The Benefit of Low Rectal Enema in Children with Uncertain Causes of Acute Abdominal Pain

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Background: *Fecal impaction (FI) can present with abdominal pain that mimics or coincides acute appendicitis. Low rectal enema (LRE) can suddenly relieve abdominal pain and distinguish this condition from appendicitis. However, there is a concern regarding the risk of delayed operation or appendiceal perforation after LRE in children who actually have appendicitis.*
Objective: *This study is aimed to determine the benefit and risk of LRE in children with uncertain causes of abdominal pain.*
Material and Method: *A retrospective chart-review cross-sectional study was conducted in children (2 to 15 years of age) who were admitted to our division due to acute abdominal pain between January 1, 2001 and October 31, 2008. Patients who had apparent peritonitis or previous abdominal surgery were excluded. Data collection includes demographic data, evidence of FI, managements including LRE and/or appendectomy, perforation of appendix and length of stay.*
Results: *There were 403 patients included in the present study. The most common diagnoses were FI (43%) followed by appendicitis (37.3%). FI was evident in 322 (79.9%) patients and LRE resulted in 204 (63.3%) resolution of symptoms. Appendectomy was performed in 118 (36.6%) children in whom the pain was persistent after LRE. The overall ruptured and negative appendectomy rates were 23.6% and 8.8%, respectively. Among 118 patients who had prior LRE, ruptured appendicitis were found in 29 (24.6%) and negative appendectomy in 9 (7.6%) which were comparable to those who did not receive LRE.*

Interestingly, among 84 patients who were referred with the diagnosis of appendicitis, 51 (70.8%) were improved after LRE, avoiding unnecessary appendectomy. Neither immediate complication nor increased risk of perforated appendicitis from LRE were observed.
Conclusion: *Low rectal enema is a safe procedure to distinguish fecal impaction from the other surgical condition in children, especially for those who had palpable fecal mass by abdominal examination. This approach could avoid unnecessary operation without increasing the risk of complication.*

Keywords: *Fecal impaction, Acute abdominal pain, Children, Low rectal enema*

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Acute abdominal pain is a common problem that leads children to the hospital. The etiologies are varied. Some problems, need emergency surgical management whereas some are self-limiting[1-3]. Distinguishing both groups of condition is a clinical challenge, especially in area with limited availability of imaging.

Nowadays, there is a trend towards increasing incidence of constipation in children[4,5]. Abdominal pain is one of the common symptoms of constipation[6-8], with or without fecal impaction (FI). At emergency department, the incidence of constipation in children presents with abdominal pain was reportedly as high as 50%[3]. Also, 19% of patients consulted to pediatric surgeons have constipation as the final diagnosis[9].

These mimicking clinical presentations lead to difficulty in accurate diagnosing acute appendicitis and may lead to unnecessary operations to pediatric patients. Moreover, delayed diagnosis due to these resembling symptoms also creates undesirable harmful consequences when appendicitis progresses to perforation[10].

Although many investigations have been developed in order to increase diagnostic accuracy, clinical determinations still plays a major role in diagnosis of appendicitis. One of the techniques that the authors use is performing low rectal enema (LRE) in

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patient who has evidence of FI. The disimpaction is effective in dramatically relieving abdominal pain[11] and can eventually distinguish constipated patients with fecal impaction from others.

The primary purpose of this report is to determine the benefit and risk of low rectal enema in children with uncertain causes of acute abdominal pain. The secondary purpose is to identify subsets of patients that would be more beneficial with this treatment.

Material and Method

A retrospective cross-sectional study was conducted in children, 2 to 15 years of age, who were admitted to the Division of Pediatric Surgery, Siriraj Hospital due to uncertain causes of acute abdominal pain between January 2001 and October 2008. Patients who had signs of obvious appendicitis or peritonitis (either localized or generalized), appendiceal mass, or previous abdominal surgery were excluded. Demographic data collection included age, sex, and body weight. Previous diagnoses of abdominal pain from referring hospital were noted. Histories and physical examinations regarding fecal impaction, such as decreased frequency of defecation, palpable mass at lower abdomen, fecal impaction during rectal examination, and excessive fecal material in colon on radiographic finding were reviewed and summarized. The management of low rectal enema, including fleet enema, rectal suppository tablets and saline irrigation via rectal tube, were considered as disimpaction procedures. The final diagnosis of self-limited group was determined by clinician at that time. The negative appendectomy rate and ruptured appendicitis rate were determined by pathological reports in appendectomized patients. The length of hospital stay and observation time prior to appendectomy was also analyzed.

The statistical analysis was calculated using PASW Statistics 18 (SPSS Inc). Comparison of categorical data were calculated with Chi-square and that for continuous data with student t-test and Mann-Whitney U test, where appropriate. This retrospective review was approved by the Ethical Committee of the Faculty of Medicine Siriraj Hospital, Mahidol University.

Results

There were 403 pediatric patients (211 girls and 192 boys) included into this study. The average age was 9.1$\pm$3.2 years (range 2 to 15 years). Age of the patient in the observation group was significantly higher than that of the LRE group (Table 1).

The final diagnosis were FI (41.2%), follow by acute appendicitis (34.7%) and other self-limiting conditions (24.1%). When comparing between children who required surgical intervention versus expectant treatment, there was no significant difference (Table 2). The overall ruptured and negative appendectomy rates were 23.6% and 8.8%, respectively. There was no mortality or serious complication among this population.

Fig. 1 shows the algorithm of the managements and outcomes of patients enrolled in the study. Of the 403 patients, 322 (79.9%) received LRE and 81were clinically observed.

Two hundred and fifty-two (78.3%) were documented with one of the indications for LRE as shown in Table 3. The only statistically significant finding that can differentiate those who would be benefit from the those who would not is a palpable hard fecal mass at lower abdomen (p-value = 0.02).

Among 403 children who received LRE, 204 (63.3%) recovered without surgical treatment and were discharged within 1.5$\pm$0.8 days. Those who did not improve (118, 36.6%) underwent appendectomy which resulted in 29 ruptured appendicitis (24.5%) and 9 negative appendectomies (7.6%). The average time of observation before operation was 8.9$\pm$8.6 hours. Total length of hospital stay was 4.0$\pm$1.7 days. There was no

Table 1. Comparison of demographic data categorized by LRE vs. Observation

	LRE (n = 322)	Observation (n = 81)	p-value
Age; year (mean, SD)	8.9 (3.38)	9.8 (2.72)	0.03*
Male; n (%)	170 (52.8%)	43 (53.1%)	0.96
Weight; kg (mean, SD)	32 (14.52)	32.9 (13.34)	0.59
Observation time; hours (mean, SD)	3.3 (6.79)	3.8 (5.70)	0.55
Length of stay; days (mean, SD)	2.4 (1.76)	2.8 (2.11)	0.08
Follow-up; days (mean, SD)	5.1 (4.07)	5.9 (4.80)	0.13
Appendectomy	118 (36.6%)	33 (40.7%)	0.50

Table 2. Patients demographic data and clinical features, categorized by final diagnoses

	Overall (n = 403)	Surgical treatment (n = 140)	Self-limiting condition (n = 263)	*p*-value
Age; year (mean, SD)	9.1 (3.28)	9.1 (3.04)	9.1 (3.4)	0.92
Male (%)	52.9%	57.6%	50.4%	0.17
Weight; kg (mean, SD)	32.15 (14.25)	32.13 (13.40)	32.15 (14.76)	0.99
Observation time; (mean, SD)	3.39 (6.58)	9.1 (8.03)	0.65 (0.00)	<0.001*
Length of stay; days (mean, SD)	2.52 (1.84)	4.13 (1.84)	1.64 (0.95)	<0.001*
LRE**	322 (79.9%)	109 (78.4%)	213 (80.7%)	0.59
Previous diagnosis of appendicitis	84 (20.8%)	24 (17.3%)	60 (22.7%)	0.20

** LRE = Low rectal enema

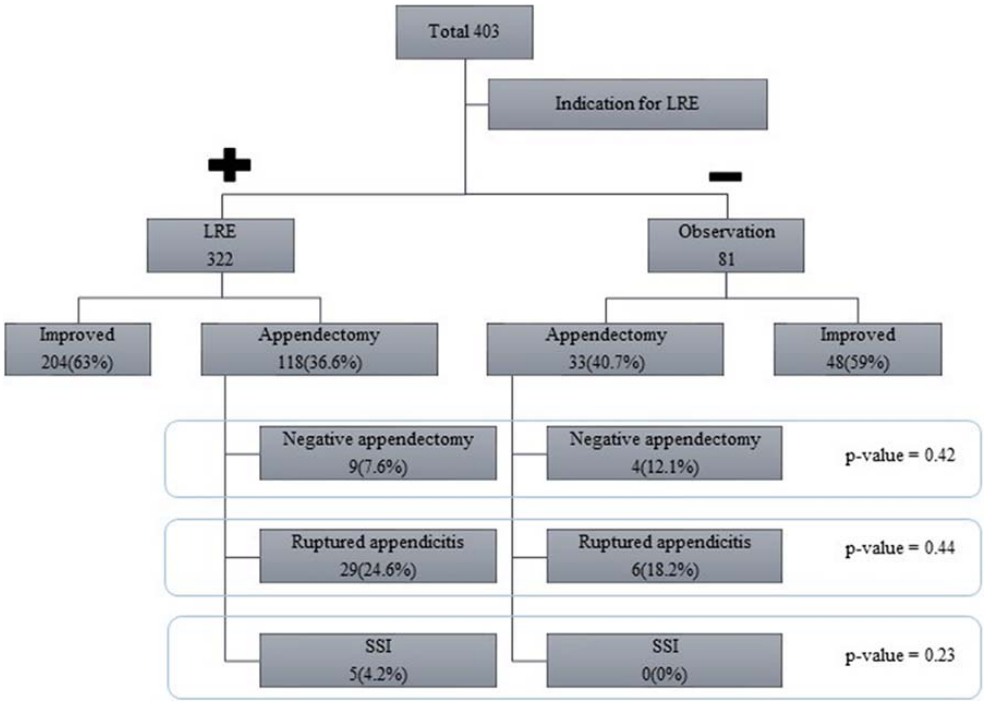

Fig. 1 Summary and overall results of study.

immediate complication from LRE.

The other 81 cases did not have evidence of FI thus were closely monitored without LRE. There were 48 (59%) self-limiting cases of which, more than 60% were finally diagnosed with gastroenteritis. Patients who had persistent abdominal pain underwent appendectomy. The negative appendectomy and ruptured appendicitis rates were 12% and 18%, respectively. The mean observation time was 9.3±5.3 hours. Length of hospital stay was 4.4±2.07 days in these patients.

Additionally, we were interested in 84 patients who were previously diagnosed as appendicitis prior to referral to our hospital. We were able to avoid 51 unnecessary appendectomies (69.9%) due to improvement of abdominal signs following LRE.

Discussion

Acute abdominal pain in children is remaining a common problem in medical practice. In this report, we included only children with uncertain diagnosis of abdominal pain and probably needed surgery on the

Table 3. Comparison of patient's characteristics categorized by response to low rectal enema

	Total (n = 322)	Response to LRE (n = 204)	Non-response to LRE (n = 118)	*p*-value
Age; year (mean, SD)	8.93 (3.38)	8.72 (3.44)	9.28 (3.26)	0.15
Male; n (%)	170 (52.8%)	104 (51.0%)	66 (55.9%)	0.39
Weight; kg (mean, SD)	32.0 (14.52)	31.26 (14.72)	33.15 (14.15)	0.26
Previous diagnosis of appendicitis; n (%)	72 (22.4%)	51 (25.0%)	21 (17.8%)	0.14
Evidence of constipation; n (%)	252 (78.3%)	166 (81.4%)	86 (72.9%)	0.09
Indication for LRE**				
Decreased frequency of individual defecation	110 (34.2%)	73 (35.8%)	37 (31.4%)	0.42
Physical examination revealed hard mass at lower abdomen	14 (4.3%)	13 (6.4%)	1 (0.8%)	0.02*
Rectal examination revealed feces impact in rectum	165 (51.2%)	104 (51.0%)	61 (51.7%)	0.90
Plain abdominal film revealed excessive feces in colon	51 (15.8%)	37 (18.1%)	14 (11.9%)	0.14

** LRE = Low rectal enema

clinical basis. Patients who had obvious local and generalized peritonitis were excluded. So, this population is quite difficult to determine even in the surgeons' hands.

Among 403 patients who were observed for abdominal signs, only one-third really required operation. All but one were diagnosed with appendicitis and underwent appendectomy. In the self-limited group, the most common diagnosis is fecal impaction (40%). The result concurs other reports, which showed only 17 to 60% of admitted patients received appendectomy[1,2,9] and also had high incidence of constipation[1,3,9]. The high incidence of FI confirmed that sometimes constipated patient could have severe abdominal pain which mimicking as other surgical conditions. Constipation and FI are not small problems on which we could overlook anymore. We should always consider FI as a differential diagnosis in children with acute abdominal pain.

The overall incidence of functional constipation tends to increase. Recent studies showed high incidence of constipation associated with either acute or chronic abdominal pain in pediatric population[6,8,12,13]. The constipated children who come with typical criteria fulfilled according to Rome III criteria[5] are easy to diagnosis even though in coexisting abdominal pain children. However, there are some patients who have only few symptoms which not fulfilled the criteria. Most of them have only sign of FI with short period of history on admission. Occult constipation is the term used to describe these patients. There was a report supporting the relation about occult constipation and recurrent abdominal pain[12]. In the present study, the authors included patients with occult constipation in the same group as those with overt constipation because both of them need disimpaction as the initial treatment. We advocated as many articles that rectal examination provide invaluable information of FI in these populations[7,12,14]. Plain radiography of abdomen is a useful alternative to identify fecal impaction in constipated patients[5,7,12,15]. In the present study, the most frequency indication for LRE in this study is finding of fecal mass in rectum. The abdominal radiography played a role only in cases of negative physical finding or refused rectal examination which was presence in 15% of LRE group.

As we known, the consensus recommendation for initial disimpaction could be either oral or rectal route[5,7]. There is limited evidence to support that which one is more efficient route for disimpaction[11,16-19]. Oral laxative, a noninvasive procedure, is not suitable for these patients because of the need for abdominal sign observation and some patients may need further anesthesiological management. LRE is the treatment of choice in this situation because of the fast and effective relief of symptoms. A randomized trial comparing the effectiveness of enema versus oral laxative in constipated child indicates that the enema may be superior to oral PEG in term of immediate relief of

symptoms[11].

In the present study, those who met any criterion of FI would receive LRE (Table 3). According to this strategy, fecal impaction was differentiated from other causes in approximately high as 60% of patients. In most cases, abdominal pain instantly resolved and the patient could be discharged home after a short period of observation. When comparing between responses to LRE group versus non-response to LRE group, feces mass which can be palpated at lower abdomen was significant different sign between these two groups (Table 3). Almost all of children who found abdominal fecal mass response to LRE.

Another parameter that represents the accuracy in diagnosis of appendicitis is negative appendectomy rate. Despite of limited used of imaging such as ultrasonography or CT scan, the overall rate according to pathological report is as low as 8.6% which is still comparable to those acceptable in the literature[2,20]. However, because of selection bias inherent to the retrospective nature, there is no significant difference in negative appendectomy rate between two groups who received and did not received LRE (7% vs. 12%). The patients who underwent negative appendectomy had longer length of hospital stay than those who recovered without operation. Moreover, these patients may be at a higher risk of late postoperative complications such as gut obstruction, which was not reviewed in this study.

More interestingly, the authors were able to avoid unnecessary operation in the patients who were referred from outside hospitals with suspected appendicitis. About 70% of these patients recovered without operation. The overall length of hospital stay was also shorter in this group. From this result, we would encourage to carefully investigate evidence of fecal impaction and perform LRE before decision making for referring these patients.

The ruptured appendicitis rate has been reported as a risk associated with LRE as well as other complications. The ruptured rate of patients who receive LRE is not significantly different (24.5% vs. 18%) and also in an acceptable range according to literature review[2,20,21]. Because constipation is commonly misdiagnosed among complicated appendicitis, all of these children were admitted and closely observed. After LRE, patients whose abdominal pain did not resolve should be carefully evaluated for surgical causes such as acute appendicitis. The close clinical evaluation by medical profession team still plays an important role for this strategy. There was no immediate complication following LRE in our series, which is the same as in other reports[11,16-18].

There were limitations due to retrospective nature of the study with some uncompleted data. In the future, we propose a prospective study with a clear clinical guideline to better manage this group of patients.

Conclusion

Low rectal enema is a safe procedure to distinguish fecal impaction from the other surgical condition in children, especially for those who had palpable fecal mass by abdominal examination. This approach could avoid unnecessary operation without increasing the risk of complication.

What is already known on this topic?

Fecal impaction (FI) in children can present with abdominal pain that mimics or coincides acute appendicitis. This might leads to unnecessary operation. Low rectal enema (LRE) can suddenly relieve abdominal pain and distinguish this condition from appendicitis. However, there is a concern regarding the risk of delayed operation or appendiceal perforation after LRE in children who actually have appendicitis.

What this study adds?

Low rectal enema is a safe procedure to distinguish fecal impaction from the other surgical condition in children, especially for those who had palpable fecal mass by abdominal examination. This approach could avoid unnecessary operation without increasing the risk of complication.

Potential conflicts of interest

None.

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ความคุ้มค่าของการสวนอุจจาระในผู้ป่วยเด็กที่มีภาวะปวดท้องเฉียบพลันที่ไม่ทราบสาเหตุ

ณัฐณิชา สุขสมานพันธ์, นิรมล ตันเต็มทรัพย์, มนวัฒน์ เงินฉ่ำ, มงคล เลาหเพ็ญแสง

ภูมิหลัง: อาการและอาการแสดงของภาวะอุจจาระค้างแข็ง (Fecal impaction) คล้ายคลึงกับภาวะไส้ติ่งอักเสบเฉียบพลัน (acute appendicitis) ในผู้ป่วยเด็กที่มีภาวะปวดท้องเฉียบพลันที่ไม่ทราบสาเหตุแน่นอน การสวนทวารหนัก (Low rectal enema) เป็นการรักษาเบื้องต้นที่สามารถลดอาการปวดท้องที่เกิดจาก Fecal impaction ได้ทันที และทำให้แพทย์สามารถวินิจฉัยแยกโรคออกจากภาวะไส้ติ่งอักเสบเฉียบพลันได้ อย่างไรก็ตามการสวนทางทวารหนักอาจมีผลทำให้เกิดไส้ติ่งแตก (ruptured appendicitis) ซึ่งเป็นผลจากการวินิจฉัยล่าช้าได้ จุดประสงค์หลักของการวิจัยนี้เพื่อวัดผลประโยชน์และโทษที่ได้รับจากการสวนทวารหนักในผู้ป่วยเด็กที่มีอาการปวดท้องเฉียบพลันโดยไม่ทราบสาเหตุที่แน่นอน

วัสดุและวิธีการ: ทบทวนเวชระเบียนของผู้ป่วยเด็กที่นอนโรงพยาบาลด้วยอาการปวดท้องเฉียบพลันที่ไม่ทราบสาเหตุแน่ชัด ที่ สาขาวิชากุมารศัลยศาสตร์ คณะแพทยศาสตร์ศิริราชพยาบาล ตั้งแต่ เดือนมกราคม พ.ศ. 2544 ถึง เดือนตุลาคม พ.ศ. 2551 ผู้ป่วยที่มีภาวะเยื่อบุช่องท้องอักเสบหรือเคยได้รับการผ่าตัดมาก่อนจะไม่นำมาเก็บข้อมูลในการศึกษานี้ ข้อมูลต่าง ๆ จะถูกบันทึกในแง่ ข้อมูลทั่วไปของประชากร ประวัติสงสัยอุจจาระค้างแข็ง การสวนอุจจาระ การผ่าตัดไส้ติ่งอักเสบ และระยะเวลานอนโรงพยาบาล

ผลการศึกษา: มีผู้ป่วยเด็ก 403 คน ได้รับการวินิจฉัยขั้นสุดท้ายว่าเป็นอุจจาระค้างแข็ง 43%, ไส้ติ่งอักเสบ 37.3% ผู้ป่วยจำนวน 322 คน ได้รับการสวนอุจจาระ อัตราไส้ติ่งแตกเท่ากับ 24.5% และตัดไส้ติ่งโดยไม่มีการอักเสบ (negative appendectomy) 7.6% ซึ่งไม่แตกต่างกับกลุ่มที่ไม่ได้รับการสวนอุจจาระ ไม่พบภาวะแทรกซ้อนที่เกิดจากการสวนอุจจาระ

สรุป: การสวนอุจจาระเป็นหัตถการที่มีความปลอดภัยและมีประโยชน์ในการแยกผู้ป่วยที่มีอุจจาระค้างแข็งออกจากผู้ป่วยเป็นไส้ติ่งอักเสบ ทำให้สามารถหลีกเลี่ยงการผ่าตัดที่ไม่จำเป็นในผู้ป่วยเด็กที่มีอาการปวดท้องเฉียบพลันที่ไม่ทราบสาเหตุได้ โดยที่ไม่เพิ่มอัตราของภาวะแทรกซ้อนต่อผู้ป่วยเด็ก