

ACCURACY OF SONOURETHROGRAPHY IN EVALUATION OF ANTERIOR URETHRAL STRICTURES

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ABSTRACT

Background and Objective: The management of urethral strictures is a challenge to both the urologists and patients. Thoughtful and satisfactory preoperative evaluation remains important to achieve good outcome. Sonourethrography can diagnose anterior urethral strictures, measure its length and detect presence of complications like spongiofibrosis and false tracts. The objective of the study is to evaluate the sensitivity and specificity of sonourethrography in the confirmation of diagnosis and measurement of length of anterior urethral strictures.

Methods: This comparative cross sectional study was carried out in the department of Radiology Ch. Rehmat Ali Memorial Trust Hospital, Lahore from 15th January 2015 to 14th January 2016. A total of 45 male patients of all age group having anterior urethral stricture on retrograde urethrography were subjected to sonourethrography of anterior urethra. The length of stricture as assessed and measured on retrograde urethrography were also measured during sonourethrography and then compared with intra operative findings during surgery. Intra operative findings were considered as gold standard.

Results: Retrograde urethrography showed 100% sensitivity, 97.78% positive predictive value and 97.78% diagnostic accuracy. Sonourethrography showed 100% sensitivity, 100% positive predictive value and 100% diagnostic accuracy.

Conclusion: Sonourethrography (SUG) is more accurate in detection of anterior urethral strictures than the retrograde urethrography (RUG). Further characterisation of stricture in terms of length is also more accurately measured by SUG compared with conventional RUG and there is no radiation hazard.

Key Words: Sonourethrography (SUG), Retrograde urethrography (RUG), Urethral stricture, Spongiofibrosis.

INTRODUCTION

The human urethra has been assessed using radiographic techniques for many years, with retrograde urethrography (RUG) being the standard¹. This method has many limitations, e.g. radiation exposure to the testes, inaccurate evaluation of urethral stricture due to factor of magnification and no outlining of periurethral structures.^{1,2} To circumvent these problems, urethral ultrasonography (sonourethrography, SUG) has been suggested as a method for evaluating the anterior male urethra.^{1,3,4}

The urethral strictures develop from various causes and patient can be asymptomatic or present with severe discomfort secondary to urinary retention. The cause of anterior urethral stricture may be infective, traumatic, post instrumentation (e.g. traumatic catheter placement, trans urethral surgery), congenital and rarely malignant tumors.

In general, the term anterior urethral stricture

refers to a fibrous scarring of the urethra caused by collagen and fibroblast proliferation. Contraction of this scar reduces the lumen of urethra. There are multiple modalities available for diagnosing urethral strictures as voiding cystourethrography, retrograde urethrography (RUG), sonourethrography (SUG), MRI and endoscopic cystourethrography.⁵

Retrograde urethrography is considered to be the best initial study for urethral stricture, however it can greatly alter the radiographic appearances of the urethra and under estimate the length of stricture.^{1,4,6} To overcome these strains and to better define the anterior urethral stricture disease, the use of ultrasonography to image the male urethra was started in 1985 at San Francisco.⁶ It was demonstrated that radiographic technique consistently underestimate the length of anterior urethral strictures compared to intra operative measurements. While sonourethrography correlates well. Estimation of length of anterior urethral stric-

ture is an important deterrent for the selection of most optimal surgical procedure.⁴

METHODOLOGY

The study was performed in Radiology Department of Ch. Rehmat Ali Memorial Hospital Lahore in collaboration with the urology department. All the patients were informed about study, risk factors and benefits. Informed consent was taken from all patients.

Following the retrograde urethrography, sonourethrography was done in all patients. Retrograde urethrography was performed using Philips fluoroscopy machine by a trained radiologist. Films of each patient were taken in antero-posterior (AP), right and left anterior oblique positions after the scout film and reviewed by the same radiologist. Length of the stricture was measured directly from the film and correction for magnification was applied. Findings of retrograde urethrography of anterior urethra were not disclosed to the radiologist who performed ultrasound (SUG) by using Nemio-20 (Toshiba) 7.5 MHz linear array transducer. Same variables were measured on RUG. All the variables analyzed on RUG and SUG were compared with intra operative findings during surgery and intra operative findings considered as gold standard. All these findings were recorded on specialized perform. The statistical differences among RUG, SUG and surgical findings were analyzed and degree of accuracy of predicting the length was calculated.

RESULTS

During one year of study period 45 patients were entertained in our urethral stricture data base. After RUG and SUG patients were admitted in urology department of our hospital for surgery.

The age distribution of patients were; 26 patients (58%) were between 17 to 37 years, 8 (18%) patients were between 38 – 57 years, 7 (15%) were between 58–77 years and 4 (9%) were above 78 years. Mean age of patients were 41.56 ± 20.77 .

RUG showed stricture in all patients (100%). SUG showed stricture in 44 (98%) patients. RUG yield 1 false positive result due to bending of urethra at the penoscrotal junction which looks like stricture.

1 (2%) patient had no stricture on SUG and surgery. Site of strictures correlated well between RUG, SUG and surgery.

Comparison of the average length of stricture revealed that average stricture length on retrograde urethrography was 24.82 ± 25.11 mm while average length of stricture on sonourethrography was 29.20 ± 26.17 mm and p value was <0.05 that was significant.

Comparison of average stricture length between retrograde urethrography (24.82 ± 25.11 mm) and surgery (30.56 ± 26.32 mm) was made. P value was <0.05 that was significant.

The comparison of average stricture length on son-

ourethrography (29.20 ± 26.17 mm) versus surgical length (30.56 ± 26.32 mm) was made and p value was > 0.05 that was insignificant.

Retrograde urethrography (RUG) showed 100% sensitivity, 97.78% positive predictive value and 97.78% diagnostic accuracy.

Sonourethrography showed 100% sensitivity, 100% positive predictive value and 100% diagnostic accuracy.

DISCUSSION

Accurate measurement of urethral stricture length is critical for making an appropriate treatment choice.⁴ To devise an appropriate treatment plan it is important to determine the location, length, depth and density of the stricture. The limitations of RUG concerning technique and clinical interpretation were reported frequently.^{1,5-7} In our study, one patient showed a short segment of smooth stricture at penoscrotal junction on RUG but when that area was examined on SUG, no stricture or any other abnormality was found and this was confirmed on subsequent operative findings. These findings are in accordance with the study conducted by Alanen A et al.⁸ Which concluded that out of 33 patients 2 patients showed false positive result of stricture on RUG when compared with SUG and surgery.

Sonourethrography is a simple technique which gives real time accurate assessment of anterior urethral strictures. It can be employed as a staging study in patients with symptomatic strictures where the need for surgery is clear.⁹

Inaccurate measurement of stricture length with RUG in the form of magnification or under estimation is frequently reported.¹⁰⁻¹² Even with technique standardisation, stricture length might be inaccurately estimated. However, despite the magnification associated with radiological urethrography, sonourethrography was significantly more accurate.

Khan et al¹³ concluded in his study that SUG is more accurate for estimating stricture length when compared to RUG.

Sonography provides additional information about the surrounding tissue, notably the degree of periurethral fibrosis which can indicate the most appropriate surgery.^{4,7,13-15}

The other study conducted by Choudhary et al¹⁶ concluded that retrograde urethrography and sonourethrography are equally efficacious in the detection of anterior urethral strictures. Further characterisation of strictures in terms of length, diameter and periurethral pathologies, like spongiofibrosis and false tracts is done with greater sensitivity using sonourethrography as compared with retrograde urethrography.

Sonourethrography is a radiation free, simple and cheap procedure and the patient has no hazard of radiation exposure of scrotum. This statement is also concluded in a study conducted by Gupta et al.¹⁷ In our

study and many international studies it is concluded that the accuracy of sonourethrography (SUG) to diagnose and measure the anterior urethral stricture is superior to retrograde urethrography (RUG).^{1,5,10,14,17,18}

It is **concluded** that Sonourethrography is more accurate in the detection of anterior urethral strictures than the retrograde urethrography. Further characterisation of strictures in terms of length is also more accurately measured by the SUG compared with conventional RUG and there is no risk of radiation to testicles during SUG.

Contribution of Authors

SM: Article writing and Proof reading. AAA: Results Compiling. AM: Data Collection.

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