Non-infectious Causes of Recurrent Flank Pain in Older Children

Kamal F. Akl[1]

Abstract

Objective: To find out the etiology of non-infectious recurrent flank pain in older children.

Methods: The medical records of 84 consecutive children older than 5 years of age with non-infectious flank pain were retrospectively reviewed. Data checked included history, physical examination, laboratory investigations (serum creatinine, uric acid, and calcium), 24 hour urine collection for creatinine, calcium, oxalate, and uric acid, in addition to imaging studies. Those with systemic disease and urinary tract infection(UTI) were excluded.

Results: The most common causes of recurrent non-infectious flank pain in older children were crystalluria (59.5%) and urolithiasis (17.8%). Amongst the crystalluria, hyperoxaluria was the most frequent. Other etiologies included constipation (6.0%), sterile vesicoureteral reflux (6.0%), and pelviureteric junction obstruction(4.7%).Family history was positive for stones in 45% of urolithiasis cases.Renal ultrasonography was adequate for diagnosing all kidney stonesand unenhanced helical computed axial tomography(UHCT)diagnosed ureteral stones with typical renal colic pain radiating to the groin. Constipation was found to be an important, yet overlooked cause of extraurinary flank pain.

Conclusion: The most important non-infectious causes of recurrent flank pain in older children were crystalluria, urolithiasis, constipation, pelviureteric junction obstruction, and sterile vesicoureteral reflux. A positive family history of stones played a key role in initiating workup for crystalluria and urolithiasis. Focused histories and physical examinations were important in those cases with constipation as a cause of reversible flank pain.

Keywords: Hyperoxaluria, children, crystalluria, urolithiasis, constipation.

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Introduction

Whenever a child presents to the primary care physician with flank pain, a presumptive diagnosis of urinary tract infection (UTI) is frequently entertained inspite of the fact that it might be erroneous. The diagnosis of UTI should be based on a urine culture and not only urinalysis, since crystalluria and nephro-urolithiasis may also present with non-infectious flank pain, dysuria,[1-6] and sterile pyuria. In addition to crystals and stones, there were isolated reports of constipation as a cause

1. **Jordan University Hospital, Faculty of Medicine, The University of Jordan.**

**** Correspondence should be addressed to:***
Kamal F Akl, MD.
P.O. Box 831373, Amman 11183, Jordan
E-mail: kamalakl@ju.edu.jo

of flank pain and lower urinary tract symptoms such as dysfunctional voiding and enuresis.[7-11]

The aim of this study was to review thenon-infectious causes of childhood flank pain. Upon conducting a literature search, we could not find a similar study that encompasses the various causes in one report.

Patients and Methods

We retrospectively evaluated children with the presenting complaint of flank pain, seen by the pediatric nephrology service at a tertiary care center.

The following was considered:

- The flank was defined as the side of the body between the pelvis and the ribs.[12]
- Recurrent: More than three episodes in two months.
- Lower urinary tract symptoms (LUTS): Various combinations of urgency, nocturia, increased frequency, post-micturition dribble, hesitancy, and dysuria.[13]
- Hypercalciuria (HC): Spot calcium to creatinine ratio of >0.2 or > 4mg/kg/24 hours.
- Hyperuricosuria (HU): Urinary excretion of uric acid in timed urine 24 hr > 815 mg/1.73 m^2/day.
- Hyperoxaluria (HX): > 45mg/1.73m^2 /day.[14]
- Constipation: Diagnosed according to the current version of the "Rome criteria".[15]
- Patients with UTI, and systemic disease (such as cystic fibrosis, and familial Mediterranean fever) were excluded.

Reviews included medical histories, physical examinations, and laboratory tests. The following investigations were done as a routine in the nephrology clinic for a child presenting with flank pain: urinalysis, urine culture, 24 hour urine collection for creatinine, calcium, uric acid, and oxalate; serum creatinine, uric acid, and calcium. Imaging included a renal ultrasound, unenhanced helical computerized axial tomography (UHCT), micturating cystourethrogram, and nuclear imaging were done for selected cases, as guided by the history.

Institutional Review Board (IRB) approval was obtained.

Results: Eighty fourchildren had flank pain. There were 36(42.7%) males and 48(57.2%) females. The mean age was 10 years, with a range from five to seventeen years. Duration of followup ranged from 4 months to 5 years.

The etiology of non-infectious flank pain included: crystalluria (50/84, 59.2%) divided into hyperoxaluria (41/84, 48.8%), hyperuricosuria (7/84, 8.3%), and hypercalciuria (2/84, 2.4%); nephrolithiasis (15/84, 17.8%); constipation (5/84, 6.0%); sterile vesicoureteral reflux(5/84, 6.0%); pelviureteric junction obstruction (4/84,4.7%); unknown(3/84, 3.6%); autosomal dominant polycystic kidney disease(1/84, 1.2%); and relation to menstruation(1/84, 1.2%).

Seven out of fifteen patients with calculi had associated hyperoxaluria, 3/15 had hyperuricosuria, and 2/15 had hypercalciuria.

LUTS such as dysuria and increased urinary frequency were present in 14/39 patients with HX.

Family history of stones was present in 23/39 patients with HX, 5/9 patients with HU, and

5/11 patients with stones. Family history of stones was not present in the other etiologies.

Flank pain secondary to crystalluria subsided after the initiation of potassium citrate therapy (2-4 mEq/kg/day) and liberal water intake. Nephrocalcinosis was detected in 6/8 patients with primary hyperoxaluria (oxalate excretion > 90 mg/1.73m^2/day).

Hematuria was detected in 8/15(53.3%) of patients with calculi.

Twelve calculi were located in the kidneys, and three were found in the ureters. In two cases, ureteral calculi were associated with renal colic, with a radiation of the pain to the groin.

Diagnostic Imaging: US was done for all patients, and UHCT was done for 28 patients including 10/15 patients with calculi. Kidney stones, detected by US, were confirmed by UHCT. However, US failed in diagnosing ureteral calculi, which were subsequently detected by UHCT in all three cases.

Flank pain, associated with increased urinary frequency and enuresis secondary to constipation resolved after treatment with lactulose.

A history of flank pain upon voiding was obtained in 3/5patientswith sterile vesicoureteral reflux (VUR).

In patients with PUJO, flank pain occurred after drinking fluids.

In one female, flank pain recurred once a month coinciding with the onset of menstruation.
Cases that had workup but did not reveal a diagnoses were labeled as unknown.

Discussion

The purpose of this study was to find out the causes of non-infectiouscases of recurrent flank painin older children.

The etiology of flank pain may reside in the urinary tract, or be extraurinary.[16]

In stone belt areas such as the Middle East, stones and crystals should be high on the list of non-infectious causes of flank pain.

Family history was positive for stones in 45% of our urolithiasis patients compared to 23%-37% in the literature.[17,18] Flank/abdominal pain, and LUTS, such as dysuria and increased urinary frequency, were described in association with crystalluria in children.[1-3,5,19]

Unlike adults, the manifestations of renal stones in children are different. The majority of children younger than eight complain of abdominal rather than flank pain. In older children, 85% presented with flank pain.[18]

In our study, the most common causes were crystalluria (59.5%) especially HX and calculi (17.8%). Other causes included constipation (6.00 %), sterile VUR (6.00%), PUJO (4.2%), unknown (3.6%), ADPCKD (1.2%), and menses related (1.2%).
In our patients with calculi, HX was present in 58%, which is higher than previous reports of 14.3% [20] and 43%.[21]

In the evaluation of flank pain in children, Eshed et al found out that an initial US was adequate in the majority of cases,[22] which was supported by our study. One disadvantage of

ultrasound is that it does not show ureteral calculi. Besides exposure to high radiation dose, an UHCT added little to the diagnosis in our cases that did not have typical renal colic.

In adults, the situation is different, and UHCT is the initial imaging of choice for acute flank pain.[23]

Constipation is a commonlyoverlooked cause of abdominal/ flank pain and voiding problem in children.[11,24] The associated voiding dysfunction resolves with the successful treatment of constipation.[7-10,24] In our patients, the presence of flank pain correlated with fecal impaction and resolved with laxatives.

Pelviureteric junction obstruction may cause intermittent abdominal/flank pain.[25,26] In a prospective study, Tsai et al found out that the flank pain secondary to PUJO occurred after increased water intake, bladder distention, or vigorous exercise.[26] The pain was due to stretching of the renal pelvis and capsule. In our patients, it was mainly related to fluid intake.

Flank pain may be multifactorial. Besides constipation and reversible urinary tract symptomatology,[27] urinary tractobstruction may coexist with non-infectious stones and metabolic abnormalities such as crystallurias.[28]

A plan of workup for flank pain in children is shown in box I.

Box I. Plan of workup for pediatric flank pain

History (focusing on constipation, family history of stones,and dietary habits including water intake).
Physical examination (flank tenderness, palpable abdominal stool masses, and rectal digital examination).
Urine analysis and culture.
If urine culture is negative, check for crystalluria by spot urine sample or 24 hour urine collection.
Renal ultrasound if pain localized to the flanks.
Unenhanced spiral computed axial tomography if pain radiates to the groin.

Conclusions: The most important non-infectious causes of recurrent flank pain in older childrenwere crystalluria, urolithiasis, constipation, sterile vesicoureteral reflux, and PUJO. A positive family history of stones played a key role in initiating a workup for crystalluria and urolithiasis.A focused history and physical examination diagnosed cases of constipation.

References

1. La Manna A, Polito C, Marte A, Iovene A, Di Toro R. Hyperuricosuria in children: clinical presentation and natural history. Pediatrics 2001 Jan;107(1):86-90.
2. Alon U, Warady BA, Hellerstein S. Hypercalciuria in the frequency-dysuria syndrome of childhood. J Pediatr 1990 Jan;116(1):103-5.
3. Akl K, Ghawanmeh R. The clinical spectrum of idiopathic hyperuricosuria in children: isolated and associated with hypercalciuria/ hyperoxaluria. Saudi J Kidney Dis Transpl 2012 Sep;23(5):979-84.
4. Polito C, La Manna A, Cioce F, Villani J, Nappi B, Di Toto R. Clinical presentation and natural course of idiopathic hypercalciuria in children. Pediatr Nephrol 2000 Dec;15(3-4):211-4.
5. Vachvanichsanong P, Malagon M, Moore ES. Recurrent abdominal and flank pain in children

with idiopathic hypercalciuria. Acta Paediatr 2001 Jun; 90(6):643- 8.

6. Alpay H, Ozen A, Gokee I, Biykli N. Clinical and metabolic features of urolithiasis and microlithiasis in children. Pediatr Nephrol. 2009 Nov;24(11):2203-9.
7. Chase JW, Homsy Y, Siggaard C, Sit F, Bower WF. Functionalconstipation in children. J Urol. 2004 Jun;171(6 Pt 2):2641-3.
8. Dohil R, Roberts E, Jones KV, Jenkins HR. Constipation and reversible urinary tract abnormalities. Arch Dis Child. 1994 Jan;70 (1):56-7.
9. O'Regan S, Schick E, Hamburger B, Yazbeck S. Constipation associated with vesicoureteral reflux. Urology. 1986 Nov;28(5):394-6.
10. Anagnostopoulos D, Mavromilhalis J, Markantonatos A, Lappas E. Constipation: a cause of enuresis. Pediatr Surg Int 1989;4:171-174.
11. Loening-Baucke V, Swidsinski A. Constipation as a cause of acute abdominal pain in children. J Pediatr 2007 Dec;151(6):666-9.
12. Stedmans Medical Dictionary, 24th ed. Baltimore, MD, Williams and Wilkins, 1982, p 764.
13. Neveus T, von Gontard A, Hoebeke P, Hjalmas K, Bauer S, Bower W, et al. The Standardization of terminology of lower urinary tract function in children and adolescents: Report from the standardisation committee of the International Children's Continence Society. J Urol 2006 July;176(1):314-24.
14. Hoppe B. An update on primary hyperoxaluria. Nat Rev Nephrol. 2012 Jun 12;8(8):467-75.
15. Rasquin A, Di LorenzoC, Forbes D, Guiraldes, Hyams JS, Staiano A, et al.Childhood functional gastrointestinal disorders. Gastroenterology. 2006 Apr;130 (5):1527-37.
16. Koroglu M, Wendel JD, Ernst RD, Oto A. Alternative diagnoses to stone disease on unenhanced CT to investigate acute flank pain. Emergency Radiol 2004 Jul;10(6):327-33.
17. Polito C, La Manna A, Signoriello G, Marte A. Recurrent abdominal pain in childhood urolithiasis. Pediatrics 2009 Dec;124(6):e 1088-94.
18. Polito C, Cioce F, Signoriello G, La Manna. Central/diffuse abdominal perception of urological pain in children. Acta Paediatr 2006 Jan;95(1):82-5.
19. Fivush B. Irritability and dysuria in infants with idiopathic hypercalciuria. Pediatr Nephrol 1990 May;4(3):262-3.
20. Aggour A, Ziada AM, Abdel-Hamid AZ, Abdel Rahman S, Morsi A.Metabolic stone composition in Egyptian children. J Pediatr Urol 2009 Apr;5(2): 132-5.
21. Rizvi SAH, Sultan S, Zafar MN, Ahmed B, Faiq SM, Hussain KZ, et al. Evaluation of children with urolithiasis. Indian J Urol 2007 Oct;23(4):420-7.
22. Eshed I, Witzling M. The role of unenhanced helical CT in the evaluation of suspected renal colic and atypical abdominal pain in children. Pediatr Radiol 2002 Mar;32(3):205-8.
23. Heidenreich A, Desgrandschamps F, Terrier F. Modern approach of diagnosis and management of acute flank pain: review of all imaging modalities. Eur Urol 2002 Apr;41(4):351-62.
24. Feng WC, Churchill BM. Dysfunctional elimination syndrome in children without obvious spinal cord diseases. Pediatr Clin North Am 2001 Dec; 48(6):1489-504.
25. Belman AB. Ureteropelvic junction obstruction as a cause for intermittent abdominal pain in children. Pediatrics. 1991 Nov;88(5):1066-9.
26. Tsai JD, Huang FY, Lin CC, Tsai TC, Lee HC, Sheu JC, et al. Intermittent hydronephrosis secondary to ureteropelvic junction obstruction: clinical and imaging features. Pediatrics. 2006 Jan;117(1):139-46.
27. McKay CP. Renal stone disease. Pediatr Rev 2010;31(5):179-88.
28. Husmann DA, Milliner DS, Segura JW. Ureteropelvic junction obstruction with concurrent renal pelvic calculi in the pediatric patient: a long-term followup. J Urol 1996;156:741-3.

أسباب ألم الخاصرة المتكرر عند الأطفال الكبار

كمال عقل [1]

1- مستشفى الجامعة الأردنية، كلية الطب، عمان، الأردن؛

الملخص

الهدف: معرفه اسباب ألم الخاصره المتكرر، عدا انتانات المسالك البوليه، عند الاطفال الكبار.

الطريقه: تمت مراجعه 84 سجلا متتابعا للاطفال فوق سن الخامسه الذين كانوا يعانون من ألم متكرر بالخاصره. شملت الدراسه السيره المرضيه، أعراض الجهاز البولي السفلي، تاريخ العائله، والتحاليل المخبريه (الكلس، الكرياتينين، وحامض البوليك بالدم)، وبول 24 ساعه للكرياتينين، الكلس، حامض اليوريك، والاكسالات. كذلك صور الالتراسوند، الطبقيه اللولبيه، وغيرها. تم استبعاد الاطفال الذين يعانون من امراض جهازيه.

النتائج: كان تاريخ العائله إيجابياً للحصى في 45% من الاطفال الذين وجدت لديهم حصى. اهم اسباب ألم الخاصره المتكرر عند الاطفال الكبار، ما عدا انتان المسالك البوليه، كانت نسبة الرمل البولي 59.5%، والحصى 17.8%. ومن ضمن الرمل البولي كان فرط إفراز الاكسالات السائد. ومن الاسباب الأخرى: الإمساك 6.0%، الجذر المثاني الحالبي 6.0%، وانسداد حوض الكليه 4.7%. كان الفحص بالالتراسوند كافياً لتشخيص الحصيات الكلويه وليست تلك الموجوده في الحوالب (التي تم تشخيصها بالتصوير المقطعي اللولبي).

الاستنتاجات: اهم اسباب ألم الخاصره المتكرر (ما عدا الانتان) عند الاطفال هو كان الرمل البولي، وحصيات المسالك البوليه، والإمساك، وانسداد حوض الكليه، والجذر المثاني الحالبي.

الكلمات الدالة: انتانات المسالك البولية، اطفال، حصى المسالك البولية الإمساك.