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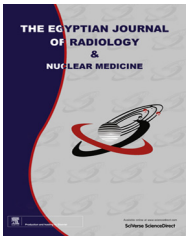

ORIGINAL ARTICLE

Magnetic resonance urethrography versus conventional retrograde urethrography in the evaluation of urethral stricture: Comparison with surgical findings

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KEYWORDS

Urethral stricture;
MR urethrogaphy;
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Abstract *Back ground:* Urethral stricture means fibrous scarring of the urethra caused by collagen and fibroblast proliferation. Magnetic resonance urethrography was emerging as a new modality for imaging the male urethra.

Objectives: To evaluate the accuracy of MR urethrography in comparison to the conventional retrograde urethrography (RUG) in the evaluation of urethral stricture in comparison with surgical findings. Design, setting and participants: This prospective study was done in the period from January 2010 to March 2012 including 20 male patients with initial diagnosis of anterior urethral stricture (diagnosed by RUG). Both newly diagnosed and recurrent cases were included regardless of the etiology of stricture. The mean age was 49.6 ± 16.4 years (ranged from 19 to 70). All patients were evaluated by conventional retrograde urethrography (RUG) and magnetic resonance urethrography (MR urethrography).

Outcome measurements and statistical analysis: Magnetic resonance urethrography images were analyzed, focusing on the signal intensity, location and length of the stricture. Additionally, MR findings were evaluated regarding the urethra proximal to the stricture, the corpora spongiosa surrounding the stricture, adjacent organ injuries, and the associated complications. Data obtained were compared with operative findings in all patients.

Results and limitations: The mean stricture length as measured by MR urethrography and RGU was 1.32 ± 0.85 and 1.75 ± 1.02 respectively with a significant difference ($p < 0.001$). The mean intra-operative stricture length was 1.29 ± 0.83. MR urethrography was accurate in 19 patients

Abbreviations: RUG, retrograde urethrography; MR urethrography, magnetic resonance urethrography

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(95%) while RUG was accurate in 15 patients (75%). This study has some limitations, firstly, a small number of patients are involved in this study, secondly, a 1 T magnet is used and finally, inter-observer agreement was not obtained.

Conclusion: MR urethrography has a higher diagnostic accuracy in the detection of urethral stricture length than conventional RUG, that is crucial for proper selection of treatment modality.

1. Introduction

Generally, the term urethral stricture means fibrous scarring of the urethra caused by collagen and fibroblast proliferation (1). The causes of anterior urethral strictures are mostly inflammatory (infectious urethritis, balanitis xerotica obliterans), traumatic (straddle injury, iatrogenic) and less commonly congenital (2).

Several diagnostic tools are available for imaging of the urethra, of which retrograde urethrography (RUG) is the primary imaging modality for evaluating urethral stricture diseases, however it has certain limitations like being invasive, poorly detecting the accurate length of stricture and the extent of spongiofibrosis (3).

Magnetic resonance (MR) urethrography and sonourethrography were introduced as newer modalities for imaging the male urethra (4). Sonourethrography has proved to be accurate in the diagnosis of anterior urethral stricture, but it has certain limitations such as its small field of view and difficulty in urethral lumen delineation (5).

On the other hand, MR has the ability to delineate clear anatomical details regarding the urethra and periurethral tissue with three dimensional orientation of the lesion (6). However, very few studies evaluated the accuracy and diagnostic capability of MR urethrography in the anterior urethral stricture.

The aim of this study is to evaluate the diagnostic capability of MR urethrography in comparison to the conventional RUG in anterior urethral stricture, using surgical findings as a gold standard.

2. Materials and methods

This prospective study was done in the period from January 2010 to March 2012 and included 20 patients with anterior urethral stricture (diagnosed by RUG). Both newly diagnosed and recurrent cases were included regardless of the etiology of stricture. Patients were informed about the nature of different diagnostic modalities used to diagnose their strictures. All patients gave a written consent for intervention.

RUG and MR urethrogram were performed for all patients prior to the intervention and results were interpreted by one radiologist who has 15 years of experience in doing RUG and 10 years of experience in interpreting MR urethrogram.

Institutional Review Board approval was obtained prior to the start of the study by the research committee for Ethics.

2.1. Technique of RUG

The patient was positioned on a fluoroscopy table in a right or left oblique position, with the right or left leg (the underside leg) bent from the knee and flexed toward the abdomen. The penis was placed laterally over the proximal thigh with moderate traction. The entire length of the urethra was assessed for any narrowing or abnormal fistulous communications. After gland sterilization, the urethra was filled by a 50 ml syringe using 25 ml of contrast material (Telebrix 300 Meglumine; Guerbet, Aulnay-sous-Bois, France) mixed with 25 ml of normal saline. Images were obtained with the patient in the oblique position during maximum urethral distention. Also A-P films are obtained.

2.2. MR urethrography

It was performed 4–10 days after RUG.

2.2.1. Technique

We used the technique of Schulam et al. (6). All patients were instructed to remove all metallic articles, e.g. coins and keys. They were asked about the presence of metallic prosthesis, coils or implants or any other articles interfering with MRI examination. The examination was done with the patient in supine position; the penis was positioned anteriorly and taped to the abdominal wall beneath the surface coil after injection of sterile gel into the urethra. MR images were obtained by using a 1.0-T MR imaging device (Gyroscan, Intera, Philips, Netherlands) and a pelvic phased-array coil. The MR imaging protocol consisted of a sagittal T1 (TR msec/TE msec 400/20) and T2-weighted fast spin-echo sequence (TR msec/TE msec 3000/99) and axial T2-weighted fast spin-echo sequence (3200/99; field of view, 24 cm; matrix, 512×264; section thickness, 3 mm; and section gap, 0.1 mm).

2.3. Image analysis

MR urethrography images were analyzed, focusing on the signal intensity, location and length of the stricture. Additionally, MR findings were evaluated regarding the urethra proximal to the stricture, the corpora spongiosa surrounding the stricture, adjacent organ injuries, and the associated complications.

Stricture length was measured along the long axis of the fibrotic segment shown as low signal intensity on the sagittal T2-weighted images.

Open urethroplasty was performed in all patients (end to end anastomosis in 15 and augmented urethroplasty in 5 patients). The strictured segments were adequately measured intra-operatively.

Radiologic data obtained were compared with operative findings in all patients.