients than in controls (table 1) and reduce the quality of life (table 2).

In conclusion the preliminary results of this study suggest that large part of gastrointestinal symptoms takes part to the clinical presentation of the JHS/EDS-HT, and they affect significantly the quality of life of these patients.

PP-6 BOLUS CLEARANCE TIME IS ASSOCIATED WITH REFLUX SEVERITY AND IT IS INVERSELY CORRELATED TO BASELINE IMPEDANCE VALUES IN ADOLESCENTS WITH GASTROESOPHAGEAL REFLUX DISEASE

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Aims: The role of esophageal clearance is still scarcely investigated in patients with gastroesophageal reflux disease (GERD). We aimed to assess esophageal clearance in adolescents by means of bolus clearance time (BCT) and to verify if there is any difference among subgroups of GERD patients according to endoscopic and impedance-pH monitoring findings.

Methods: We revised endoscopic and impedance-pH monitoring (off-therapy) data of 28 consecutive adolescents (range 12–16 years). We evaluated acid exposure time (AET), total number of reflux episodes, baseline impedance (BI), and BCT. According to impedance-pH monitoring features, adolescents were grouped into pH/MII negative (normal AET and normal number of refluxes), and pH/MII positive (abnormal AET and/or abnormal number of refluxes). This latter were further subgrouped on the basis of abnormal/normal AET (pH+/-) and abnormal/normal number of refluxes (MII+/-). Finally, adolescents were also classified as erosive and non erosive reflux disease (ERD, NERD).

Results: We observed 22 pH/MII positive adolescents (7 ERD and 15 NERD). Eight patients were further subgrouped as pH+/MII-, 6 as pH-/MII+ and 8 as pH+/MII+. BCT values (in seconds) progressively decreased from pH+/MII+, pH+/MII-, pH-/MII+ to pH-/MII- (34.5 ± 8.1 vs. 22.0 ± 7.2 vs. 16.4 ± 4.5 vs. 10.1 ± 2.1, respectively; p < 0.001), whereas BI gradually increased (1236 ± 358 vs. 1592 ± 762 vs. 1854 ± 567 vs. 3256 ± 743, respectively; p < 0.001). There was an inverse correlation between BCT and BI, and a direct correlation between BCT and AET (p < 0.0001) and ERD presence (p < 0.0001).

Conclusions: BCT seems to reflects reflux severity, and it is inversely correlated to BI, a marker of mucosal integrity, supporting the role of esophageal clearance in the GERD pathophysiology.

PP-7 CHILDHOOD RECURRENT ABDOMINAL PAIN IS ASSOCIATED WITH DUODENAL EOSINOPHILIA REGARDLESS OF H. PYLORI INFECTION

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Objectives: This study aimed to investigate histologic features of children with RAP undergoing upper gastrointestinal endoscopy, after exclusion of common organic disease.

Methods: Children referred for endoscopy were prospectively enrolled at a single tertiary center between 2008 and 2010, after obtaining informed consent. Cases were defined as children with clinical diagnosis of RAP, as opposed to controls with suspicion of organic disease. Gastric and duodenal biopsies were analysed by pathologists blinded to indication. Demographic and clinical variables, *H. pylori* infection, biochemical, endoscopic and pathologic results were compared between cases and controls.

Results: A total of 101 children were included after exclusion of villous enteropathy (n = 6) and parasitic, rotaviral or salmonella enteritis (n = 14), resulting in 72 cases and 29 controls. There were no significant differences in demographics, clinical symptoms, *H. pylori* infection and endoscopic findings between cases and controls. Duodenal eosinophil counts per 5 HPF were significantly increased in cases vs. controls (median (IQR) 86 (62–114) vs. 49 (31–88); p < 0.001) and did not differ regarding age, gender and *H. pylori*. Intraepithelial lymphocytes per 100 enterocytes were similar in cases vs. controls (19 (15–25) vs. 18 (14–23); p = 0.89) with ≥ 25 in 25% of cases. Duodenal eosinophilia was equally observed in *H. pylori* negative cases (n = 50) vs. controls (n = 19) (87 (61–119) vs. 53 (36–95); p = 0.01), as well as positive cases (n = 21) vs. controls (n = 10) (85 (55–105) vs. 42 (18–65); p = 0.03). Logistic regression yielded an adjusted odds ratio of 1.23 (95% CI 1.08–1.40) for duodenal eosinophilia in RAP.

Conclusions: Children with a clinical diagnosis of RAP have marked duodenal eosinophilia, independent of *H. pylori* infection, suggesting the role of unknown infectious or allergic triggers in the pathogenesis of functional gastrointestinal disorders in childhood. Further research is needed on the diagnostic and therapeutic benefits of targeting duodenal eosinophilia.

PP-8 ESOPHAGEAL HIGH RESOLUTION MANOMETRY IN NEUROLOGICALLY IMPAIRED CHILDREN AND GASTRO-OESOPHAGEAL REFLUX DISEASE

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Objectives: Mechanism underlying the occurrence of Gastroesophageal reflux disease (GERD) in neurologically

impaired children (NIC) is poorly understood. We sought to characterize, by Esophageal High Resolution Manometry (EHRM), alterations of esophageal motility associated with GERD in NIC and to compare with a group with a suspicion of GERD and normal psychomotor development (NDP).

Methods: EHRM and multichannel intraluminal impedance/pH-metry (MII/pH) were conducted in 7 NIC and 9 patients with suspicion of GERD and NDP. Esophago-gastric junction relaxation (EGJr), the presence/pressure troughs of the oesophageal segments, the distal contractile integral adjusted for esophageal length (DCIa) and the pressurization frontal velocity (PFV) were analyzed by EHRM.

Results: Three out of 7 NIC (42.8%) and 4 out of 9 patients with NDP (44.4%) resulted positive to MII/pH (p = 1). No statistical differences were observed for EGJr and PFV between NIC and NDP patients. DCIa was significantly lower in NIC subjects respect to NDP patients (p < 0.01). Comparing NIC with GERD and patients with GERD and NDP we found that third segment was absent in 2/3 (66.6 %) of NIC respect to NDP patients (p < 0.05) and that the third pressure trough was significantly lower in NIC respect to NDP patients (p < 0.05). There were no statistical differences with respect to the first and second pressure trough between NIC and NDP patients.

Conclusions: NIC have esophageal motor dysfunction that can be detected by EHRM. Some esophageal manometric alterations could be predictive of GERD in NIC and could explain a different pathogenesis of GERD in NIC and in patients with NDP.

PP-9 NORMAL VALUES OF 3D HIGH-RESOLUTION ANORECTAL MANOMETRY IN CHILDREN

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Background and Aims: 3D high-resolution anorectal manometry (3D HRAM) provides a 3D topographic image of pressure along the anal canal. The aim of the study was to determine normal values of 3D HRAM in children.

Methods: Children without any symptoms arising from the lower gastrointestinal tract were prospectively enrolled in the study. Manometry procedures were performed using a rigid probe (Covidien/Medtronic, Ireland) without premedication. Pressure within the anal canal and 3D images of sphincters were measured. If possible, defecation dynamics and thresholds of sensation were evaluated. Data were expressed as the mean (\pm SD).

Results: A total of 61 children (34 males; age: 2–17 years, mean: 8.28 years) were studied. The mean resting and squeeze sphincter pressures were 83.43 (\pm 23.23) mmHg and 191 (\pm 64.21) mmHg, respectively. The mean length of the anal canal was 2.62 (\pm 0.68) cm and correlated with age (r = 0.49, p < 0.0001). The mean rectal balloon volume to elicit recto-anal inhibitory reflex was 15.66 (\pm 10.9) cc. The first sensation, urge and discomfort were observed at 24.42 (\pm 23.98) cc, 45.91 (\pm 34.55) cc and 91.58 (\pm 50.17) cc

of the balloon volume, respectively. The mean resting pressure of the puborectalis muscle was 71.54 (\pm 14.58) mmHg while the mean squeeze pressure was 134.10 (\pm 35.2) mmHg. A positive correlation between age and balloon volume needed to elicit discomfort was determined ($r=0.49$, $p<0.001$).

Conclusion: Normative data of 3D HRAM in children without symptoms arising from the lower gastrointestinal tract were established. There were no significant differences in pressure results between males and females.

PP-10 CHARACTERIZATION OF ESOPHAGEAL MOTILITY IN INFANTS BORN WITH CONGENITAL DIAPHRAGMATIC HERNIA USING HIGH RESOLUTION MANOMETRY

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Purpose: Congenital diaphragmatic hernia (CDH) is a rare condition characterized by a congenital defect in the diaphragm. Abdominal organs are displaced into the thorax through the diaphragmatic defect, hereby causing lung hypoplasia. Survivors also present with long-term functional gastro-intestinal morbidity such as gastro-esophageal reflux, esophageal dysfunction and poor nutritional status. Congenital esophageal dysmotility and surgical disruption of the esophago-gastric junction (EGJ) may contribute to this esophageal dysfunction. The aim of this study was to characterize esophageal function in young infants born with CDH.

Methods: High resolution solid state manometry was used to investigate the esophageal function in 9 postoperative infants born with CDH (6 M, median age 23 days). A total of 416 liquid swallows were analyzed (range 27–70 swallows per patient; mean 46 swallows). All data are presented as median (IQR).

Results: We included 9 patients: 8 with a left diaphragmatic defect, 5 with a “liver up” defect, 4 underwent a fetal tracheal occlusion procedure because of severe lung hypoplasia, 8 needed a patch to close a large diaphragmatic defect. Across patients, length of peristaltic defects was 0.4 (0.3,0.6) cm. Distal contractile integral (DCI) was 357 (249,428) mmHg.sec.cm. Distal Latency (DL) was 4.9 (3.6,5.6) sec, whereby 5/9 patients had a DL less than 4.5 sec. EGJ resting pressure was 37 (17,60) mmHg. The integrated relaxation pressure (IRP4) was 14 (9,19) mmHg with IRP4 over 15 mmHg in 4 patients.

Conclusion: We investigated the esophageal body and EGJ function in 9 patients with CDH using high resolution

manometry. This pilot study shows that the distal contractile integral is reduced in all infants with CDH. This reflects weak esophageal contractile strength and supports the congenital foregut dysmotility hypothesis. Surprisingly, deglutitive relaxation pressures were increased in only 4/9 patients suggesting that EGJ outflow obstruction post hernia repair of the crural diaphragm, is only partially contributing to the esophageal motor dysfunction observed in patients with CDH.

PP-11 PROLONGED INTRA-ESOPHAGEAL PH PROFILE AND ESOPHAGEAL MOTILITY IN CHILDREN WITH EOSINOPHILIC ESOPHAGITIS (EOE)

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Background: Patients (pts) with eosinophilic esophagitis (EoE), a chronic immune-mediated disorder, may exhibit symptoms of disturbed food transit (i.e. dysphagia, impaction) or mimicking gastro-oesophageal reflux (GOR). We aimed at characterizing in EoE pts the intra-esophageal pH pattern with 24-h multichannel intraluminal impedance (MII-pH) as well as the esophageal motility with high-resolution manometry (EHRM)

Methods: during a 30 month period we studied 57 patients (pts), median age 11 years (range: 7–16): 25 with EoE, diagnosed according to widely agreed criteria (JPGN 2014;58:107–18; ESPGHAN guidelines) and 32 with GOR disease (GORD). All underwent esophagogastro-duodenoscopy, MII-pH and EHRM. The pH-MII and data analysis were done according to ESPGHAN EURO-PIG protocol (JPGN 2012;55:230–4); variables analysed: reflux index, symptom index, number and type of liquid reflux, number of long lasting reflux episodes, correlation symptom-reflux. The test was diagnostic of GORD if at least ≥ 2 of the previous variables were positive. The EHRM was performed with water perfused catheters and swallow contractile patterns categorized using criteria recently reported by a paediatric group (AmJ Gastroenterol 2010;105:460–7). Several motility variables were analysed: esophago-gastric junction (EGJ) morphology, end-expiratory and end-inspiratory EGJ pressure, distal contractile integral (DCI), pressurization front velocity (cm/s), peristaltic propagation pattern.

Results: An abnormal MII-pH profile was markedly more common in GORD pts (27; 84.37%) than in EoE pts (4; 16%; $p<0.001$). On the contrary, EHRM irregularities were detected more commonly in EoE than the GORD pts: in particular, when motility tracing were analysed no significant difference for EGJ pressure and deglutitive EGJ relaxation was detected between the 2 groups; however, abnormalities such as peristaltic dysfunction (i.e. failed peristalsis, aperistalsis, and esophageal spasm features) and lower distal contractile integral adjusted for esophageal body length

(DCIa) were more common in EoE (17; 68%) than in GORD pts (15; 46.8%) ($p < 0.05$)

Conclusions: 1) The great majority of EoE pts have a normal MII-pH profile that doesn't support the use of proton pump inhibitory therapy. 2) EoE pts exhibit higher prevalence of oesophageal motility abnormalities than GORD: this feature is likely sustained by the inflammatory infiltrate that characterizes the esophageal wall in EoE and accounts for the esophageal dysmotility complaints often detected in EoE pts.

PP-12 EFFICACY OF A STANDARDIZED EXTRACT OF MATRICARIAE CHAMOMILLA L., MELISSA OFFICINALIS L. AND TYNDALLIZED LACTOBACILLUS ACIDOPHILUS (H122) COMPARED WITH LACTOBACILLUS REUTERI (DSM 17938) AND WITH SIMETHICONE FOR THE TREATMENT OF INFANTILE COLIC

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Background and Aim: Infant colic is a prevalent physiological event of healthy children under 3 months of age, which can disrupt the child's home environment. Despite its benign natural history, sometimes it requires a therapeutic approach. There is limited evidence supporting the use of complementary and alternative treatments. The aim of this study was to investigate the effectiveness of a mixture of standardized extract of matricariae Chamomilla L., Melissa Officinalis L. and tyndallized *Lactobacillus Acidophilus* (H122) compared with *Lactobacillus Reuteri* (DSM 17938) and with simethicone for the treatment of infantile colic.

Patients and Methods: A multicenter prospective, randomized comparative study was conducted involving 133 infants with colic, according to Rome III criteria, who were assigned at random to receive Chamomilla L., Melissa Officinalis L. and tyndallized *L. Acidophilus* (H122) (Group A; n = 45), *L. reuteri* DSM 17938 (10^8 CFU) (Group B; n = 45) or simethicone (Group C; n = 43). Treatment was given to subjects for 21 days and they were followed for 4 weeks. Treatment success was assessed at the end of study period. Daily crying and fussing times were recorded in a structured diary, and maternal questionnaires were completed to monitor changes in infant colic symptoms and adverse events.

Results: Treatment success was observed in 30 out of 45 patients (66.7%) of infants in Group A, while it was seen in 31 out of 45 patients (68.9%) of Group B and in 19 out of 43 (44.2%) of subjects of Group C (χ^2 : 6.8; $p = 0.03$). Mean daily crying time was more significantly reduced (from

211.3 ± 40 min/day to 69.6 ± 59 min/day) in the Group A and in Group B (from 201.6 ± 32.5 min/day to 58.1 ± 48.9 min/day) when compared with Group C (from 199.5 ± 32 min/day to 106 ± 56.5 min/day) ($p < 0.01$, $p = 0.006$ respectively). No significant difference was observed comparing Group A and B ($p = 0.4$). No adverse events were reported in any group.

Conclusions: This study suggests that administration of Chamomilla L., Melissa Officinalis L. and tyndallized *L. Acidophilus* (H122) and *L. reuteri* DSM 17938 are significantly more effective than simethicone in improving colic symptoms. Therefore, the use of herbal supplements may represent a new therapeutic strategy in the management of colicky infants.

PP-13 FATIGUE RATE INDEX IS HIGHER IN CHILDREN WITH FUNCTIONAL CONSTIPATION AND RETENTIVE FECAL INCONTINENCE

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Introduction: The fatigue rate index (FRI) is a parameter in anorectal manometry (ARM) to assess sustained voluntary contraction, considering the squeeze pressure and fatigability of the external anal sphincter. It is used in adults to detect fecal incontinence even in patients who present normal squeeze pressures. The FRI in adult patients with functional constipation is similar to controls¹.

The aim of this preliminary study was to evaluate the feasibility and values of FRI in children with retentive fecal incontinence secondary to functional constipation.

Methods: This retrospective study evaluated 105 ARM performed from Jan 2014 to Apr 2015. 42 patients were selected (were able to perform a voluntary contraction and had no co-morbidities other than functional constipation). 14 of those (33,3%) collaborated in sustaining contraction for 40 seconds (s), allowing the evaluation of the FRI. Patients with retentive fecal incontinence secondary to functional constipation (n = 7, aged 6 to 13 years, 6 boys) were our interest group. Patients with functional constipation without fecal incontinence (n = 7, aged 6 to 13 years, 4 boys) were considered a reference group. The ARM were performed with a radial eight-channel perfusion catheter (Dynamed™, São Paulo, Brazil) and the FRI was calculated (Proctomaster 6.4) in the first 20 s and overall 40 s of sustained voluntary contraction.

Results: In the first 20 s of contraction, the fecal incontinence group showed a significantly higher mean FRI (2.48 ± 1.39 min) compared to the reference group (1.13 ± 0.72 min, $p = 0.042$), which was not observed in the 40 s due to less uniform contraction. The anal resting pressure was higher in fecal incontinence group (76.83 mmHg) than in the reference group (54.13 mmHg), but the statistical study did not reach significance ($p = 0.051$).

Discussion: The mean FRI obtained in this study is lower than the reported in constipated adults (2,8 min).

We hypothesized that the higher FRI found in children with retentive fecal incontinence may be associated with retention behavior in cases of severe constipation and to higher anal resting pressure in patients with retentive incontinence.

Conclusions: FRI may be feasible in older children, its reference value may be lower than in adults and it is higher among patients with retentive incontinence.

PP-14 EFFECTS OF BODY MASS INDEX ON GASTRIC MOTILITY IN CHILDREN WITH ABDOMINAL PAIN-PREDOMINANT FUNCTIONAL GASTROINTESTINAL DISORDERS

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Introduction: There is evidence that overweight children have a higher prevalence of functional gastrointestinal disorders (FGIDs) than normal-weight children. Objective of this study was to assess the effects of body mass index (BMI) on gastric motility abnormalities in children with abdominal pain-predominant FGIDs (AP-FGIDs).

Methods: Gastric motility parameters of 100 children with AP-FGIDs (61(61%) girls, mean age 8.0 years [SD 2.1years] and 50 healthy controls (30 (30%) boys, mean age 8.6 years [SD 1.9 years]) were assessed at the Gastroenterology Research Laboratory of Faculty of Medicine, University of Kelaniya, Sri Lanka, using a previously validated ultrasound method. AP-FGIDs were diagnosed using Rome III criteria. Fifty-four had functional abdominal pain, 23 had irritable bowel syndromes, 9 had functional dyspepsia, 8 had abdominal migraine and 6 had more than one AP-FGID.

Results: Patients with AP-FGIDs had significantly lower gastric emptying rate (44.9% vs. 59.5% in controls, $p < 0.0001$), frequency of antral contractions (8.29 vs. 9.44, $p < 0.0001$), amplitude of antral contraction (48.6% vs. 58.1%, $p < 0.0001$) and antral motility index (4.0 vs. 6.4, $p = 0.001$). Fasting antral size (FA) and antral area at 1 minute (AA1) and antral area at 15 minutes (AA15) after ingestion of the liquid test meal were not significantly different. BMI of children with AP-FGIDs and controls were respectively 15.2 and 15.6 ($p = 0.42$). The correlations between BMI and AA1 ($r = 0.29$, $p = 0.007$), AA15 ($r = 0.32$, $p = 0.003$) and MI ($r = 0.22$, $p = 0.038$) in children with AP-FGIDs were significant. Patients with BMI $< 15 \text{Kg/m}^2$ had a lower FA (1.5cm² vs. 2.1cm², $p = 0.03$), AA1 (8.9 cm² vs. 10.7 cm², $p = 0.003$) and AA15 (4.6 cm² vs. 5.8 cm², $p = 0.01$) than patients with BMI $> 15 \text{Kg/m}^2$.

Conclusions: BMI has an impact on certain gastric motility parameters in children with AP-FGIDs. However, it does not contribute to abnormalities seen in main gastric motility parameters such as gastric emptying.

PP-15 THE EFFECT OF EXTENSIVELY HYDROLYZED PROTEIN FORMULA IN PRETERM INFANTS WITH SYMPTOMATIC GASTRO-OESOPHAGEAL REFLUX

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Background: Gastroesophageal reflux (GER) occurs commonly in infants especially preterm infants. Current anti-reflux medication has shown limited therapeutic benefits for this age group. Our study aims to evaluate the efficacy of extensively hydrolyzed formula feed (EHFF) compared to standard infant formula (SF) on GER episodes in preterm infants using Multichannel intraluminal impedance and pH monitoring (MII-pH).

Methods: This is a prospective crossover trial involving preterm infants > 29 weeks corrected gestation age with symptoms of GER. All patients were recruited from a single tertiary neonatal unit in Singapore. MII-pH was performed over 48 hours. For the first 24 hours the infants were either fed on standardized infant formula (SF) or Expressed Breast Milk (EBM) depending on maternal choice. For the second 24 hours their feeds were changed to EHFF. All infants were on orogastric/nasogastric tube feeding and were given 2 to 3 hourly bolus feeding throughout the study period.

Results: 23 infants completed the study: 14 males: 9 females. Mean weight 2971 g (SD +1569 g). None of the patients were on any anti-reflux medications (apart from one). Type of feeds during first 24 hours were EBM 8/23(35%), SF 5/23(22%) or mixed feeding 10/23(43%). GER symptoms were: desaturations 16/23(70%), cough 8/23(35%), arching 7/23 (30%), vomit 3/23(13%), crying 2/23(8%) and apnoea 1/23 (4%). The median total GER episodes (detected by pH and MII) was significantly lower during the EHFF period compared to SF/EBM period 42(21–71) vs 68(32–104) $p < 0.001$. The median acidic reflux episodes detected by pH was also significantly lower in EHFF vs SF/EBM period 8(4–24) vs 23(3–58) $p < 0.005$. Total number of refluxes detected by MII showed a significant reduction for EHFF compared to SF/EBM: 17(11–56) vs 46(20–65) $p < 0.015$. There was no difference in reflux index, MII bolus exposure indexes, and number of long lasting episodes (> 5 min) between the 2 groups. There were no significant difference in the number of symptoms recorded between the two study period.

Conclusions: Our data suggest that the number of gastroesophageal reflux was significantly lower in preterm infants fed with EHFF compared to standard formula as measured by pH-MII monitoring. EHFF may potentially be an effective treatment modality for gastroesophageal reflux disease in infants with minimal side-effects. The lack of symptom reduction during EHFF despite fewer GER episodes suggests that other pathology other than GER should be considered. A larger study is required to further evaluate the efficacy and mechanism of EHFF on reduction of GER in infants.

PP-16 WEAK ACID REFLUX A TRIGGER FOR RECURRENT RESPIRATORY DISEASES IN CHILDREN

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Introduction: The main advantage of multichannel intraluminal impedance (MII) compared with pH monitoring is its ability to detect both acid and non-acid gastroesophageal reflux (GER) and to determine the characteristics of reflux (liquid or gas).

Aim: To compare the value of pH monitoring and MII for diagnosis of GER in children who present with refractory respiratory symptoms.

Materials: A prospective study that included 37 patients, aged 4.25 ± 3.15 years, using combined MII-pH monitoring was performed. Patients were referred for investigation because of suspected GER as the etiology of recurrent respiratory diseases, including recurrent obstructive bronchitis, recurrent pneumonia, laryngitis, and chronic cough. We analyzed the percentage of time during which the pH was less than 4, the numeric and percentile values of acid, weak acid, and non-acid reflux episodes, and the values of liquid and mixed reflux. Diagnostic values were determined separately for pH monitoring and MII using Fisher's exact test.

Results: Reflux was detected in 31 patients. pH monitoring was positive in 20 patients (% time during which pH <4 was 17.72 ± 12.06) and negative in 17 patients ($2.93\% \pm 1.67$). Both pH and MII were positive in 19 patients: in 11 patients, MII was positive and pH was negative, and in 6 patients, both were negative. Fisher's exact test showed significant statistical difference and superiority of MII in diagnosing GER ($p = 0.033$). Out of 30 patients with MII-positive results, 15 had both acid and weak acid reflux episodes, 3 had only acid reflux, 8 had weak acid reflux, and 3 had non-acid reflux. Sixteen patients had mixed (liquid and gas) reflux, and 14 had both liquid and mixed reflux.

Conclusions: This study suggests that significant numbers of GER include weak acid reflux that cannot be detected by pH probes alone. The weak acid reflux could be a trigger for recurrent respiratory symptoms. Combining pH with MII monitoring is a valuable diagnostic method for diagnosing GER in children.

PP-17 AEROPHAGIA IN CHILDREN IS ASSOCIATED WITH EMOTIONAL ILL-TREATMENT

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Background: Aerophagia is a functional gastrointestinal disease characterized by air swallowing, abdominal

distension, excessive flatus and belching. The aetiology of this disorder is not clear. Previous studies have suggested an association between aerophagia and psychological stress. We aimed to assess the association between emotional ill-treatment and aerophagia.

Methods: A cross sectional survey was conducted in 4 provinces of Sri Lanka. Children aged 13–18 years were selected from schools in these provinces. A validated, self-administered questionnaires were used for collect data on functional gastrointestinal disease including aerophagia and emotional ill-treatment. Aerophagia was defined using the Rome III criteria.

Results: A total of 1069 questionnaires were included in the final analysis (males 508 [47.5%], mean age 15.3 years, SD 1.8 years). One hundred and thirty six (136) children had aerophagia. Prevalence of aerophagia was significantly higher in children who experienced emotional ill-treatments (43 (23.2%) vs. 160 (17.1%), $p < 0.0001$). Emotional ill-treatments that were significantly associated with aerophagia include, teasing by others (54.1% vs. 45.0%, $p < 0.0001$), humiliation (38.2% vs. 20.3%, $p < 0.0001$), treating inferiorly by others (22.8% vs. 11.1%, $p < 0.0001$), threatening to abandon (8.8% vs. 2.6%, $p < 0.0001$), threatening destroy belongings (14.0 vs. 4.5%, $p < 0.0001$), and forcing to do unwanted deeds (9.6% vs. 3.9, $p = 0.003$). Parenting factors such as refusal of attending to emotional needs (8.8% vs. 3.0%, $p < 0.001$), refusal to look at (6.6% vs. 0.7%, $p < 0.0001$), refusal of hugging (10.5% vs. 5.6%, $p = 0.03$), and not appreciating achievements (5.9% vs. 2.1%, $p < 0.0001$) were significantly common among children with aerophagia.

Conclusions: Aerophagia in children is associated with emotional ill-treatments. Attending to child's emotional needs likely reduce the prevalence of aerophagia and its consequences.

PP-18 DAILY TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION AT HOME IN A PATIENT WITH DOWN SYNDROME

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CASE REPORT

A four year old boy with Down syndrome born from non-consanguineous parents presented for exclusion of Hirschsprung's disease because of signs severe constipation since several months. The first meconium passage was uncertain. Stools were hard and infrequent (every 7 to 10 days). Additional investigations included anal manometry without recto-anal inhibitory reflex, leading to rectal biopsy that was normal (excluding Hirschsprung disease). Pellet studies showed a significant delayed colon transit time (139,2h) with pellets spread throughout the colon, suggesting a slow

transit constipation. Treatment with a high dose laxative (macrogol 40 g), led to continuous leakage of stool.

He was unable to attend school because of the combination Down's syndrome and constant need of diaper change.

By the age of five years old a trial with daily transcutaneous electrical nerve stimulation (TENS) at home was started. The portable device for TENS consists of a pulse generator with amplifier and electrodes. A low frequency of 2 Hz is applied with maximum tolerable intensity, defined as below pain threshold, for 2 hours every day. Two surface electrodes are put at the level of the sacral root S3.

Two months after daily TENS at home the boy made daily stools in the diaper with a continuing treatment with 7 g macrogol. Another two months later he made daily stools without any laxatives, most of the times on the toilet.

DISCUSSION

Transcutaneous electrical nerve stimulation is often used in urinary incontinence, but more rarely used in constipation or fecal incontinence. The exact mechanism of action is still unclear, leaving it impossible to predict who would react in a positive way to the treatment. Some studies using TENS show promising results on slow transit constipation in children (Southwell BR et al, Australia). TENS is less expensive and minimal invasive compared to sacral nerve stimulation, antegrade colon enema or double-barreled stoma. In this boy TENS was given in a complete different way than the earlier mentioned studies (different settings with low frequency and different electrode use) still leading to complete normalization of stool. Placebo effect, most efficient modalities of TENS and long term results still have to be studied further.