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• *BRIEF REPORTS* •

Manometric assessment of idiopathic megarectum in constipated children

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Abstract

AIM: Chronic constipation is a frequent finding in children. In this age range, the concomitant occurrence of megarectum is not uncommon. However, the definition of megarectum is variable, and a few data exist for Italy. We studied anorectal manometric variables and sensation in a group of constipated children with megarectum defined by radiologic criteria. Data from this group were compared with those obtained in a similar group of children with recurrent abdominal pain.

METHODS: Anorectal testing was carried out in both groups by standard manometric technique and rectal balloon expulsion test.

RESULTS: Megarectum patients displayed discrete abnormalities of anorectal variables and sensation with respect to controls. In particular, the pelvic floor function appeared to be impaired in most patients.

CONCLUSION: Constipated children with megarectum have abnormal anorectal function and sensation. These findings may be helpful for a better understanding of the pathophysiological basis of this condition.

Key words: Constipation; Manometry; Megarectum

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INTRODUCTION

Chronic constipation is a frequently encountered symptom in children[1]. Due to a general belief that childhood constipation gradually disappears before or during puberty, this symptom is often underestimated and scarcely taken into consideration. However, recent evidence suggests that up to one-third of the constipated children followed beyond puberty continue to have severe complaints of constipation[2].

The definition of constipation in childhood is also less standardized than in adults; for the latter, in fact, the Rome II criteria[3,4] seem quite accepted and widespread whereas the criteria for children[5] are believed to be too restrictive, in that they might exclude several children with constipation[6].

For practical purposes, childhood constipation may be grossly divided into two groups, represented by functional fecal retention (FFR, most frequent) and slow transit constipation (STC), which also reflect the main pathophysiological abnormalities[7]. In fact, constipation in children is very rarely caused by a colonic motility disorder, as frequently found in adults[8]. Childhood constipation is mostly due to a maladaptive behavior triggered by an unpleasant defecation that in some subjects led to delay further defecation by withholding the stools. These patients, who were different than those with STC, have normal colonic motility[9].

In chronically constipated children with FFR, the abnormal motor activity is often found in the rectum, which may become so dilated that it is unable to generate enough pressure to propel the stools into the anal canal[9]. This megarectum is found in 30-100% of constipated children, depending on the definition used[10-14]. Thus, no uniform definition of megarectum for constipated children is available, it is unknown whether a large rectum is the result or the cause of constipation, and which underlying mechanism is responsible for fecal impaction[15].

Therefore, purpose of the present study was the assessment of chronically constipated pediatric patients with megarectum defined by radiologic criteria.

MATERIALS AND METHODS

Patients

Fifteen constipated children (11 males and 4 females, age 9±0.6 years) entered the study. Average duration of symptoms was 4 years (range 2-8 years). Patients were recruited when they met at least two of the following criteria[16,17]: (1) less than three defecations per week; (2) soiling and/or encopresis episodes more than twice per week; (3) passage of large amounts of feces once per 7-30 d; and (4) presence of a palpable rectal mass. Moreover, barium enema showed the presence of an enlarged rectum

(diameter more than 6.5 cm in the lateral view, as measured on a line extending perpendicular to S_2[18]) in all patients.

On physical examination, all patients had a large amount of soft stool that filled the rectum. Soiling, defined as the loss of a small amount of loose stool in the underwear[17], was present in 3 (13%) patients and encopresis, defined as the loss of a normal amount of stool in the underwear after the age of 4 years (without an underlying organic disorder)[17], was present in 13 (87%) patients. Before performing manometric and rectal compliance determination, a rectal disimpaction schedule was performed in all patients. This schedule consisted of oral osmotic laxatives (lactitol, 5 g/10 kg body weight in two divided daily doses) and tap water enemas given by the parents for a maximum of 7 d. The last enema was given at least 5 h before physiological assessment was done. Rectal digital examination was performed in all patients, to ascertain that an adequate rectal disimpaction was achieved.

Controls

The control group was represented by 12 children (nine males and three females, age 10±0.7 years) with recurrent abdominal pain (RAP) and without rectal fecal impaction. These patients were recruited on the basis of Rome II criteria for RAP[5]: at least 12 wk of: (1) continuous or nearly continuous abdominal pain in a school-aged child or adolescent; and (2) no or only occasional relation of pain with physiological events (e.g., eating, menses, or defecation); and (3) some loss of daily functions; and (4) the pain is not feigned (e.g., malingering); and (5) the patient had insufficient criteria for other functional gastrointestinal disorders that would explain the abdominal pain. All controls had at least one bowel movement per day, and they did not meet the criteria for constipation as defined above.

Methods

Anorectal manometry and tests of rectal compliance were carried out according to a standard technique. Briefly, a commercially available four-lumen pediatric anorectal catheter with terminal balloon (Menfis bioMedica, Bologna, Italy, type 5R-9-100CB), connected via physiological pressure transducers to a low-compliance infusion pump and to a computerized recording system (Dyno Compact System, Menfis) was used.

After recording the rectoanal pressure profile with stepwise withdrawal (1 cm/30 s), the anal resting tone was recorded for 2-5 min with the catheter fixed at the highest pressure point obtained during two pull-throughs. Then, the rectosphincteric reflex was evaluated by inflating and rapidly deflating the catheter balloon with 10, 20, 30, 50, and 100 mL of air. Finally, the sphincteric response to straining was assessed by asking the patients to strain as if to defecate thrice at 1-min intervals.

To test rectal compliance and sensation, a single-lumen PVC catheter (outer diameter 4 mm) with a 7-cm-long cut terminal unstretched condom was used, connected to the above-mentioned pressure transducer and recorder, as previously described[19]. The balloon was placed with its distal portion about 5 cm from the anal margin and, through a syringe equipped with a three-channel stopcock, inflated with 50 mL of air increments every 60 s until the maximum rectal tolerable volume (MRTV) was reached. Rectal expulsion ability was assessed, with the patient lying on the left side, by inserting a well-lubricated Foley catheter in the rectum, then filling it with 50 mL of water and asking the patient to defecate it[20].

Ethical considerations

After careful explanations about the aims of the study, the parents of the children gave written informed consent, and the studies were carried out in accordance with local ethical guidelines, following the recommendations of the Declaration of Helsinki.

Data analysis

All tracings were analyzed in blind by one of the investigators. For anorectal manometry and test of rectal compliance and sensation, the following variables were taken into account[19,21]: (1) maximum basal pressure of the internal anal sphincter, defined as the mean of the highest resting pressures recorded from each of the four ports during the two pull-throughs[19,21,22]; (2) minimum relaxation volume (MRV), defined as the lower quantity of air inflated in the rectal balloon necessary to elicit the rectoanal inhibitory reflex, a drop in pressure >5 mmHg, which represents relaxation of the internal sphincter[23,24]; (3) defecatory sensation threshold (DST), defined as the smallest volume at which the first desire to defecate was reported by the patient[25,26]; (4) response to straining, evaluated by observing whether straining to defecate caused a decrease in intra-anal pressure (normal response) or a paradoxical increase in intra-anal pressure[27]; (5) MRTV, defined as the maximum volume of air that could be infused into the rectal balloon and responsible either for an intolerable urge to defecate, painful distension, or expulsion of the balloon itself[11]; (6) rectal compliance, defined as the intraballoon pressure at 100 mL when inflated intrarectally minus the intraballoon pressure at 100 mL when inflated in open air[28,29]; and (7) rectal expulsion. Without any time limitation, the test was considered abnormal when the patient was not able to expel the balloon (Foley catheter filled with 50 mL of water) and refused further straining attempts.

Statistical analysis

The Kolmogorov-Smirnov test for normality was applied, and showed that the data were not normally distributed. Therefore, comparisons of data between controls and patients were done by means of nonparametric tests. The Wilcoxon rank sum test (two-tailed) and the χ^2 test were applied, where necessary. Values of P less than 0.05 were chosen for rejection of the null hypothesis. Data are expressed as mean±SE.

RESULTS

No differences between groups were found concerning age (9.6±0.7 years in controls *vs* 9.5±0.6 years in patients, $P = 0.10$). Soiling and/or encopresis was found in none of the controls and in 13/15 (87%) patients ($P<0.0001$). Analysis of anorectal physiological variables showed that

the maximum basal pressure of the anal sphincter was significantly higher in controls with respect to the patients (58±3.4 *vs* 31±3 mmHg, $P<0.001$), whereas the MRV was lower in controls (13.3±1.4 *vs* 39±5.3 mmHg, $P<0.001$). Concerning the DST, this was found to be significantly lower in controls compared to that found in megarectum patients (54±4 mmHg *vs* 130±27 mmHg, $P<0.01$). As expected, controls displayed lower values of MRTV compared to the megarectum patients (171±11 mL *vs* 523±68 mL, $P<0.001$) and higher compliance values (18±1.3 mmHg *vs* 10.5±2 mmHg, $P<0.02$).

The response to straining was abnormal in 1/12 (8.3%) controls and in 9/15 (60%) patients ($P = 0.017$); the rectal expulsion test was abnormal in 1/12 (8.3%) controls and in 15/15 (100%) patients ($P<0.0001$).

DISCUSSION

The term megarectum is frequently employed in children with constipation or fecal impaction without any quantification measure, and there are only a few data obtained in groups with more objective definitions[17]. In the present study, we adopted a validated radiological definition, at least for adults and adolescents: the limit of this definition is due to the fact that lesser degrees of megarectum in the pediatric population may have been excluded. However, we had a well-defined group of patients with objective criteria, and we feel that this is important since to the best of our knowledge there are no such reports from Italy.

The comparison of anorectal parameters between patients and controls showed significant abnormalities in the former that displayed lower basal pressures of the anal sphincter and compliance values, whereas higher values were found for MRV, DST, and MRTV. In addition, most megarectum patients had clinical and instrumental evidence of abnormal pelvic floor function.

These results are in agreement with some previous studies[11,30-33], where others were not able to find such differences[16,17,34]. We are at present unable to explain such discrepancies, although patients' selection, severity of symptoms, and assessment methods may be responsible for these differences between studies.

We feel of interest that this group of children with megarectum shares anorectal abnormalities similar to those we found in adult patients with megarectum[19]. In this rather homogeneous group of pediatric patients, the findings seem consistent with similar mechanisms proposed for adults, i.e. that megarectum may be a mechanism for constipation by outlet obstruction[35], as shown by the impairment of anorectal dynamics in such patients. The rectal function, in fact, seems to be severely deranged, as shown by the MRTV recorded in these children, due to an atonic rectum that sometimes adapted to masses of over 800 mL, too large to be defecated. The MRV and rectal sensation were also impaired, with some of the patients needing higher volumes to relax the sphincter and feeling the defecatory stimulus only at high volumes of distension, thereby enforcing the mechanisms leading to further dilatation of the rectal ampulla.

The clinical significance of a dyssynergic phenomenon in these patients is unclear. Previous studies have proposed this phenomenon as one of the main causes of impaired rectal expulsion in megarectum and megacolon patients[36], but other studies have challenged this hypothesis, since rectal emptying may happen against a contracting pelvic floor[37,38]. However, since fecal consistency is likely to influence the efficiency of rectal emptying[39,40], it is possible that the presence of large, hard stools in a megarectum may elicit a dyssynergic pattern.

In conclusion, we described a group of constipated children with well-defined megarectum, and showed that these patients display important abnormalities of anorectal variables and sensation. We feel these findings may be of some interest for a better understanding of the pathophysiological mechanisms of this condition and, possibly, for a more targeted therapeutic approach.

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