antibodies level changes was analysed. Western diet consists of 10–20 grams of gluten per day and as 'safe' is considered anything under 10 mg per day what is an equivalent to 1/350 of a piece of bread. Atypical gluten-free diet will consist anywhere between 6 milligrams and 10 mg of gluten per day but 'gluten-free' diet is rarely 100% without gluten i.e. proteins of plant origin from oats, rye, barley and wheat.

Results Mathematical simulations of the celiac disease immune response showed the differences in antibodies levels changes depending on the amount of gluten consumed by paediatric patients. The profile of the antibodies levels decrease after of changing diet from gluten containing to gluten free was also presented.

Conclusions Application of the nutritional systems biology approach in diet planning ensures detail insight in metabolic process and simple control of the metabolic reaction influenced by nutrient intake.

279

LIVER DISEASE IN PEDIATRIC PATIENTS TREATED AT THE CYSTIC FIBROSIS CENTRE OF THE UNIVERSITY HOSPITAL CENTRE ZAGREB

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Objective To describe the characteristics of patients with cystic fibrosis-associated liver disease (CFLD), a complication of cystic fibrosis (CF) that is often asymptomatic until an advanced stage.

Methods Retrospective analysis included patients aged 0–20 years followed in 2018. at the Cystic Fibrosis Centre of the University Hospital Centre Zagreb. CFLD1 was diagnosed if ≥ 2 of the following were present: hepatomegaly and/or splenomegaly, elevated transaminases or gamma-glutamyl transferase (GGT) 3 times during 12 months, ultrasound signs of liver involvement or portal hypertension (PTH), suggestive pathohistological findings. Severe CFLD was defined as a disease with signs of PTH.

Results 61 patients with a mean age of 10.9 years (9 months–19 years, male: female = 34:27) were included. 9/61 (14.8%) of them had CFLD, 6 girls and 3 boys, aged 2–19 years (average age 10.7 years). They all had at least one F508del mutation, and 7/9 were homozygous. Regarding the severity of the disease, 4 patients (3 boys and 1 girl, 6–19 years) had a severe form of CFLD with PTH and presumed cirrhosis, which was confirmed by liver biopsy in one patient. Two patients also had impaired synthetic liver function, two had hypersplenism with platelet count $< 80 \times 10^9/L$, and one had esophageal varices without bleeding. The remaining 5/9 patients had mild CFLD with ultrasound changes (hyperechoic or nodular liver parenchyma, periportal fibrosis) and/or elevated liver enzymes.

We observed a trend of poor nutritional status in patients with severe CFLD (mean BMI z-value -0.66, range -0.26 to 0.62) compared to those with mild form of CFLD (mean BMI z-value -0.41, range -2.76 to 1.49), but the difference wasn't significant, and the most severely malnourished patient had mild CFLD.

We also assessed some noninvasive biomarkers of fibrosis: the APRI index was elevated (≥ 0.5) in all patients with severe

CFLD and in one with mild CFLD, and Fibrosis-4 score was pathological in only one patient with PTH. Elastography was performed in 5 patients: it was normal in one patient with mild CFLD, whereas in four increased liver stiffness was found (significantly increased in two patients with severe CFLD, and mildly in two patients with mild CFLD).

4/9 patients with CFLD had meconium ileus, which is approximately twice the frequency compared to all included CF patients.

Conclusion The diversity of clinical expression and findings in our patients is consistent with the literature data on the spectrum of CFLD manifestations. We confirmed a higher incidence of meconium ileus and severe mutations, and male dominance in CFLD with PTH. In all CF patients, liver disease should be actively sought from an early age (clinical examination once a year + abdominal ultrasound + AST, ALT, GGT).

280

TRANSCUTANEOUS NEUROMODULATION IN CHILDREN WITH CHRONIC INTRACTABLE CONSTIPATION

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Objective Transcutaneous neuromodulation is a therapeutic method using electrical stimulation on nerve fibers. It may be optional therapy in children and adults with chronic constipation. The goal was to evaluate the effectiveness of this method in children with chronic refractory constipation who had been treated with conventional pharmacological and biofeedback therapy without complete improvement.

Methods 15 patients (8 boys and 7 girls), with median age of 9.03 ± 2.98 years and diagnosis of intractable chronic functional constipation were assigned for neuromodulation. They had been previously treated conservatively following ESPGHAN guidelines, for the median period of 37 months (7–66 months) without achieving complete stool regulation. Biofeedback therapy had also been performed in 11 patients. Neuromodulation was added as an additional treatment, without removing previous therapy. Transcutaneous sacral (TSNS) or tibial (TTNS) nerve stimulation was performed at home, every day for 20 minutes, during the period of 2 to 3 months. Self-adhesive surface electrode was placed at sacral S2–S3 for TSNS and 4–5 cm cranial from medial malleolus for TTNS. The usefulness of this method was evaluated according to 3 parameters: the frequency of spontaneous defecation, the improvement of sensation for defecation, and reduction of rectal dimensions (followed by ultrasound before and after neuromodulation).

Results Data of 15 patients was analyzed. TSNS was performed in 13 (86.7%), and TTNS in 2 (13.3%) children. Positive effects were noticed in 9 (60%) children for all of 3 parameters.

Monitoring each parameter separately, a better dynamic of spontaneous defecation was achieved in 10 (66.7%) children, improving of sensation in 9 (60.0%) children, and decreasing of rectal diameter in 10 children, from the 11 that underwent an ultrasound (90.9%). Rectal diameter reduced from initially 4.98 ± 1.24 cm to 3.80 ± 1.15 cm, on average 1.18 ± 0.91 cm, which was statistically significant ($p = 0.024$). Every patient achieved improvement, on at least one of the parameters. 10

(66%) parents wanted to continue with this form of therapy. They found the technique to be uncomplicated, painless and useful. None of our patients became worse or had side effects.

Conclusion Neuromodulation is a noninvasive method which was found to be useful in improving stool regulation by more than half of our patients with chronic intractable constipation when administered as a complementary method to standard therapy and biofeedback. As this study included a small number of patients it would be desirable to plan a prospective study which will actuate a larger number of patients and long-term monitoring.

281

FOREIGN BODY INGESTION IN CHILDREN – FIVE YEARS OF EXPERIENCE AFTER THE ADOPTION OF GUIDELINES

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Objective Reevaluation of our experiences in adherence to the established local guidelines in our population of pediatric patients diagnosed with foreign body ingestion.

Methods A retrospective study of patients aged 0-18 years who were admitted to pediatric emergency department of the University Hospital Centre Zagreb between 1.1.2015. and 31.12.2019. due to suspected foreign body ingestion. We grouped them according to their age and localization of the foreign body along the digestive tract. We analyzed how many patients and with what success underwent endoscopy in relation to the applicable guidelines in our Institution.

Results Of the 410 patients with suspected foreign body ingestion, a foreign body was found in 175 patients ($x = 4$ years ± 9 months), more common in male children (100/175). Most of them (78/175, 45%) were in the age group 3-7 years, followed by 1-3 year group (51/175, 29%). Foreign body was localized radiologically in 165 (94%), by endoscopy in 8 (5%) patients, while in the two patients localization hasn't been determined, and there was also one spontaneous foreign body expulsion. Most common foreign bodies were coins in 61 children (35%), followed by another metal object in 51 (29%), button battery in 35 (20%) and plastic object in 7 (4%) patients. In 11 children (6%) it was food bolus impaction, and 10 of them swallowed other objects. Most foreign bodies were localized in the stomach (95 patients, 54%), followed by the small intestine (38 patients, 22%), the esophagus (27 patients, 15%) and the colon (9 patients, 5%). Two toothpicks were found in piriform sinus and tonsils. Endoscopy was performed in a third of patients (59/175; 34%), and it was successful (resulting in foreign body extraction) in 48 of them (81%). In 25/27 of patients with foreign body localized in the esophagus endoscopy was performed, while the two asymptomatic patients were observed. 7/8 patients with food bolus impaction were previously diagnosed with esophageal stenosis. According to guidelines, 41 endoscopies (70%) were warranted and 18 (30%) were not. We compared our results from this period (III) with the two previous ones: before the adoption of guidelines (I) and the early period following the introduction of guidelines (II). The following was shown: endoscopy in 67% of patients with foreign body ingestion

with 77% success rate (I), endoscopy in 20% of patients with 90% success rate, and in 34% of patients with 81% success rate (III).

Conclusion Global experiences suggest that endoscopic extraction is indicated in 10-20% of cases of all foreign body ingestions in children. In the study period, in one third of 34% of patients in which the endoscopy was performed, it was not indicated according to current guidelines. Despite the existence of guidelines, tenacity and the vigilance of adherence to them decreases over time. Their existence by itself is not sufficient in reducing children's exposure to unnecessary and potentially harmful interventions.

282

GASTROSCOPY IN PEDIATRICS – 4 YEAR EXPERIENCE

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Objective Comparing the referral diagnosis as an indication for EGD with final histological diagnosis, and to assess whether it was justified to perform these endoscopies in our patients.

Methods Retrospective analysis of patients who underwent gastroscopy with biopsy in the period from 1.1.2016. to 29.02.2020 at the Clinical Hospital Center Zagreb. The study did not include foreign body removal procedures, follow up endoscopies and endoscopies for the purpose of placing medical orthopedic aids. We have described the symptoms leading to referral for endoscopy, as well as their average duration prior to endoscopy. We analyzed the correlation between referral and final histological diagnosis.

Results In a cohort of a total of 100 patients, the most common indication for gastroscopy in 24/100 (24%) was abdominal pain, and in approximately half of them (13/24, 54.2%) the histological cause of the discomfort was found (gastritis in 12 and celiac disease in 1). Of the 20 gastroscopies performed on suspicion of gastritis, in 12/20 (60%) pathological substrate was found (9 gastritis, 2 eosinophilic esophagitis, 1 celiac disease). Due to celiac disease suspicion, we endoscoped 18 patients, of whom in 10 (55.6%) celiac disease was histologically confirmed. In 6/11 (54.5%) patients with dyspeptic symptoms diagnosis of gastritis was made after the endoscopy. In almost half of the patients, the pathohistological finding was normal. From 52 pathological findings; 31/52 (59.6%) corresponds to gastritis, 12/52 (23.1%) to celiac disease, 5/52 (9.6%) to eosinophilic esophagitis, and in 2 patients (3.8%) esophageal varices and stomach polyps were found.

The average duration of discomfort was 10 months and 26 days, while the largest number of patients; 17 of them had symptoms for a year, 16 had problems for 6 months, 9 had symptoms for 2 years, and 8 had symptoms for 1 and 3 months, respectively before the endoscopy. It should be noted that 10 were asymptomatic and were referred for endoscopy on the basis of pathological laboratory findings (complete blood count, iron, antibodies to tissue transglutaminase) or specific anamnesis (body weight loss, failure to thrive). Endoscopy completion rate by entering into the distal end of duodenum was 100%. We did not record any complications.