

COLONIC TRANSIT TIME IN CHILDREN AND ADOLESCENTS WITH BOWEL AND BLADDER DYSFUNCTION

Hypothesis / aims of study

Bowel and bladder dysfunction have been noted to be coexistent in children, and treatment of bladder symptoms needs concomitant targeting of bowel issues to succeed. It has been proposed that one common pathologic mechanism would be the base for both bladder and bowel dysmotility. Some of these children have refractory constipation and others respond to treatment but once treatment for their bowel issues is discontinued, most children tend to relapse their constipation [1,2]. This would indicate that there is some type of intrinsic defect in the colon motility, with persistent peristalsis problem, that led to reaccumulation of stool. The hypothesis of this study is that there is an association between slow transit constipation and lower urinary tract dysfunction. Furthermore, an autonomic dysfunction potentially would lead to issues with the internal anal sphincter with its involuntary relaxation which potentially leads to sustained pelvic floor hyper tonicity which may persist during voiding. The aims of the study were to measure colonic transit time and to define the site of decreased colonic transit in children and adolescents with BBD; to compare the subgroups of lower urinary tract dysfunction with the subgroups of functional constipation and colonic transit time with the severity of LUTS measured by DVSS.

Study design, materials and methods

The study was designed as a prospective, descriptive study. Subjects were recruited from march to october 2013 from pediatric gastroenterology outpatients clinics and had chronic constipation refractory to conventional medical and behavioral treatment. The patients were eligible if they have lower urinary tract symptoms and have being treated for constipation at least 6 months. The exclusion criteria were endocrine, metabolic or neurologic diseases; Hirschsprung disease, anorectal, spinal, urological or orthopedic malformation of the lower limbs. The cohort contained 4 girls and 8 boys, aged from 7 to 14 years (mean 9,7 years). The study was based on the following protocol: In the first visit, the a standardized medical history was recorded focusing on the diagnosis of lower urinary tract symptoms (LUTS), the severity of LUTS, the general development level, nutrition, medicine, history of constipation or faecal incontinence and previous medical history. The severity of LUTS was assessed using a version validated for Brazilian portuguese of Dysfunctional Voiding Scoring System(DVSS). A clinical examination was performed, with focus on the neurological system, back, lower limbs, abdomen, perineal and digital rectal examination. We classified the child's constipation based on Rome III criteria. At the end of the first visit, the parents were instructed in keeping a 3-day diary on the child's micturition habits and in keeping a 2-week diary on the frequency of bowel movements, abdominal pain, difficult to evacuate and the consistency of stools based on the Bristol scale. In the next visits the patients underwent to transabdominal ultrasound evaluation of kidneys, urinary tract and measurements of rectal diameter, urodynamic evaluation and mensurement of colononic transit time. The urodynamic studies consisted of cystometry, electromyography and fluxometry. The urodynamic pattern was considered abnormal when the bladder had involuntary detrusor contractions, when the bladder capacity was smaller than expected for age, when the bladder pressure increased with filling to more than 10 cm H₂O, when the bladder failed to have a sustained contraction during emptying, and when there was uncoordination between bladder and external sphincter during a voluntary voiding contraction.

The assessment of total and segmental colonic transit time (CTT) was done using radio-opaque markers, as described by Metacalf et al [3]. The subject ingested a small capsule containing 24 radiopaques markers on 3 consecutives days. On the fourth day of the study subjects underwent plain abdominal radiograph in the supine position. One additional x-ray was performed on the seventh day of the study in children more than 80 % of the markers had not been eliminated. The upper limit of normal for total CTT, in the right colon, left colon and sigmoid were respectively 62,18,20,34 hours. Patterns of colonic motility disorders were described as: Outlet obstruction (increased CTT in the rectosigmoid); distal obstruction (increased CTT in the left colon with or not associated with increased CTT in the rectosigmoid); stasis of the right colon (increased CTT in the right colon with or not associated with increased CTT in the left colon and sigmoid) and normal CTT in all segments. The patients were considered to have slow colonic transit when there was delay in transit through the right colon, the left colon or both.

The lack of existing data on bowel physiology in CTT of children with BBD prevented formal power calculation; the only previous study of colonic motility in children with LUTS was performed using colonic manometry and included 11 patients[1]. Statistical analyses were performed with Statistical Package for the Social Science (SPSS) 17. Data are given as mean (std) and compared using Fisher test. Other data are given as median values (range) and compared using Mann-Whitney U test. P < 0.05 was considered statistically significant.

Results

We analyzed 12 patients with severe constipation and LUTS. 9 (75%) subjects had urgency; 6 (50%) daytime incontinence; 3 (25%) straining for voiding; 2 (16.7%) had monosymptomatic enuresis. 3 (25%) had a previous history of febrile urinary tract infection. Urodynamic features were abnormal in 10 of 12 subjects, 8 (66,6%) presented detrusor overactivity (DO) and uncoordination between bladder and external sphincter, 2 (16,7%) isolated DO. Regarding the CTT evaluation 6 (50%) subjects had stasis of right colon, 1(8,3%) had left colon stasis and 3(25%) had outlet obstruction. 2 subjects with monosymptomatic nocturnal enuresis had normal urodynamic evaluation and normal CTT despite of constipation. 7 (77,8%) subjects with DO presented increased CTT (p = 0,023). There was not significant association between outlet obstruction in CTT and uncoordination between bladder and external sphincter (p= 0.39). DVSS scores ranged from 6 to 21 in girls and 7 to 18 in boys (p = 0,260). When using Mann-Whitney test the subgroup with increased total CTT had DVSS score (median = 13) significantly higher than the subgroup with normal total CTT (median = 7), p = 0,036.

Interpretation of results

The present study provides the first systematic evaluation of colonic transit time with radiopaque markers in a group of children with BDD. Interestingly, the overactive bladder was significantly associated with slow colonic transit constipation and 2 subjects with monosymptomatic nocturnal enuresis had normal urodynamic evaluation and normal CTT. Outlet obstruction in CTT was not associated with voiding dysfunction. The more pronounced is the LUTS severity in DVSS, greater is the probability of CTT transit time in subjects with BDD. These results are in accordance with the concept of one common pathologic mechanism would be the base for both bladder and bowel dysmotility.

Concluding message

We demonstrated the association between detrusor overactivity and slow colonic transit suggesting that some children with severe constipation may have a neuropathy affecting both colonic and lower urinary tract system. Further studies are necessary to better understand the physiopathology and the optimal treatment for the BDD subgroups.

References

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Disclosures

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