

Dear Doctor,

Greetings from Micro Labs limited. We are happy to bring you **“NU Rounds”** which contains latest and interesting news in the field of Urology.

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Looking forward to your valuable feedback

Best Regards,

Medical Team, Micro Labs Ltd

The role of angioembolization in the management of blunt renal injuries: a systematic review

Introduction

Renal angioembolization (RAE) is an effective, minimally invasive treatment that was first developed in the 1970s. Renal injuries occur in approximately 10% of all abdominal trauma and the kidney is the third most commonly injured solid organ. Every year, up to 245,000 renal injuries occur worldwide; blunt trauma is responsible for 80–90% of them. Over the last few decades, non-operative management (NOM), including observation, transfusion, bed rest and/or renal angiography with embolization (RAE), has become increasingly popular, especially for low-grade (I–II) and intermediate grade (III) blunt renal injuries (BRI). High-grade renal trauma has traditionally been managed via surgical exploration and published evidence is unclear about the role of NOM for higher grades (IV and V). Over the last few decades, the management of patients with multiple injuries has improved thanks to specialized trauma units and NOM has become the treatment of choice for most renal injuries. Hemodynamic stability is one of the most important criteria to decide between operative and non-operative strategies in renal injuries. As a whole, primary conservative management is associated with a lower rate of nephrectomies, without increasing the immediate or long-term morbidity. The improved staging of injury severity, thanks to advancing radiographic techniques, has enhanced the use of NOM. Furthermore, selective treatment with interventional radiology procedures has eventually reduced the need for surgical interventions in patients with both blunt and penetrating renal injuries. Hemodynamic stability is one of the most important criteria to decide between operative and non-operative strategies in renal injuries. Angioembolization has an important role in the management of high-grade BRI but currently, its use remains heterogeneous.

Aim:

To evaluate the efficacy of angioembolization in blunt renal trauma in current literature, with the aim of understanding the indications and outcomes of RAE in patients with moderate- to high grade renal trauma.

Methods:

The methodological quality of eligible studies and their risk of bias was assessed using the Newcastle – Ottawa scale

Results:

A total of 16 articles that investigated angioembolization of blunt renal injury were included in the study. Overall, 412 patients were included: 8 presented with grade II renal trauma (2%), 97 with grade III renal trauma (23%); 225 with grade IV (55%); and 82 with grade V (20%). RAE was successful in 92% of grade III–IV (294/322) and 76% of grade V (63/82).

Outcomes of RAE sorted by hemodynamic status (a) and by AAST category (b)

Patients' characteristics	Number of patients	RAE Success	RAE Failure
(a) Hemodynamic status			
Overall	412 (100%)	354 (85%)	58 (15%)
Hemodynamic stable patients	346 (85%)	312 (90%)	34 (9%)
Hemodynamic unstable patients	66 (15%)	42 (63%)	24 (37%)
(b) AAST category			
Overall	412 (100%)	354 (85%)	58 (15%)
Grade V	82 (19%)	63 (76%)	19 (24%)
Grade III–IV	322 (77%)	294 (92%)	28 (8%)
Grade II	8 (2%)	8 (100%)	0

Regarding haemodynamic status, success rate was achieved in 90% (312/346) of stable patients, but only in 63% (42/66) of unstable patients. The most common indication for RAE was active contrast extravasation in hemodynamic stable patients with grade III or IV BRI.

Conclusions:

This is the first review assessing outcomes and indication of angioembolization in blunt renal injuries. The results suggest that outcomes are excellent in hemodynamic stable, moderate to high-grade renal trauma.

Source: Liguori, et al. The role of angioembolization in the management of blunt renal injuries: a systematic review. BMC Urol. 2021; 21:104.

Manual kidney stone size measurements in computed tomography are most accurate using multiplanar image reformations and bone window

Introduction

Urolithiasis is highly prevalent in developed countries and has a relevant impact on quality of life. It occurs in up to 15% of the population, showing an increment in incidence and prevalence over the last decades with a risk of recurrence as high as 50%. In current guidelines, non-contrast computed tomography (CT) is recommended as the modality of choice for the diagnosis of urolithiasis, preferably conducted in low-dose technique. CT has a high sensitivity and specificity regarding detection of stones and provides information on stone localization and size which influence treatment decision between conservative, pharmacological and invasive options. Technical advances in CT imaging include the implementation of new iterative reconstruction algorithms into clinical routine. As a consequence, filtered back-projection (FBP) has gradually been replaced by hybrid and model-based iterative reconstruction algorithms (HIR and MBIR, respectively), which enable a reduction of radiation dose while maintaining or improving image quality and diagnostic accuracy. So far, a couple of studies demonstrated size and volume measurements of kidney stones to be unaffected by radiation dose, comparing normal-dose and low-dose protocols as low as 2 mGy. Pertaining to image reconstruction methods, a recent study showed closest agreement between CT-based and real urinary calculus size when employing a model-based iterative reconstruction algorithm and a pointy image kernel, while radiation dose and denoising levels did not have a significant influence on size measurements. However, albeit reconstruction parameters are defined, different slice thicknesses and/or standard image orientations (axial, coronal, sagittal) also as different window settings (bone versus soft tissue) may impact stone size measurement. This is of particular importance as current guidelines emphasize the role of size assessment for treatment decision by means of the longest diameter. Opposed to these recommendations, no guidance is provided and measurement strategies in routine operations are predominantly driven by individual preference. Only recently, it's been shown that urinary calculus volume could be a far better predictor of treatment outcome, which is

understood to be time-consuming and hence inapplicable for clinical routine. Another approach to require the irregular 3-dimensional structure of kidney stones under consideration are multiplanar reformatations (MPR), which enable views in any spatial orientation needed, e.g. alongside the longest axis of the urinary calculus. In this study, we aimed to comprehensively evaluate the influence of various reconstruction algorithms (HIR, MBIR), image reformatations (axial, MPR), slice thicknesses (MPR, 2 mm, 5 mm) and window settings (soft-tissue, bone) on accuracy of urinary calculus size measurements.

Aim:

To investigate the influence of different image reformatations, slice thicknesses and window settings on stone size measurements.

Methods:

Reference stone sizes of 47 kidney stones representative for clinically encountered compositions were measured manually using a digital caliper (Man-M). Afterwards stones were placed in a 3D-printed, semi-anthropomorphic phantom, and scanned using a low dose protocol (CTDIvol 2 mGy). Images were reconstructed using hybrid-iterative and model-based iterative reconstruction algorithms (HIR, MBIR) with different slice thicknesses.

Semi-anthropomorphic phantom with kidney stones placed in a plastic box filled with water. Subsequently, CT scans were performed using a CTDIvol of 2 mGy

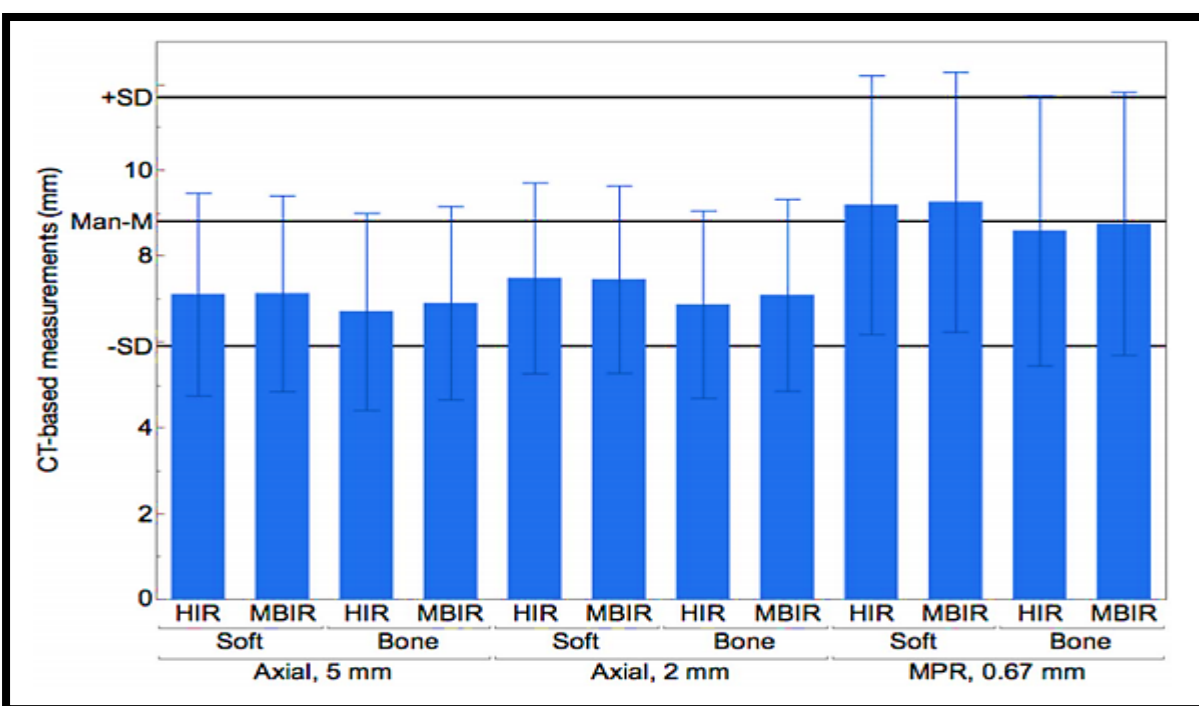


Two independent readers measured largest stone diameter on axial (2 mm and 5 mm) and multiplanar reformations (based upon 0.67 mm reconstructions) using different window settings (soft-tissue and bone). Statistics were conducted using ANOVA± correction for multiple comparisons.

Results:

Overall stone size in CT was underestimated compared to Man-M (8.8 ± 2.9 vs. 7.7 ± 2.7 mm, $p < 0.05$), yet closely correlated ($r = 0.70$). Reconstruction algorithm and slice thickness did not significantly impact measurements ($p > 0.05$), while image reformations and window settings did ($p < 0.05$). CT measurements using multiplanar reformatation with a bone window setting showed closest agreement with Man-M (8.7 ± 3.1 vs. 8.8 ± 2.9 mm, $p < 0.05$, $r = 0.83$). Manual CT-based stone size measurements are most accurate using multiplanar image reformatation with a bone window setting, while measurements on axial planes with different slice thicknesses underestimate true stone size.

Computed tomography (CT) based measurements of kidney stone size performed on multiplanar reformations (MPR) using a bone window setting in images reconstructed with a model-based iterative reconstruction algorithm (MBIR) (8.8 ± 3.1 mm) showed closest agreement with Man-M (8.8 ± 2.9 mm) compared to axial reformations, a soft-tissue window setting and hybrid-iterative reconstruction algorithm



Conclusions

CT measurements using axial reformations tend to systematically underestimate size measurements of kidney stones. While image reformatation and window settings affect measurement accuracy, hybrid and model-based reconstruction algorithms and different slice thicknesses using axial reformations demonstrate no influence on stone size measurements. We found closest agreement between CT-based measurements and true stone size using multiplanar reformations with a bone window setting in images reconstructed with a model-based iterative reconstruction algorithm. Therefore, these settings should undergo systematic evaluation in-vivo and are recommended for studies reporting stone size measurements based on CT.

Source: Reimer, R.P., Klein, K., Rinneburger, M. et al. Manual kidney stone size measurements in computed tomography are most accurate using multiplanar image reformatations and bone window settings. Sci Rep. 2021; 11:16437.

Combination therapy with botulinum toxin and bulking agent - An efficient, sustainable, and safe method to treat elderly women with mixed urinary incontinence

Introduction:

Mixed urinary incontinence (MUI) is the combination of both stress urinary incontinence (SUI) and urgency urinary incontinence (UUI), and is defined by the complaint of involuntary leakage associated with effort, sneezing or coughing and also with urgency. MUI is the dominant subtype among ≥ 65 year-old women, and is estimated to account for 33% of all incontinence. Whereas the stress component can easily be identified and treated, the urgency component is more difficult to address. MUI is initially treated with behavioural therapy, bladder training, and pelvic floor muscle exercises. Currently, no medication or surgical treatment is specifically indicated for this “mixed” condition. Clinicians commonly turn to a single therapy targeting the predominant symptom, for example, in case of predominant SUI to a sling or to polyacrylamide hydrogel (PAHG), or in case of predominant UUI to anticholinergics or β -3 adrenergic agonists. The risk of potentiating adverse events such as postvoid residual urine (PVR) and urinary tract infections (UTI), or of a poor outcome with de novo urgency possibly discourages surgeons from a routine combinatory application, especially in a frail patient population. Conversely, these patients would strongly benefit from a short combined intervention without general anesthesia. To offer this option in the future, this study aims to test a novel combinatory therapy for MUI, by injecting both botulinum toxin to treat UUI and PAHG to treat SUI. Intradetrusor injections of botulinum toxin has been approved for overactive bladder syndrome (OAB) with symptoms of UUI, urgency and frequency in patients who have an inadequate response to or are intolerant of an anticholinergic medication. Injection of bulking agents into the urethra to treat SUI has become an alternative to suburethral sling insertions. The present study investigates the efficacy, sustainability and safety of a novel surgical management of MUI by combining UUI and SUI specific treatments in a single operation session. Subjective and objective outcome of both, the UUI and SUI components are evaluated after 4 and 12 months, and a close monitoring of complications brings insight into the safety of this therapy.

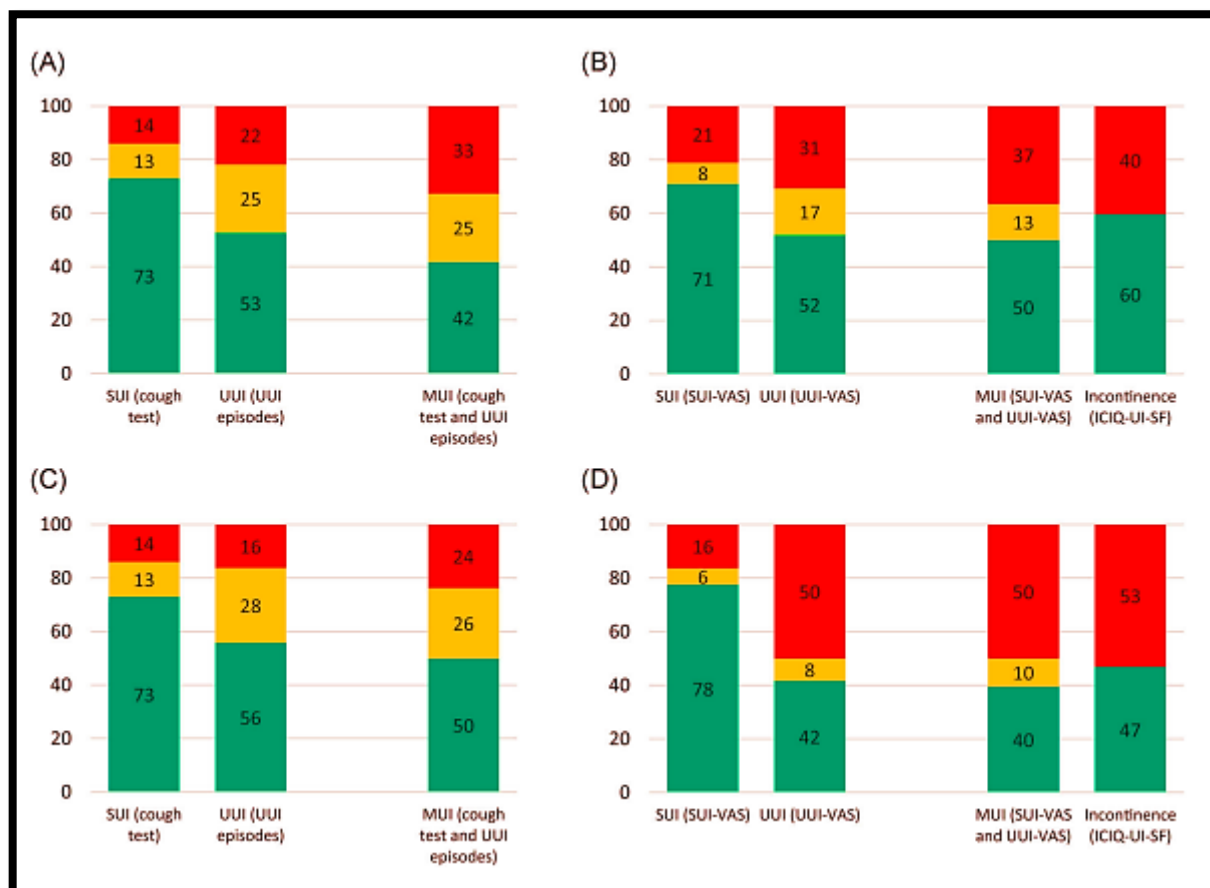
Methods:

Fifty-five women with therapy-refractory MUI were treated with botulinum toxin and PAHG in one surgical procedure. Urgency urinary incontinence (UUI) and stress urinary incontinence (SUI) outcomes were separately assessed after 4 and 12 months by objective UUI episodes/24 h and cough test, subjective impact of UUI and SUI on quality of life, and subjective International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF). MUI outcome was calculated by combining UUI and SUI outcomes. Complications were monitored throughout the study.

Results:

At 4 months, objective cure rates were 73%, 53%, and 42%, and subjective cure rates were 71%, 52%, and 50% for SUI, UUI, and MUI. At 12 months, objective cure rates were 73%, 56%, 50% and subjective cure rates were 78%, 42%, and 40% for SUI, UUI, and MUI.

Cure and improved rates of objective and subjective outcomes at 4 and 12 months after treatment



The ICIQ-UI SF score decreased by 9.0 and 8.7 points after 4 and 12 months. All complications were transient and included 22% clean intermittent catheterization immediately after surgery, 33% postvoid residual volumes >100 ml at 14 days, and 13% symptomatic urinary tract infection within the first postoperative month.

Conclusions:

The combination of botulinum toxin and PAHG is effective, sustainable and safe to treat therapy-refractory MUI, even in an elderly and frail study population. Patients benefit from the short surgical procedure without the need for general anaesthesia or discontinuation of anticoagulation

Source: Viereck V, et al. Combination therapy with botulinum toxin and bulking agent—An efficient, sustainable, and safe method to treat elderly women with mixed urinary incontinence. *Neurourol Urodyn*. 2021;1-9.



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