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OC-078 COELIAC DISEASE AND PERSISTING SYMPTOMS: SHOULD CAPSULE BE THE NEXT INVESTIGATION?

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Introduction Up to a third of patients with coeliac disease fail to have a symptomatic response to a gluten-free diet (GFD), or relapse after initial response. Causes include inadvertent gluten exposure and complications of coeliac disease such as lymphoma. There are limited published data assessing the role of capsule endoscopy (CE) in patients with coeliac disease and persisting symptoms. For this reason we evaluated our experience of CE in this group of coeliac patients.

Methods Data from all patients with established, biopsy-proven coeliac disease and persisting symptoms despite 12 months GFD, who underwent CE between 2004 and 2011 in a tertiary gastroenterology department were analysed. Concurrently we performed serology (endomysial antibody [EMA] and tissue transglutaminase [tTG]), and a duodenal biopsy (Marsh grading, and where appropriate T cell clonality). At CE changes of coeliac disease such as scalloping, mosaic pattern and loss of folds were assessed including extent of disease (proximal or diffuse). Concordance between serology, histology and CE was assessed using Spearman's coefficient.

Results 69 patients (47 female, median age 56 years, range 22–83 y) were identified. 8/69 (13.0%) had significantly abnormal CE findings with either mass lesions, extensive disease or ulceration. In these eight cases: two had enteropathy associated lymphoma (EATL), four Type 1 refractory disease, one fibroepithelial polyp, one had ulcerative jejunitis. Of the 4 (4/69, 5.8%) refractory Type 1 cases, two were started on immunosuppressants, one died of unrelated causes and another was a tertiary referral case in whom outcome data are unknown. There was no correlation between the likelihood of having complicated coeliac disease and the serological titres (either a positive EMA or significantly raised tTG). However, there was a positive correlation between more extensive changes at CE (diffuse) and the level of tTG ($r=0.448$, $p=0.001$). A similar observation was made for the relationship between diffuse involvement at CE and EMA positivity ($r=0.351$, $p=0.003$). There was also a correlation between the extent of disease observed at CE and histology ($r=0.455$, $p<0.0001$).

Conclusion This is the largest internationally reported series demonstrating a role for CE in coeliac disease patients with persisting symptoms. A significant proportion are found to have complicated or refractory coeliac disease. Extensive changes of coeliac disease seen on CE should prompt clinicians to investigate for refractory disease, request PCR on duodenal biopsy (for monoclonality) and consider immunosuppressive therapy.

Abstract OC-078 Table 1 Features of coeliac disease on CE and serology

| | No features | Mild | Extensive |
|------------|-------------|------|-----------|
| tTG 0–99 | 22 | 15 | 12 |
| tTG100–299 | 0 | 2 | 5 |
| tTG >300 | 3 | 2 | 8 |

Competing interests None declared.

OC-079 FGF19 EXPRESSION IS HIGHLY RESPONSIVE TO BILE ACIDS COMPARED TO OTHER BILE ACID REGULATORY GENES WITHIN THE HUMAN ILEUM

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Introduction The expression of the enteric hormone FGF15 is largely restricted to the ileum in the mouse. FGF15 has also been shown to be the most BA responsive gene in mouse ileum. FGF19 is the human orthologue of FGF15 and is thought to have roles in the regulation of bile acid pool sizes and BA homeostasis. We set out to investigate the distribution of FGF19 expression in the human GI tract and FGF19 gene responses to BA in human ileum.

Methods Biopsies of normal ileal mucosa were obtained from 29 patients undergoing colonoscopy. Basal ileal FGF19 expression was compared to colonic (n=9) and duodenal FGF19 expression (n=3). Ileal biopsies (explants) from 20 patients were incubated for 6h in short term tissue culture in parallel with BA (chenodeoxycholic acid [CDCA] or glyco-chenodeoxycholic acid [GCDCA]) or without (control explants). 3 Duodenal and colonic explants from were also studied. Real-time qRT-PCR was used to measure expression of transcripts for FGF19, and several other ileal BA regulatory genes (ASBT, IBABP, SHP, FXR, OST α and OST β). FGF19 protein levels in culture fluid were also measured by specific ELISA.

Results Transcripts for FGF19 were detected in human ileum, but not colon or duodenum. FGF19 expression was greatly induced in all ileal explants incubated with BA: geometric mean induction of 316-fold by 50 μ M CDCA (n=17, $p=0.0003$), and 231-fold by 50 μ M GCDCA (n=11, $p=0.001$). Measured by ELISA, the amount of FGF19 protein released into the culture media was significantly higher from the explants incubated with 50 μ M of BA (CDCA 51 pg/explant, range 8–169, n=11 and GCDCA 38 pg/explant, range 3–113, n=10) compared to the matched control explants (8pg/explant, range 0–46 [$p=0.0008$] and 6 pg/explant, range 0–13 [$p=0.0022$] respectively). The EC50 for CDCA was 20 μ M and 24 μ M for GCDCA. Responses to both BA were similar at 50 μ M and 100 μ M. 6 h incubation of duodenal and colonic explants with 100 μ M CDCA or GCDCA showed that FGF19 expression levels were <0.35 times the FGF19 expression seen in the control ileal explants at 6 h. In ileal explants, responses of other genes to CDCA and GCDCA at 50 μ M (n=3–4) showed median increases for IBABP, OST α , OST β and SHP between 2.4 and 4.0-fold, whereas ASBT and FXR showed little change.

Conclusion FGF19 is expressed in human ileum but not the colon or duodenum. Ileal FGF19 expression is highly responsive to CDCA and GCDCA, compared to other BA regulatory genes. No significant induction of FGF19 expression is observed in duodenum or colon with BA. Ileal BA induced FGF19 responses could be studied in clinical conditions of dysregulated BA homeostasis.

Competing interests None declared.

OC-080 REDUCED CIRCULATING FGF19 LEVELS ARE ASSOCIATED WITH SYMPTOMS OF DIARRHOEA IN CROHN'S DISEASE

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Introduction FGF19 is a polypeptide hormone produced in the ileum which inhibits hepatic synthesis of bile acid and is thought to have roles in regulation of bile acid pool size and in clinical conditions of diarrhoea. Fasting serum levels of FGF19 are reduced in patients with Crohn's disease (CD) involving the ileum and also in patients with CD and ileal resections (IR). Aims: To investigate the relationship between serum FGF19 and disease activity in CD and length of ileal resection.

Methods Blood samples were taken prospectively from patients after an overnight fast in 40 patients with Crohn's disease (24 non resected and 16 with previous IR), 19 healthy controls and 75 disease controls with SeHCAT negative chronic idiopathic diarrhoea. In 9 IR patients clinical records were available to establish the precise length of ileum resected. Disease activity was assessed by Harvey-Bradshaw Index (HBI). Diarrhoea was defined as stool frequency ≥ 3 , Bristol stool chart ≥ 6 . Serum FGF19 was measured by ELISA and data are expressed as medians and ranges. Nonparametric statistical tests (Mann-Whitney and Spearman rank correlations) were used.

Results Median levels of FGF19 were significantly lower in patients with non-resected CD (114 pg/ml, 3–339) compared to healthy controls (231 pg/ml, 74–655, $p=0.002$ and 0.005 respectively). Patients with previous IR (71 pg/ml, 17–152) had significantly lower levels than non-resected CD ($p=0.02$). Out of 15 patients with non resected CD with ileal or ileo-colonic disease, eight had active disease (HBI >4) and had further radiological or endoscopic assessment of the ileum: four with symptomatic strictures had significantly higher FGF19 levels (328 pg/ml, 178–339) compared to the inactive patients (118 pg/ml, 46–256, $p=0.04$). Conversely, four with non-obstructive ileal inflammation had significantly lower FGF19 levels (33 pg/ml, 3–59) than inactive patients ($p=0.01$) and this group had the lowest observed levels of FGF19. Six non resected CD with diarrhoea had significantly lower levels of FGF19 (86 pg/ml, 30–169) compared to the diarrhoea controls (246 pg/ml, 72–1000, $p<0.0001$). In nine IR patients an inverse correlation between FGF19 levels and resection length was observed ($r=-0.81$, $p 0.01$).

Conclusion Fasting serum levels of FGF19 are significantly reduced by IR or non obstructive ileal inflammation. Symptoms of diarrhoea in CD are associated with low levels of FGF19 and an inverse correlation is found between FGF19 and the length of previous ileal resections.

Competing interests None declared.

OC-081

GENETIC POLYMORPHISMS AND PATTERNS OF FGF19 RESPONSE TO MEALS IN PRIMARY BILE ACID DIARRHOEA

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Introduction Primary bile acid diarrhoea (PBAD) is associated with low median serum fibroblast growth factor 19 (FGF19) levels. Our group has suggested that PBAD results from impaired negative feedback by FGF19 on the enzyme CYP7A1, leading to over production of bile acids, which spill over into the colon leading to diarrhoea. We aim to characterise abnormalities in FGF19 in PBAD, in particular the response of the hormone to meal stimuli and to describe phenotypic patterns of response. We have explored possible

associations of genetic polymorphisms with both PBAD and specific phenotypes.

Methods Subjects with PBAD were prospectively recruited. After an overnight fast, blood was sampled every 90 min for 6 h. Meals were provided at 9:00 and 12:00. Serum FGF19 was quantified by ELISA using a commercially available kit. Three phenotypes of meal stimulated FGF19 response are described: 1. Low-low (L-L) all five serum FGF19 levels <400 pg/ml. 2. Low-high (L-H) sample 1 400 pg/ml sample 4 or 5 >400 pg/ml. 3. High-high (H-H) samples 1 and 3 or 5 >300 pg/ml. In a separate part of the study genomic DNA was extracted from 91 subjects with PBAD and 120 diarrhoea control subjects. Eight SNPs were analysed, two from the FXR gene (rs61755050, rs56163822), two from the FGF19 gene (rs1789170, rs948992) as well as SNPs from the genes for OST α , klotho β , FGFR4 and ASBT (rs939885, rs17618244, rs376618, rs188096). Genotyping was performed using Taqman SNP genotyping assays.

Results 18 subjects underwent serial FGF19 sampling. Seven were defined as L-L response, five as L-H and four as H-H. Two subjects did not match criteria for the subtypes. The seven L-L subjects had lower SeHCATs compared with L-H and H-H combined ($p<0.05$). Five subjects had SeHCATs of $<5\%$, all but one were L-L. Overall, subjects with lower SeHCATs had lower FGF19 levels. Area under the curve was lower for those with SeHCAT $<5\%$ than those above (median 701 pg/ml h vs 1655 pg/ml h $p=0.023$). The FGF19 level at 1.5 h correlated with subjects' SeHCAT ($r=0.49$, $p=0.04$). The ASBT SNP was associated with L-L subjects, present in four out of seven ($p<0.05$). No other significant SNP associations were found within the phenotypes described nor between PBAD as a whole and diarrhoea controls.

Conclusion Serial FGF19 sampling in PBAD identified three responses to meal stimulus. Most individuals with severe PBAD have L-L response of FGF19, and most of these have a polymorphism in the gene for ASBT. L-H and H-H phenotypes are seen in those with higher SeHCATs. The L-H pattern resembles that previously reported in healthy individuals. These patterns may represent a defect in the receptor component of the feedback mechanism for BA synthesis.

Competing interests None declared.

OC-082

26-WEEK EFFICACY AND SAFETY OF ONCE-DAILY ORAL LINALOTIDE IN PATIENTS WITH IRRITABLE BOWEL SYNDROME WITH CONSTIPATION (IBS-C): A EUROPEAN PERSPECTIVE

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Introduction Linaclotide, a minimally absorbed guanylate cyclase-C receptor agonist, is an investigational drug treatment for IBS-C. As part of the European Medicines Authority submission we evaluated the efficacy and safety of linaclotide 290 μ g, administered once daily for 26 weeks (wks), in a Phase 3 trial of patients with IBS-C.

Methods In a randomised, double-blind, Phase 3 trial, IBS-C patients (modified Rome II criteria) with an overall complete spontaneous bowel movement (CSBM) frequency of <3 /wk, an overall spontaneous bowel movement (SBM) frequency of ≤ 5 /wk and an average abdominal pain score of ≥ 3 (0–10 scale) during a 2 wk baseline period were randomised to linaclotide or placebo for 26 wks of treatment. Efficacy parameters were analysed at 12 and 26 wks.

Results In total, 804 patients (female 90%; median age 44 years) received linaclotide ($n=401$) or placebo ($n=403$). During the 2 wk baseline period, 87% had abdominal pain every day (mean score 5.6;