

IMAGING

Pelvic floor dysfunction: assessment with combined analysis of static and dynamic MR imaging findings

El Sayed RF, El Mashed S, Farag A, Morsy MM, Abdel Azim MS

Department of Radiology, Faculty of Medicine, Cairo University, Kaser El Aini Street, Cairo, Egypt

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Purpose: To prospectively analyze static and dynamic magnetic resonance (MR) images simultaneously to determine whether stress urinary incontinence (SUI), pelvic organ prolapse (POP), and anal incontinence are associated with specific pelvic floor abnormalities.

Materials and Methods: This study had institutional review board approval, and informed consent was obtained from all participants. There were 59 women: 15 nulliparous study control women (mean age, 25.6 years) and 44 patients (mean age, 43.4 years), who were divided into four groups according to chief symptom. Static T2-weighted turbo spin-echo images were used in evaluating structural derangements; functional dynamic (cine) balanced fast-field echo images were used in detecting functional abnormalities and recording five measurements of supporting structures. Findings on both types of MR images were analyzed together to determine the predominant defect. Analysis of variance and the Bonferroni t test were used to compare groups.

Results: In the four patient groups, POP was associated with levator muscle weakness in 16 (47%) of 34 patients, with level I and II fascial defects in seven (21%) of 34 patients, and with both defects in 11 (32%) of 34 patients. SUI was associated with defects of the urethral supporting structures in 25 (86%) of 29 patients but was not associated with bladder neck descent. Levator muscle weakness may lead to anal incontinence in the absence of anal sphincter defects. Measurements of supporting structures were significant ($P < 0.05$) in the identification of pelvic floor laxity.

Conclusion: Combined analysis of static and dynamic MR images of patients with pelvic floor dysfunction allowed identification of certain structural abnormalities with specific dysfunctions.

Editorial Comment

Multifactorial dysfunction contributes to the etiology of pelvic organ prolapse: a) weakness, thinning and /or tearing of levator ani musculature; b) laxity and/or tearing of the endopelvic fascia and c) laxity and /or tearing of apical supporting ligaments of the vagina. Both static and dynamic magnetic resonance imaging studies have been shown to be useful for the evaluation of female pelvic floor dysfunction an entity that usually encompasses stress urinary incontinence, pelvic organ prolapse and anal incontinence. Although these techniques have been used more frequently in recent years, determination of precise anatomic causes of these clinical abnormalities are still not clear. The authors present the results of a prospective study performed in 59 women (15 volunteer nulliparous women-control group and in 44 women with a parity range of 0 to 7, and pelvic floor dysfunction). Combined analysis of static and dynamic MR images of the pelvic floor reveals that it is possible to differentiate whether prolapse is due to defects in the endopelvic fascia, to levator muscle weakness, or to abnormalities in both fascia and muscles. Another important conclusion: a) stress urinary incontinence is associated with structural defects in the urethral supporting structures rather than with bladder neck descent and b) in the absence of an anal sphincter defect, anal incontinence is associated with marked levator muscle weakness.

Dr. Adilson Prado

*Chief, Department of Radiology and
Diagnostic Imaging, Vera Cruz Hospital*

Campinas, São Paulo, Brazil

E-mail: adilson.prando@gmail.com

Frequency of serum creatinine changes in the absence of iodinated contrast material: implications for studies of contrast nephrotoxicity

Newhouse JH, Kho D, Rao QA, Starren J

Department of Radiology, Columbia University Medical Center, New York, NY, USA

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Objective: Most studies of contrast-induced nephropathy lack controls to distinguish it from nephropathy from other causes. We assessed the frequency and magnitude of serum creatinine changes in patients not receiving iodinated contrast material to compare with creatinine changes in publications regarding contrast nephropathy. **Materials and Methods:** From the electronic medical records of an academic medical center, adults with creatinine determinations on five consecutive days who had not received contrast material during the previous 10 days were identified. The first creatinine level was compared with those on subsequent days. We calculated the frequency with which these levels exceeded thresholds used to identify contrast nephropathy in previous publications.

Results: Among 32,161 patients, more than half showed a change of at least 25% and more than two fifths, a change of at least 0.4 mg/dL. Among patients with baseline creatinine levels of 0.6-1.2 mg/dL, increases of at least 25%, 33%, and 50% occurred in 27%, 19%, and 11% of patients, respectively. Increases of 0.4, 0.6, and 1.0 mg/dL occurred in 13%, 7%, and 3% of patients. Among patients with baseline creatinine levels greater than 2.0 mg/dL, increases of at least 25%, 33%, and 50% occurred in 16%, 12%, and 7%. Increases of 0.4, 0.6, and 1.0 mg/dL occurred in 33%, 26%, and 18%. These increases were not different from the incidences of contrast nephropathy previously published.

Conclusion: The creatinine level increases in patients who are not receiving contrast material as often as it does in published series of patients who are receiving contrast material. The role of contrast material in nephropathy may have been overestimated.

Editorial Comment

Contrast agent-induced nephropathy (CIN) is the occurrence of renal failure, characterized by an increase in serum creatinine level or a fall in creatinine clearance, after the administration of an iodinated contrast agent. This entity occurs only in patients who have abnormal renal function before contrast agent injection. Unfortunately, the parameters used clinically (creatinine levels) for the estimative of the risk of CIN are imprecise. For this reason, one should calculate the creatinine clearance. Although contrast agents have been considered as one of the most frequent causes of in-hospital renal failure, many other concomitant risk factors exist such as dehydration, diabetes, previous extensive surgery and the use of nephrotoxic medications (e.g., gentamycin, nonsteroidal anti-inflammatory drugs, and certain chemotherapeutic drugs). Adequate hydration and the use of N-acetyl cysteine or both can prevent CIN.

This report raises several questions, and the most important are: what if there is no such entity as CIN?, b) what if there is no real increase in serum creatinine level in the general population that can be attributed to the intravascular administration of contrast media? (1). It is obvious that until more rigorous studies including an appropriate control group address the issue of CIN, our understanding of the actual risk of CIN when administering IV contrast media is limited. We should also consider that most studies have been shown that N-acetyl cysteine is useful for intra-arterial / intracardiac contrast but we do not know if the patient that receives intravenous contrast injection has the same risk of these patients. For this reason, we should not avoid doing a necessary iodinated contrast-enhanced radiological examination in a patient at risk of CIN. Obviously, the risk-benefit should be always balanced but in such situation, hyper-hydration should be immediately initiated and N-acetyl cysteine and non-ionic contrast material should be used.

Reference

1. Baumgarten DA, Ellis JH: Contrast-induced nephropathy: contrast material not required? *AJR Am J Roentgenol.* 2008; 191: 383-6.

Dr. Adilson Prando

*Chief, Department of Radiology and
Diagnostic Imaging, Vera Cruz Hospital
Campinas, São Paulo, Brazil
E-mail: adilson.prando@gmail.com*

UROGENITAL TRAUMA

Long-term functional and morphological effects of transcatheter arterial embolization of traumatic renal vascular injury

Mohsen T, El-Assmy A, El-Diasty T

Department of Radiology, Urology & Nephrology Center, Mansoura University, Mansoura, Egypt

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Objective: To assess the long-term morphological and functional outcome of superselective transarterial embolization (TAE) for treating traumatic renal vascular injury.

Patients and Methods: The surgical records of 124 patients with traumatic renal vascular injury managed by TAE between 1990 and 2004 were reviewed, of whom 81 completed a long-term follow-up and were included in the final analysis. Patients were followed using serum creatinine levels, grey-scale ultrasonography, intravenous urography (IVU) and radioisotopic renography using (99m)Tc-mercapto-acetyl triglycine (MAG3) and (99m)Tc-dimercaptosuccinic acid (DMSA).

Results: Embolization resulted in the cessation of haematuria in all patients but two (97.5%). At 3 months, serum creatinine levels increased in four of nine patients with a solitary kidney, but only one of them required haemodialysis. After a mean follow-up of 4.6 years, IVU showed a normal calyceal configuration in 70% of renal units, pyelonephritic changes in 26% and no dye excretion in 4%. DMSA scans showed no evidence of photopenic areas in 17 renal units (21%). The mean (sd) percentage of DMSA uptake by the corresponding kidney improved from 24 (9)% at the 3-month scans to 32 (10)% at the last follow-up scan ($P < 0.001$). Using MAG3, the mean (sd) glomerular filtration rate improved significantly from 26 (11) mL/min at the 3-month scan to 32 (9) mL/min at the last follow-up ($P < 0.05$).

Conclusions: Superselective TAE is safe and effective for traumatic renal vascular injury. The short-term deleterious effects were more pronounced in patients with a solitary kidney. The long-term follow-up showed functional and morphological improvements in the embolized renal units.

Minimally invasive endovascular techniques to treat acute renal hemorrhage

Breyer BN, McAninch JW, Elliott SP, Master VA

Department of Urology, San Francisco General Hospital, University of California-San Francisco, San Francisco, California, USA

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