

UCSF

UC San Francisco Previously Published Works

Title

MP82-18 EMERGENCY DEPARTMENT IMAGING MODALITY AFFECT ON SURGICAL MANAGEMENT OF NEPHROLITHIASIS

Permalink

<https://escholarship.org/uc/item/3dh8k9f5>

Journal

Investigative Urology, 195(4)

ISSN

0021-0005

Authors

Metzler, Ian
Mogadassi, Michelle
Stoller, Marshall
et al.

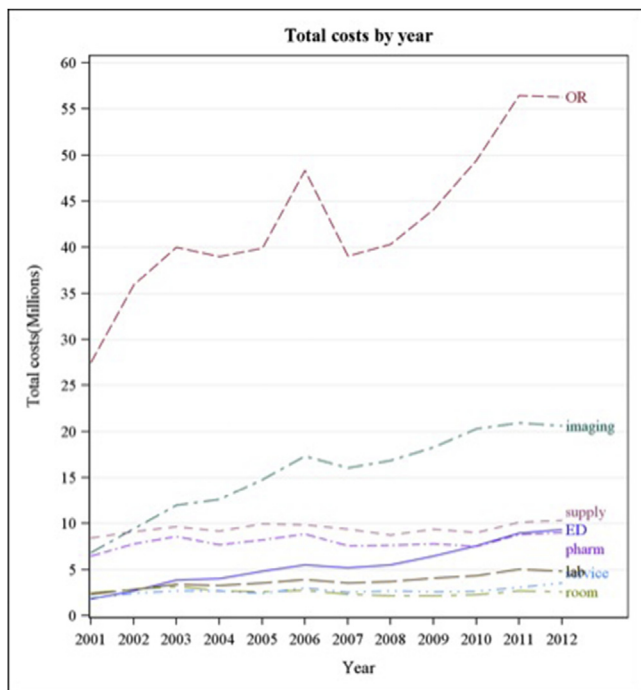
Publication Date

2016-04-01

DOI

10.1016/j.juro.2016.02.2159

Peer reviewed



Source of Funding: Dr. Tasian was supported by K23-DK106428 and Dr. Furth was supported by K24DK78737 from the National Institutes of Health (NIH)/National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). The NIH and NIDDK had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; and preparation, review, or approval of the manuscript. The views expressed in this article are those of the authors and do not necessarily represent the official view of the NIDDK or NIH.

MP82-16
CT FOR EVALUATION OF UROLITHIASIS: IMAGE QUALITY OF ULTRALOW-DOSE (SUB MSV) CT WITH KNOWLEDGE-BASED ITERATIVE RECONSTRUCTION AND DIAGNOSTIC PERFORMANCE OF LOW-DOSE CT WITH STATISTICAL ITERATIVE RECONSTRUCTION

Jin wook Kim, Young Tae Moon, Kyung Do Kim, Tae-Hyoung Kim, Soon Chul Myung, Seung Hyun Ahn, Jae Duck Choi, Jung Hoon Kim, Min Soo Kim, Shin Young Lee, Byung Hoon Chi, In Ho Chang, Seoul, Korea, Republic of*

INTRODUCTION AND OBJECTIVES: To compare radiation dose and image quality in regular, low, and ultralow-dose CT protocols, and to evaluate diagnostic performance of low-dose CT for urolithiasis.

METHODS: Sixty-five patients with suspected urolithiasis underwent three different scans under the regular, low, and ultralow-dose protocols. The regular dose scans were reconstructed using filtered back projection and the low-dose scans were reconstructed using a statistical iterative reconstruction. The ultralow-dose scans were reconstructed using both techniques in addition to a knowledge-based IR. Effective radiation doses were compared. Objective image noise was assessed by measuring standard deviation of HU and subjective image assessment was performed with a 3- or 5-point scale. Diagnostic performance of the low-dose image was evaluated, using the regular dose image as a standard reference and the interobserver agreement between two reviewers with different levels of experience was calculated.

RESULTS: The effective radiation dose was significantly different in each protocol ($p < 0.001$) and estimated dose reduction of the low-dose and ultralow-dose protocols was 76.4% and 89.8%, respectively. The knowledge-based iterative reconstruction algorithm showed poorer subjective image quality than the regular and lowdose

protocols, but it also had the least objective image noise. Overall, the low-dose image set showed a greater than 84% concordance rate and 100% in ureter stones larger than 3 mm. Interobserver agreement was substantial (κ value = 0.61).

CONCLUSIONS: The knowledge-based IR can provide a better quality image while reducing radiation exposure under the same protocol. Furthermore, the diagnostic performance of the low-dose CT protocol is comparable to the regular dose scan.

Source of Funding: none

MP82-17
CAN ULTRASONOGRAPHY BE USED TO GUIDE THE DIAGNOSIS AND MANAGEMENT OF NEPHROLITHIASIS?

Troy Larson, Burlington, VT; Natalia Hernandez, Brian Eisner, Boston, MA; Juliet Han, Vernon M Pais Jr., Lebanon, NH; Kevan M. Sternberg, Burlington, VT*

INTRODUCTION AND OBJECTIVES: Non-Contrast Computed Tomography (NCCT) has the highest sensitivity and specificity for detection of nephrolithiasis and the greatest accuracy for determination of stone size. Renal ultrasound (US) may have advantages over NCCT insofar as it is lower cost with no ionizing radiation. However, the ability to make judgements about endourologic intervention for stones based on US has not been proven. Herein we compare findings on NCCT and US which were obtained within 60 days of one another in order to evaluate the concordance between the two studies.

METHODS: A retrospective review was conducted at three academic institutions of patients who were evaluated for flank pain with both renal US and NCCT from 2011-2015. Patients receiving both imaging modalities within 60 days were included. Imaging was obtained through both the ED and outpatient settings. Stone presence and size were reviewed and compared between imaging modalities. Stone size was determined by largest measured diameter. Stones were then grouped into 3 size categories (1-5mm, 6-10mm, and >10mm) based on NCCT and compared with US. Statistical analysis was performed using 2-sided t-tests and chi-squared tests.

RESULTS: 156 patients received an US and NCCT within a 60 day period (avg=6.7 days). Stones were detected in 144 patients. US identified stones in 108 (75%) of the patients while NCCT identified stones in 142 (99%). Size measurements were available for comparison in 103 cases. When comparing the average largest stone diameter for US (9.4mm) vs. NCCT (6.6mm), US overestimated stone size by 2.8mm ($p < 0.001$). Depicted in the table below are the results from the categorical size comparison between imaging modalities:

CONCLUSIONS: Renal US imaging was less sensitive and significantly overestimated stone size when compared to NCCT. This was most pronounced in the evaluation of small (1-5mm) and intermediate (6-10mm) sized stones. While US is safe for evaluating suspected renal colic, it may not always provide sufficient information to guide urologic management.

NCCT Measured Stone Diameter (mm)	Average Diameter on NCCT (mm)	Average Diameter on US (mm)	Frequency US overestimate	Average US size overestimate (mm)
1-5mm- n=50	3.68	7.28	90% (45/50)	4.04 (110%)
5-10mm- n=33	6.96	10.02	78.8% (26/33)	4.20 (60.3%)
>10mm- n=20	13.37	13.70	55% (11/20)	2.58 (19.3%)

Source of Funding: none

MP82-18
EMERGENCY DEPARTMENT IMAGING MODALITY AFFECT ON SURGICAL MANAGEMENT OF NEPHROLITHIASIS

Ian Metzler, Michelle Mogadassi, Marshall Stoller, Rebecca Smith-Bindman, Tom Chi, San Francisco, CA*

INTRODUCTION AND OBJECTIVES: Computed tomography (CT) remains the gold standard diagnostic imaging study for patients

with suspected nephrolithiasis. But with growing concerns over the long-term health consequences of cumulative ionizing radiation exposure and additional cost, a trend toward minimizing radiation-based imaging has grown. In the emergency department (ED), ultrasonography (US) is emerging as an alternative for diagnosing patients with nephrolithiasis. Using US as the initial imaging study has not shown any detriment to patient outcomes, however, it remains unclear how this shift alters urologic referral or treatment patterns. In this multi-center randomized clinical trial, we examined rates of urologic referral and intervention to elucidate if initial diagnostic imaging modality affected the type or timing of the urology intervention for nephrolithiasis.

METHODS: Patients ages 18-76 years who presented to the ED with renal colic across 15 diverse treatment centers were randomized to receive either a renal-bladder US by an ED physician, a radiologist or an abdominal CT. We analyzed the 180 day follow up for patients diagnosed with a kidney stone to assess subsequent urologic work up, procedure types and the duration of time to intervention.

RESULTS: Of 1666 patients diagnosed with nephrolithiasis in the ED, 241 (14.5%) had a consultation with urology at initial presentation and 192 (12%) had at least one urologic procedure in the follow up period. Forty-nine (26%) patients had an intervention at presentation, 30 (16%) patients had a procedure after representation to the ED, and 114 (59%) patients had elective outpatient procedures.

The median number of days to outpatient procedure, the rate of emergent procedures or type of procedures performed did not vary significantly between imaging groups. Median time to outpatient procedure did not differ significantly. Most patients (82%) had a CT scan performed at some point prior to intervention. Patients with US performed by an ED physician were 2.6 times more likely to receive a CT prior to intervention than those with US performed by a radiologist.

CONCLUSIONS: The vast majority of patients presenting with a symptomatic urinary stone to the ED do not receive consultation with a urologist, but the most that see a urologist undergo intervention. Patients receiving urologic intervention who had US as their initial imaging do not experience significant delay to intervention or difference in procedure type, but the majority ultimately receive a CT scan prior to surgery. Formal US by a radiologist may encourage fewer CT scans preoperatively.

Source of Funding: Agency for Healthcare Research and Quality

MP82-19 CESSATION OF URETERAL COLIC DOES NOT NECESSARILY MEAN THAT A URETERAL STONE HAS BEEN EXPELLED

Natalia Hernandez, Boston, MA; Yan Song, Shenyang, China, People's Republic of; Brian Eisner, Boston, MA*

INTRODUCTION AND OBJECTIVES: Follow-up imaging is recommended as follow up for patients who present to the emergency department with ureteral stones and colic, but it often omitted if patients report cessation of pain. The purpose of this study was to evaluate how often a patient's ureteral colic will cease despite still having a stone obstructing the ureter.

METHODS: Thirty-six patients evaluated in an emergency department for ureteral colic and diagnosed with an obstructing ureteral stone who subsequently had follow-up in the urology clinic were retrospectively evaluated. Patients who described the cessation of pain 72 hours prior to their office visit and who had follow up imaging were included in the study.

RESULTS: Thirty-six (36) patients were included in the study. Mean patient age was 44.7 years (SD 15.7), gender distribution was 19.4% female:80.6% male, and mean time between visits was 40.1

days (SD 41.6). All patients (100%) reported having no pain for at least 72 hours prior to follow-up appointment, while 31% still demonstrated an obstructing ureteral stone on follow up imaging. Mean stone axial and coronal diameter was not different for patients who had passed their stones versus those who had not (axial diameter = 3.5 mm versus 3.8 mm respectively, coronal diameter = 4.1 mm versus 4.6 mm, $p = NS$ for both).

CONCLUSIONS: In this small pilot study, nearly 1/3 of patients with ureteral stones whose pain completely ceased still had obstructing stones lodged in the ureter. We feel that cessation of pain alone does not demonstrate proof of stone passage and recommend some form of follow-up imaging for these patients unless they observe stone passage per urethra.

Source of Funding: none

MP82-20 PROSPECTIVE MID-TERM EVALUATION OF THE IMPACT OF SILENT URETERAL STONE TREATMENT ON RENAL FUNCTION USING 99mTc-DMSA

Giovanni Marchini, Fábio Vicentini, Fábio Torricelli, Alexandre Danilovic, Artur Brito, Cesar Camara, Eduardo Mazzucchi, Miguel Srougi, Sao Paulo, Brazil*

INTRODUCTION AND OBJECTIVES: Ureteral stones may be asymptomatic in 0.3-5.3% of patients. The purpose of our study was to evaluate the impact of silent ureteral stone on renal function before and after treatment, searching for predictive factor of better outcomes.

METHODS: A ureteral stone was defined as silent if the patient had no subjective/objective symptoms related to the calculus. Patients with a silent ureteral stone were prospectively enrolled in the study. Patients were evaluated with 99mTc-DMSA scintigraphy, serum creatinine (Cr), Cr clearance (CrCl) and ultrasound (USG) pre and post-operatively on months three and 12. Patients treated outside our institution or with incomplete perioperative evaluation were excluded. ANOVA, Chi-square/Fisher test, and regression analysis were used. Significance was set at $p < 0.05$.

RESULTS: Between Jan/06-Jan/14, 26 patients with silent ureteral stones met our inclusion criteria, comprising 2.1% of all ureteral stones treated at our institution. Half of patients were female, mean age was 59.3 ± 11.3 years-old. Stone diagnosis was related to a urological cause in 14 (53.8%) cases. Mean stone diameter and density were 11.8 ± 2.8 mm and 1201 ± 272 HU, respectively. Only two patients had no hydronephrosis at initial USG evaluation and mean renal parenchyma thickness was 10.7 ± 4.1 mm. Mean preoperative Cr, CrCl and 99mTc-DMSA were 1.24 ± 0.87 mg/dL, 72.5 ± 25.2 mL/min and $33.4 \pm 16.7\%$, respectively. Twenty (77%) patients had 99mTc-DMSA $< 45\%$ at initial examination. Multiple regression revealed age ($p = 0.041$) and renal parenchyma thickness ($p = 0.001$) to predict initial 99mTc-DMSA. When compared to preoperative values, Cr ($p = 0.89$), CrCl ($p = 0.48$) and 99mTc-DMSA ($p = 0.19$) remained unaltered three and 12 months postoperatively. Hydronephrosis improved from before to three months after treatment ($p < 0.01$), but remained unchanged from three to 12 months ($p = 0.06$). No preoperative variable was able to predict a $> 5\%$ variation on 99mTc-DMSA from pre to postoperative periods, though stone size ($p = 0.12$) and time to treatment ($p = 0.15$) had a marginal influence.

CONCLUSIONS: Silent ureteral stones are associated with decreased renal function and hydronephrosis already at diagnosis. Age, renal parenchyma thickness and degree of hydronephrosis predict initial 99mTc-DMSA. Hydronephrosis tends to diminish after stone removal, while renal function remains stable. No preoperative factor significantly predicted renal function progression twelve months postoperatively.

Source of Funding: None