Chronic constipation in Turkish children: clinical findings and applicability of classification criteria

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We aimed to evaluate general features of children with chronic constipation and classified them according to the Iowa criteria and Rome II criteria in order to analyze applicability of these criteria in our population.

The medical records of 485 children who were referred for chronic constipation over a six- year period were evaluated retrospectively. We found that 7.7% of the cases had an organic pathology, and short segment Hirschsprung disease was the leading cause. Other children (92.3%) were classified as functional constipation, with a mean age of 6.4±4 years and with slight male dominance. Encopresis was found in 117 children (51.7%) aged over four years, and was associated with older age, male predominance and long duration of symptoms. Both of the classification systems showed a similar prevalence of constipation, but 9.9% of the children with pediatric constipation were not recognized by Rome II criteria. Additionally, 1.8% of the children were not recognized by either Iowa or Rome criteria.

Functional constipation is common in primary care, and most of the children were school-aged. Constipation associated with encopresis and nutritional problems such as obesity is less common in developing countries. Rome II criteria are too restrictive and do not recognize approximately 12% of the children. A new classification system must be simple, easy to understand especially by the primary care physician, and must include the common features of constipation recognized by the parents.

Key words: constipation, children, encopresis.

Chronic constipation is one of the most common conditions encountered in general pediatric and pediatric gastroenterology offices. It is defined as either decrease in defecation frequency or painful defecation, and is sometimes associated with involuntary loss of stools. Chronic stool retention may contribute to the recurrent abdominal pain, and the symptoms of chronic abdominal pain and fecal soiling may cause psychosocial difficulties, disruption of peer relationships and familial stress[1].

Chronic constipation is mainly functional, and there is no identifiable organic lesion in most cases. It is especially difficult for the clinicians to define functional disorders of the gastrointestinal system in children; therefore, many specialized groups attempt to set criteria for functional disorders. In the last decades, the Iowa criteria have been used in many studies for functional constipation. It is based on the most common features of childhood constipation: frequency of defecation, amount of stools, abdominal or rectal mass on physical examination (pediatric constipation) and encopresis (solitary encopresis)[2]. These criteria are useful and easy in clinical practice but do not include the whole spectrum of constipation. Another classification system (Rome II) was designed based mainly on presenting symptoms, including functional constipation, functional retention and functional non-retentive fecal soiling[3].

In this study, we analyzed the general features of the children admitted to our general pediatric and pediatric gastroenterology unit with complaints of chronic constipation. We classified them according to the Iowa criteria and Rome II criteria in order to analyze the applicability of these criteria in children with chronic constipation.

Material and Methods

The study comprises 485 children (257 males; mean age±S.D: 6.3±4.1 years, range: 2 months-16 years) who were admitted with complaints of chronic constipation to Ege University Medical Faculty Hospital general pediatric and pediatric gastroenterology units between January 1999 and November 2005. Constipation was defined by the parents or children (of adolescent age) as having decreased defecation frequency or difficulty in evacuation of the feces. The medical records of these patients were retrospectively evaluated for the following parameters: demographic features, family history, duration of the symptoms, and frequency, volume (pebble-like, scybalous and large caliper), and character (hardness, looseness) of the stool. Additionally, associated symptoms such as encopresis, enuresis, vomiting, and straining or pain during defecation were also evaluated. Anthropometric measurements and physical findings were recorded.

Our hospital is one of the largest referral centers in the Aegean region and most of the patients (65%) were from the urban population. In our unit, a detailed clinical history including the demographic features, characteristics of the stool and associated symptoms were taken at the initial examination, and complete blood count, liver and kidney function tests, serum electrolytes, thyroid function tests, urinary culture, abdominal X-ray and abdominal ultrasound were routinely performed. Barium films and rectal biopsy were performed during the second visit if the symptoms persisted or suggested Hirschsprung disease. We consulted the pediatric psychiatrist regarding all the children with encopresis.

One hundred and twenty-six children were excluded from the study for the following reasons: (i) they were already receiving laxative treatment at the time of admission (n=49), (ii) they had inadequate file records (n=52), (iii) they had major neurological deficits (n=20), and (iv) they had previous surgery of the small intestine or colon (n=5). Final data were based on 359 children.

Encopresis was defined as the loss of loose stool in the underwear, whereas soiling was defined as staining of the underwear in children older than four years of age. It is also defined as encopresis when the parents are not able to accurately estimate the amount of feces lost in the underwear. Retentive posture was described as avoiding defecation by purposefully contracting the pelvic floor muscle and gluteal muscle[4].

Children with any identifiable organic causes for defecation disorder were classified as organic constipation. Patients with functional constipation were then classified according to Iowa criteria and Rome II criteria to analyze the applicability of these two criteria in childhood constipation.

Results

General Features

During the six-year period, 485 children were referred to our hospital for constipation, and 361 of them were referred to our general pediatric unit, accounting for approximately 1.2% of all general pediatric unit admissions, and other children were admitted to our pediatric gastroenterology unit, comprising 8.3% of all admissions. Three hundred and fifty-nine (52.3% boys) children were included into the study, with a mean age of 6.1±4.1 years (range: 2 months-16 years) and 193 (58.3%) children were younger than 6 years of age.

An organic pathology was found in 28 cases (7.7 % of all cases): Hirschsprung diseases in 11, anorectal malformations in 5, intestinal neuronal dysplasia in 4 and spinal anomalies in 4 cases. Functional constipation was observed in 331 cases (92.3%). Table I shows the general features of the children with chronic constipation.

Clinical Features of the Patients with Functional Constipation

The clinical presentation of the patients with functional constipation is shown in Table II. Sixty percent of the children had defecation frequency of less than 3 per week, while 70% of the children had large diameter stool and

Table I. General Features of the Patients (n=359)

Organic constipation, n (%)	28 (7.7)
Mean age ± SD in years (median)	2.5 ± 4 (3)
Male, n (%)	18 (64.2)
Duration of symptoms, mean ± SD (range)	23 months ± 28 months (30 months)
Initial laxative treatment, n (%)	20 (71.4)
Final diagnosis	
Hirschsprung disease	11
Anorectal malformations	5
Intestinal neuronal dysplasia	4
Spinal anomaly (tethered cord)	4
Congenital hypothyroidism	3
Intestinal stricture	1
Functional constipation, n (%)	331 (92.3)
Mean age ± SD in years (median)	6.4 ± 4 (5)
Male, n (%)	170 (51.3)
Duration of symptoms, mean ± SD (range)	35 months ± 47 months (41 months)

Table II. Demographic and Clinical Presentation of the Patients with Functional Constipation (n=331)

Parameter	Number of cases (%)
Family history	101 (30.5)
Symptoms	
Defecation frequency <3/week	195 (58.9)
Encopresis/soiling	117 (51.7)*
Large diameter stools	229 (69.1)
Scybalous, pebble-like	85 (38.9)
Straining and/or pain during defecation	132 (39.8)
Retentive posturing	56 (16.9)
Abdominal pain or distension	98 (29.6)
Vomiting	39 (11.7)
Enuresis	23 (6.9)
Urinary tract infection	44 (13.2)
Rectal bleeding	59 (17.8)
Physical examination	
Growth retardation	8 (2.4)
Obesity	17 (5.1)
Abdominal mass	71 (21.4)
Anal fissures	89 (26.9)
Fecal retention	45 (36%)**

*: 226 children were over 4 years old, **: rectal digital examination was performed in 125 children.

approximately 40% had scybalous, pebble-like stools. Thirty percent of the children had non-specific abdominal pain at the time of admission and a minority of the cases had vomiting. Retentive posture was reported in 17% of the patients. Constipation was associated with enuresis and culture-proven urinary tract infection in 6.9% and 13.2% of the children, respectively. Most of the children were school-aged (Fig. 1).

On physical examination, 8 children (2.4%) had growth retardation, while 17 (5.1%) had obesity (BMI $\geq 95^{th}$ percentile). Palpable abdominal mass was found in 20% of the patients, and rectal digital examination was performed in 125 children and was associated with fecal retention in 45 children (36%). Forty percent of the children had pain/straining during defecation, while anal fissures were found in 25% of the patients.

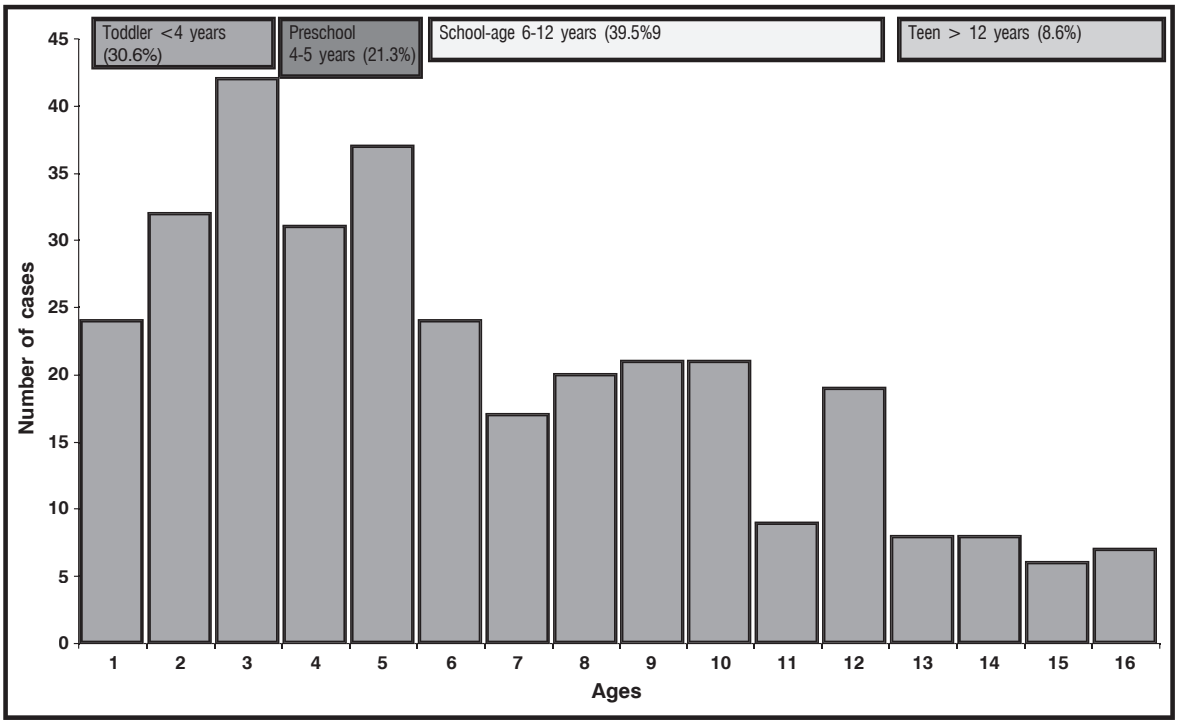

Fig. 1. Age distribution of the patients with functional constipation. Note that most of the children were school-aged.

Encopresis

Encopresis was found in 117 children (51.7%) over 4 years of age, and was associated with older age (8.6±2.9 vs. 7.7±3.7, p=0.042), male predominance (60.6%) and long duration of symptoms. No difference was found in terms of defecation frequency and defecation pattern between children with and without encopresis. Most of the patients had abdominal pain and abdominal mass on physical examination. It was associated with enuresis in 15 (12.8%) cases and culture-proven urinary tract infection in 25 cases (21.3%).

Of all children with constipation according to Iowa (pediatric constipation) and Rome II (functional constipation and functional fecal retention) criteria, 21.2% and 7.9% had encopresis, respectively. All the children with encopresis were consulted with the pediatric psychiatrist, which revealed no major psychiatric problem.

Constipation

The frequency of constipation as defined by Iowa criteria (pediatric constipation) and Rome II criteria (functional constipation and functional fecal retention) was found as 72.5% and 63.7%, respectively.

The mean age of the patients with pediatric constipation was 6±4 years (range: 1-16 years). Seventy percent of the cases had defecation frequency <3/week, while 62.2% had large amount of stools.

On the other hand, functional constipation and functional fecal retention were found in 48.9% and 14.8% of the cases, respectively. The mean age of the patients with functional constipation was 3.3±1.5 years, and consisted of 87.5% of the children younger than 6 years of age. Moreover, 15 children older than 6 years of age fulfilled functional constipation criteria, but were outside the classification due to age restriction. No significant difference was found in terms of defecation pattern and frequency in the children younger than 6 years of age in the functional constipation group compared to children older than 6 years of age outside the criteria. Functional fecal retention was found in 49 children (14.8%), with a mean age of 10.1±3.3 years. Associated symptoms such as fecal soiling, irritability and abdominal pain with functional fecal retention were found in 7, 10 and 14 of the cases, respectively. Rectal digital examination revealed fecal retention in 30 of the 35 children in whom this examination was performed. Only 1 case had encopresis

with functional fecal retention. This child had defecation frequency of less than 2/week, retentive posture and encopresis.

Solitary Encopresis and Functional Non-Retentive Fecal Soiling

Sixty-five children fulfilled the criteria for solitary encopresis, with a mean age of 8.5±2.8 years (range: 4.5-15 years). According to Rome II criteria, 79 cases (23.8%), with a mean age of 8.5±2.8 years, had functional non-retentive fecal soiling, and defecation frequency of <3 per week, and large volume stool were common (45 cases and 43 cases, respectively) in those.

Comparison of Iowa and Rome II Criteria

We found that 72.5% and 63.7% of the children with chronic constipation were recognized by Iowa (pediatric constipation) and Rome II (functional constipation and functional fecal retention) criteria, respectively. In pediatric constipation, the diagnosis of constipation is based on low defecation frequency, encopresis, fecal retention, large volume stools due to decreased defecation frequency and slow transit time of stool. In Rome II criteria, functional constipation is based on defecation pattern but restricted with the age, and functional fecal retention is characterized by slow transit of stool along with the contraction of the gluteal muscles to avoid defecation.

The comparison of Iowa and Rome II criteria is shown in Table III and Figure 2. We found that 14 children (5.8%) with pediatric constipation were recognized as functional non-retentive fecal soiling according to Rome II criteria. These children had defecation into unsuitable places at inappropriate times, which fulfills the functional non-retentive fecal soiling criteria, but had defecation frequency <3/week, which fulfills the pediatric constipation criteria. On

Table III. Comparison of Iowa and Rome II Criteria

	Pediatric constipation	Solitary encopresis	Unrecognized	Total
Functional constipation	146		19	165
Functional fecal retention	47		1	48
Functional nonretentive fecal soiling	14	65		79
Unrecognized	33		6	39
Total	240	65	26	331

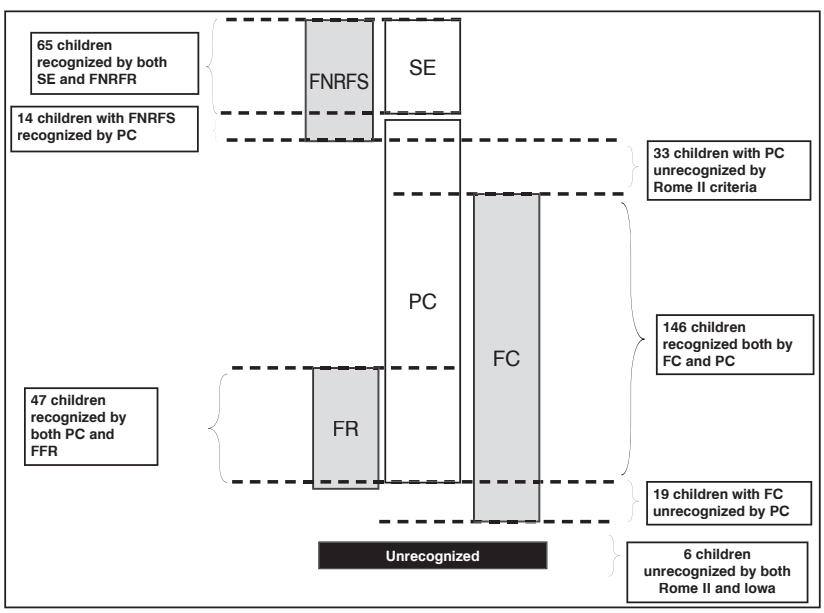

Fig. 2. Comparison of the two classification criteria. FC: Functional constipation. FFR: Functional fecal retention. FNRFS: Functional nonretentive fecal soiling. PC: Pediatric constipation. SE: Solitary encopresis.

the other hand, 33 children (9.9%) with pediatric constipation were not recognized by functional constipation and functional fecal retention criteria, due to age restriction. In contrast, 20 children (6%) who fulfilled the Rome II criteria were not recognized by Iowa criteria due to only having scybalous or pebble-like stools or retentive posture without other criteria mentioned in the Iowa criteria. Totally, 6 children (1.8%) did not meet any criteria mentioned in the Iowa and Rome II criteria; these children had defecation frequency >3 per week and painful defecation, and had neither encopresis nor fecal retention.

Discussion

In this study, we evaluated the clinical features of children who were admitted for chronic constipation to our general pediatric and pediatric gastroenterology units over a six-year period. There were totally 485 children with constipation, accounting for 1.2% and 8.3% of all general pediatric and pediatric gastroenterology unit admissions, respectively. Three hundred and fifty-nine children were included into the study, and it was found that 7.7% of the cases had an organic pathology, with short segment Hirschsprung disease the leading cause, which is compatible with the previous studies[5-7]. Other children (92.3%) were classified as functional constipation, with a mean age of 6.4±4 years and with slight male dominance. Most of the children were school-aged.

We found that the majority of the children with functional constipation had passage of large diameter stool, in combination with decreased bowel movements and straining/ painful defecation. Despite the high frequency of large diameter stool, only half of the patients had encopresis. It is less common in this group of children according to previous studies[1,4,8,9]. Additionally, nutritional problems such as obesity or malnutrition were also less common in our patients[10]. Children with constipation may have abdominal pain, which disappears immediately after defecation, or rectal bleeding owing to anal fissure. One-third of these patients had abdominal pain. We found that 20% of the children had enuresis or urinary tract infection, suggesting the routine examination of urine in constipated children. It is important to exclude spinal anomalies if the patient has fecal retention and daytime enuresis.

We revealed that according to Iowa criteria, 72.5% and 19.6% of the children fulfilled the criteria for pediatric constipation and solitary encopresis, respectively. On the other hand, 48.9%, 14.8% and 23.8% of the children fulfilled the criteria for functional constipation, functional fecal retention and functional non-retentive fecal soiling according to Rome II criteria, respectively. Both of the classification systems showed a similar prevalence of constipation, but 9.9% of the children with pediatric constipation were not recognized by Rome II criteria. Additionally, 1.8% of the children were not recognized by either Iowa or Rome criteria. Totally, approximately 12% of the children did not fulfill the Rome II criteria.

In previous studies, it was shown that Rome II criteria were too restrictive[4,11-13]. There are three important points in Rome II criteria: retentive posture, age restriction in functional constipation and encopresis. The low incidence of functional fecal retention in our study might be related with subjectivity of the retentive posture. Parents are often not able to determine reliably whether their child exhibits stool-withholding behavior or not; in addition, most of the children are school-aged, and parents may not be aware of the retentive posture. Retentive posture is important not only for the differential diagnoses (functional fecal retention or functional non-retentive fecal soiling) but also for treatment, whether the children have fecal retention or not; therefore, an objective method is needed for the assessment of fecal retention. Rectal digital examination may be helpful, but it is often considered as too invasive, stressful and unethical by the parents and child, and may have a negative effect on treatment compliance and outcome[14]. Moreover, most of the primary care physicians avoid performing rectal digital examination[15]. In this study, rectal digital examination was performed in 35 of the 49 patients with functional fecal retention and 30 patients were found to have fecal retention, whereas fecal retention was found in 10 of the other 90 patients. An abdominal radiography with accurate scoring system, which is a non-invasive, simple, cheap and easily available method, may be used instead of rectal digital examination for the assessment of fecal retention. It was shown that the presence of firm, packed hard stool in the rectum correlates closely with radiological

evidence of fecal retention, with sensitivity and positive predictive values exceeding 90%[16-18]. It may also be useful for markedly obese children and children who present for evaluation but are already on laxative treatment.

Age restriction is another problem in functional constipation. We think that age restriction is nonessential for functional constipation. There are no certain age limits for the onset of childhood constipation; moreover, we found that there was no difference between the children under or older than 6 years of age in terms of defecation frequency and defecation pattern.

Encopresis is the major clinical entity associated with constipation. It may associate with behavioral problems such as depression, social withdrawal, shame or anger[19]. In this study, we found that it was associated with older age and male predominance. Although it is only accepted as an accompanying symptom rather than inclusion criteria in Rome II, all of our cases with encopresis were recognized by Rome II due to retentive posture or involuntary loss of stool in socially inappropriate places (functional non-retentive fecal soiling)[3]. However, it was shown that encopresis is correlated with the severity of constipation and an objective marker of efficiency of the treatment[20]. Therefore, we recommend that encopresis must be included in the inclusion criteria in order to assess the severity of constipation and to follow-up the outcome.

A new definition of chronic constipation was made by the Paris Consensus on Childhood Constipation Terminology (PACCT) group in July 2004. They defined chronic constipation as the occurrence of 2 or more of the following characteristics, during the last 8 weeks: frequency of bowel movements of less than 3 per week, more than 1 episode of fecal incontinence per week, large stools in the rectum or palpable on abdominal examination, passing of the stools so large that they obstruct the toilet, retentive posturing and withholding behavior, and painful defecation[21,22]. According to these criteria, 45 patients (13.5%) were not recognized due to only having scybalous, pebble-like defection pattern. Although we did not subdivide into separate groups, there were some cases with only straining defecation. In addition, only 60% of the cases had defecation frequency of less than 3 per week.

Finally, Rome III criteria were published in April 2006[23,24]. Some conditions were redefined according to symptom clusters. Functional gastrointestinal disorders in the pediatric age group were divided by age into an infant/toddler group (0-4 years) and child/adolescent group (5-18 years). The duration of symptoms were decreased from 12 weeks to 1 month in the infant/toddler group and to 2 months in the child/adolescent group owing to previous published data showing that the longer functional constipation goes unrecognized, the less successful is the treatment[25]. Another difference is that functional constipation and functional fecal retention merged in a single entity as functional constipation. Functional constipation was defined as presence of 2 of the following criteria for at least 1 month for infant/toddlers and for 2 months for child/adolescent: ≤2 defecation/week, at least 1 fecal incontinence/week, history of painful or hard bowel movements, presence of large fecal mass in the rectum, history of large diameter stools that may obstruct the toilet, and history of excessive stool retention or retentive posture for the child/adolescent. Diagnostic criteria for non-retentive fecal retention were similar to the previous Rome II criteria, with only duration of symptoms decreased from 12 weeks to 2 months[24,25].

Problems such as retentive posture and age restriction in functional constipation seem to be resolved in Rome III criteria[26,27]. Retentive posture was 1 of the diagnostic criteria in functional fecal retention in Rome II; now it is only 1 of the 6 criteria in Rome III, which may support the diagnosis, without requirement to be present in all children. Additionally, fecal incontinence was added in the diagnostic criteria in Rome III. Rome III criteria seem to be both less restrictive and include all the cases with chronic constipation. Most of the cases in our study who were not recognized by Rome II due to age restriction and unawareness of retentive posture by the parents would be recognized by Rome III criteria.

In conclusion, most of the children with constipation are school-aged, and constipation associated with encopresis and nutritional problems such as obesity is less common in developing countries such as Turkey. We would like to emphasize that inclusion criteria for the new classification system must be simple, easy to understand especially by the primary care physician, and include the common

features that are recognized by the parents. Further epidemiological studies are needed to determine the validation of Rome III criteria in different communities.

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