

Results: The variability in the costs associated with the use of the currently available smaller than 9F ureteroscopes was significant. The initial instrument purchase price, durability, repair costs, and associated warranties all contributed to large discrepancies in the cost of performing ureteroscopy. In this model, during the first year of ownership, the projected cost of performing 100 ureteroscopic cases varied by a difference of 95% depending on the ureteroscope used.

Conclusions. Physicians and institutions that perform ureteroscopy should strongly consider the purchase price, durability, repair cost, and associated warranties before the purchase of small flexible ureteroscopes.

Editorial Comment

The most impressive advances in the surgical treatment of urolithiasis over the past decade have been in ureteroscopy. The holmium:YAG laser is a significantly superior flexible lithotrite, and ancillary instruments such as tip less nitinol baskets and improved ureteral access sheaths have contributed greatly as well. Certainly, however, the most prominent improvements have been with regards to the size and capabilities of flexible ureteroscopes. The 7 to 8F flexible ureteroscopes, with working channels in excess of 3F, allow routine access to all portions of the upper urinary tract. As pointed out in this article, these instruments come at a considerable price. Although the initial purchase price of these ureteroscopes are similar, ranging from \$11,995 to \$15,000 (USD), there is greater variability in the cost of major repairs, the degree of damage covered by the warranties, and – most importantly – the durability of the scopes. With the exception of the ACMI DUR-8 (the new Storz ureteroscope was not included in this analysis), the other four ureteroscopes have been shown in a previous study to last only 9.4 to 14.5 cases before repair is required. These figures were drawn from a head-to-head comparison of these ureteroscopes published previously, while the durability of the ACMI DUR-8 (25 cases before repair) was obtained from a meeting abstract that examined only that instrument. As such, the markedly improved figure for the DUR-8 could be due in part to other factors, but the concept that durability (as well as repair cost and warranty coverage) makes a large difference in the overall cost of using a small-caliber ureteroscope is valid. The authors give us the very interesting figure “on the basis of consistent data provided by all four manufacturers” that 70% of ureteroscopes sent in for repair have been damaged by user error - usually holmium:YAG laser damage to the working channel. The take-home message is: if you want to minimize the cost of flexible ureteroscopy, then determine the repair cost and warranty coverage of a ureteroscope, consider its reported durability, and be careful with the lithotrite.

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IMAGING

Clinical characteristics of ureteral calculi detected by nonenhanced computerized tomography after unclear results of plain radiography and ultrasonography

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J Urol. 2003; 170: 799-802

Purpose: Prospective nonenhanced computerized tomography (CT) was performed for patients presenting with renal colic and showing negative or equivocal results on plain x-ray of the kidneys, ureters and bladder (KUB) as well as ultrasonography (US) to evaluate the usefulness of plain CT. We also evaluated the clinical characteristics of urinary calculi detected under such conditions.

Materials and Methods: Between January 2000 and June 2002, 560 patients presented with acute unilateral renal colic. Of these patients 238 negative or equivocal for ureteral calculus on KUB and US underwent nonenhanced CT. The diagnostic value of plain CT in patients with negative or equivocal KUB and US was determined, and results and other clinical findings were compared. Clinical characteristics of ureteral stones detected by plain CT were compared with those of stones diagnosed by KUB and US.

Results: By plain CT 143 (60.1%) and 6 (2.5%) cases of pain were determined to have been caused by ureteral stones and other pathogeneses, respectively. No definitive diagnosis was obtained in 89 (37.4%). Stone size detected by plain CT was significantly smaller than controls (3.77 vs 6.37 mm, $p < 0.0001$) and tended to be located in the middle or lower ureter (76.2% or 109 of 143 vs 52.2% or 168 of 322, $p < 0.0001$). Symptoms spontaneously improved in 137 (95.8%) after conservative therapy while 6 underwent intervention, a rate significantly lower ($p < 0.0001$) than controls (32.9% or 106 of 322).

Conclusions: Nonenhanced CT is a useful modality for diagnosis of patients presenting with acute renal colic but whose results are negative or equivocal on KUB and US. Excretory urography is rarely needed because stones undetected on KUB and US tend to be small and in the middle or lower ureter, and spontaneous passage is expected.

Editorial Comment

Since its introduction, nonenhanced computed tomography (NECT) has become a very important diagnostic tool for detection and characterization of urolithiasis with unprecedented sensitivity, specificity and accuracy. NECT provides also useful information regarding treatment planning (location and size of the calculus) and etiology of several diseases that simulates renal colic. This technology has been shown to have sensitivity of 96% - 100%, specificity of 95.5% - 100%, and accuracy of 96% - 98%. In this study, the authors used NECT for renal colic evaluation only when plain film of the abdomen (KUB) and urinary tract ultrasound were negative or equivocal. Studying a population of 560 patients, they found ureteral stones in 322. Of the remaining 238 patients (42.5%) a definitive diagnosis of ureteral stones by NECT was possible in only 60% of patients. Although the sensitivity and specificity could not be calculated, it is clear that this rate is too low when compared to previous reports. As already pointed out by the authors, the main reason for their low sensitivity in diagnosing ureteral stone could be explained by different technology employed. In previous report showing higher accuracy, images were obtained at a section thickness of 3 - 5 mm and pitch of 1.0 - 1.8. By using 10 mm slice thickness the authors had lower accuracy rate and also detected larger stones. Another fact that could explain the low yield of NECT in this population is because KUB and US previously detected the majority of larger calculus (mean stone size detected by KUB = 6.37 mm; mean stone size detected by CT 3.77 mm). It is obvious that when NECT is done as the initial diagnostic modality, it will show higher sensitivity and specificity because all sizes of stone will be available for its detection. In other words, the stones will not be previously "filtered" by KUB and US evaluation leaving only the small ones for the CT detection. Although the authors used different technical protocol and presented lower sensitivity rate, this paper is very important because is the first one to show the value of NECT as a complimentary modality for patients with negative or equivocal screening tests (KUB and US).

In many important medical centers around the world, including some in Brazil, spiral NECT has become more and more accepted as the primary modality for screening patients with renal colic. Although this procedure has important drawbacks as high dose radiation exposure and for this reason should not be used in children and pregnant patients, it is of great value. In our institution, similarly to many others, NECT for renal

colic has the same cost of an IVP, but economical consideration is still a very important issue. New protocols using less radiation have been already developed. It is expected that in the near future NECT will completely replace IVP for the evaluation of renal colic.

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CT of primary hyperaldosteronism (Conn's syndrome): the value of measuring the adrenal gland

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AJR Am J Roent. 2003; 181: 843-9

Purpose: The objectives of our study of patients with primary hyperaldosteronism (Conn's syndrome) were to determine whether the adrenal glands are larger in patients with bilateral adrenal hyperplasia than in those with aldosterone-producing adenomas or in healthy control subjects; and whether a CT criterion based on adrenal gland size can be developed to positively diagnose bilateral adrenal hyperplasia.

Materials and Methods: A retrospective study of CT scans of 28 patients with primary hyperaldosteronism was performed. The means of two observers' measurements of adrenal gland size were recorded and compared with published normal values. In addition, a radiologist experienced in adrenal imaging and unaware of the cause of the primary hyperaldosteronism diagnosed either bilateral adrenal hyperplasia or aldosterone-producing adenoma by visual inspection.

Results: The adrenal glands in patients with bilateral adrenal hyperplasia were significantly ($p < 0.05$) larger than those in patients with aldosterone-producing adenoma or in healthy control subjects. A sensitivity of 100% was achieved when a mean limb width of greater than 3 mm was used to diagnose bilateral adrenal hyperplasia, and a specificity of 100% was achieved when the mean limb width was 5 mm or greater. Receiver operating characteristic curve analysis showed that the overall performance of the radiologist and the mean adrenal limb width in detecting bilateral adrenal hyperplasia were equivalent.

Conclusion: In patients with primary hyperaldosteronism, adrenal limb measurements on CT can aid in differentiating bilateral adrenal hyperplasia from aldosterone-producing adenoma because the adrenal glands in bilateral adrenal hyperplasia are larger.

Editorial Comment

Aldosterone-secreting adrenal adenomas are rare tumors, which are responsible for 75% of primary aldosteronism, with adrenal hyperplasia accounting for 25%. Adrenal hyperplasia may be further subdivided into idiopathic (far more common) and primary adrenal hyperplasia. Aldosteronomas are usually small lesions measuring less than 3 cm in diameter and more frequently found on the left side. CT differentiation between adenoma from bilateral adrenal hyperplasia is not an easy task because primary adrenal hyperaldosteronism may be micronodular or macronodular and also because the adrenal glands may appear normal or diffusely thickened. Thus evaluation with CT in patients with primary aldosteronism has its limitations even in the presence of unilateral adenoma. Difficulties increase much more when both adrenals have a nodular appear-

ance. In some patients with hyperaldosteronism the presence of hyperplastic glands may actually contain unilateral aldosteronoma. This report brings to us new and important radiological signs that might help us in the differentiation between bilateral adrenal hyperplasia from aldosterone-producing adenoma. Differentiating between these two distinct causes is fundamental because an aldosteronoma is usually best treated surgically, whereas bilateral adrenal hyperplasia is treated medically. A specificity of 100% was achieved when a mean limb width of greater than 5 mm was used to diagnose bilateral adrenal hyperplasia.

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UROGENITAL TRAUMA

Recent advances in management of female lower urinary tract trauma

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Curr Opin Urol. 2003; 13: 279-84

Purpose of Review: Abdominal and pelvic injuries are often associated with devastating lower urinary tract injuries. The literature is replete with studies involving male lower urinary tract trauma, however the diagnosis and management of similar injuries in women is not as well covered. In this article we will review recent advances in the diagnosis and management of female lower urinary tract trauma.

Recent Findings: The recent literature emphasizes the importance of diagnosing and managing female lower urinary tract injuries, both of the bladder and the urethra, caused by blunt or penetrating trauma to the lower abdomen, pelvis and perineum. Successful management of these injuries is based upon accurate diagnosis, recognition of associated injuries, and prompt treatment. Diagnosis and treatment of female bladder perforation have been well established. Reports of female urethral injuries are scarce, however, and subsequently the management is not standardized.

Summary: High suspicion, accurate diagnosis and prompt treatment are key for the successful management of female lower urinary tract injuries associated with lower abdominal, pelvic and perineal trauma. A standardized algorithm for management of female urethral injuries would be helpful.

Editorial Comment

Female urethral trauma is sufficiently rare that few of us have any significant individual experience. This analysis nicely encapsulates the diagnosis and treatment of both bladder and urethral injuries in women. While the treatment of bladder injuries will be reviewed for many, several aspects of care for female urethral injury bear emphasis. 1)- Urethral injuries in women are far more common in those less than 17 years old. 2)- Index of suspicion should remain high, and hematuria or vaginal bleeding should be evaluated with cystoscopy, even if that is inconvenient in the multi-injured patient. 3)- MRI may be used in females to delineate anatomy before definitive reconstruction, if required. 4)- Repair of severe urethral injury with subsequent fistula or stricture is not yet standardized in the literature. Transfer to a center with experience in this entity may be warranted. Options include first stage Johanson urethroplasty, two stage Johanson urethroplasty, "cut to the light" urethrotomy and dilation, bladder flap urethroplasty, vaginal flap urethroplasty, buccal mucosal onlay