

Original Research Article

Comparing retrograde urethrography readings with intraoperative findings in urethral stricture

Tanvi Subhash Kelkar, Anil Joshi*

Department of Radiology, Bharati Vidyapeeth Medical College and Hospital (Deemed to be University), Sangli, Maharashtra, India

Received: 31 March 2019

Accepted: 04 May 2019

*Correspondence:

Dr. Anil Joshi,

E-mail: tanviskelkar@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Urethral strictures are relatively common in men with most patients acquiring the disease due to injury or infection. The present study was conducted to assess the accuracy of retrograde urethrography (RGU) in diagnosing urethral strictures in patients presenting with lower urinary tract symptoms.

Methods: All male patients presenting with lower urinary tract symptoms and referred for retrograde urethrogram to the Department of Radiodiagnosis, Bharati Vidyapeeth Medical College and Hospital (Deemed to be University), Sangli from November 2018 till January 2019 were included. The parameters of RGU were compared with intra-operative findings as gold standard to calculate the operating characteristics of RGU.

Results: The present study included 42 patients, mean age 54.9 ± 11.2 years. Grade I urethral stricture was observed in 42.8% and 26% had grade II stricture. Bulbar stricture was the most common location. The common presenting complaints were increased frequency (50%) and dribbling micturition (40.4%). Approximately one tenth of all patients had a history of trauma. RGU was 100% sensitive and 66.7% specific in detecting strictures of less than 2 cm. Overall accuracy of RGU in detecting urethral strictures of less than 2 cm was 83.3%.

Conclusions: RGU is a reliable means for establishing the diagnosis of a suspected urethral stricture and also provides accurate staging information with regard to stricture number, length, location, and coexistent urethral pathology.

Keywords: Anterior urethral stricture, Diagnostic accuracy, Retrograde urethrography

INTRODUCTION

Urethral strictures are relatively common in men with most patients acquiring the strictures due to injury or infection. The most common etiology for stricture urethra is iatrogenic injury due to urologic instrumentation (e.g., oversized resectoscope at the time of transurethral surgery) or the placement of indwelling catheters.¹ Most patients present with chronic voiding symptoms, but acute urinary obstruction can occur without significant warning, requiring emergency urethral dilation or urinary

diversion. Pretreatment evaluation identifies the location, length and severity of the stricture and guides the choice of treatment which can include minimally-invasive therapies, urinary diversion or urethral reconstruction. Urethral stricture is usually diagnosed through clinical symptoms and the diagnostic methods based upon imaging are confirmed through clinical diagnosis.² Currently, retrograde urethrogram (RGU) is the main diagnostic method to find anterior urethral stricture.³ Further, to diagnosing the stricture, this method helps us find the length of the stricture as well. By utilising a

catheter which enters urethra, the contrast material is injected into the urethra, and its stricture and length are determined through oblique imaging with the help X-ray.⁴ The present study was conducted to assess the accuracy of RGU in diagnosing urethral strictures in patients presenting with lower urinary tract symptoms.

METHODS

Study design and setting

The present observational study was conducted in the Department of Radiodiagnosis, Bharati Vidyapeeth Medical College and Hospital (Deemed to be University), Sangli from November 2018 till January 2019. Male patients who presented with complaints suggestive of lower urinary symptoms referred to our department were included. The purpose of the study was explained to the patients and their informed written consent was obtained before being included in the study. All patients gave informed consent for undergoing RGU separately. The study was approved by the institutional ethics committee.

Sample population

Consecutive male patients who presented with symptoms of thin, weak and/or scattered stream of urine were selected from the outpatient urology department. Patients who did not underwent RGU or refused to undergo surgery for urethral stricture or having other urethral pathologies like acute urethritis were excluded from the study.

Retrograde urethrography protocol

All patients were instructed to empty their bladder before the procedure. RGU was performed with the patient in a right oblique or semi-lateral position. After disinfecting the glans, 10 ml of 15% (w/v) iohexol was injected through a Foley catheter placed in the external meatus. The penile tip was pressed gently around the catheter during injection to prevent escape of contrast medium, while the patients were instructed to relax their pelvic floor muscles during injection. Radiographs were taken using a conventional X-ray machine. Additional radiographs were taken if the study was not satisfactory while being interpreted by senior radiology consultants of our department. The RGU was evaluated for the location, number, length, diameter of strictures, presence of false tracts, filling defects or diverticula. Stricture length and diameter were determined by direct measurement on the film and correction was applied for magnification.

Data collection and data analysis

Authors obtained a detailed clinical history, which included allergy to contrast media, penile or urethral trauma, infection, urethral surgery, prolonged urethral catheterization or urethral dilatation. Clinical information for additional clinical conditions of meatal stenosis,

epispadias, hypospadias, fistulae, diverticula or purulent urethral discharge was obtained from the medical records of the patients. The parameters studied by RGU were compared with intra-operative findings as gold standard to calculate the operating characteristics of RGU. Data were described as means and standard deviation or frequency distribution.

RESULTS

The present study included 42 patients. Mean age of the patients was 54.9 ± 11.2 years, the most common age group was 61 to 80 years (50%), followed by 21 to 40 years (Table 1). The common presenting complaints were increased frequency (50%) and dribbling micturition (40.4%). Other complaints reported by the patients were burning micturition, fever and cough. Approximately one tenth of all patients had a history of trauma.

Two patients had gonococcal infection, and one patient had hernioplasty injury and tuberculosis each. Grade one urethral stricture was observed in 42.8% of the patients and 26% had grade 2 stricture (Figure 1).

Table 1: Baseline characteristics of the patients included in the study.

Variables	N (%)
Age distribution	
Less than 20	02 (4.8%)
21 to 40	11 (26.1%)
41 to 60	07 (16.7%)
61 to 80	21 (50%)
More than 80	01 (2.4%)
Presenting complaints	
Increased frequency	21 (50%)
Dribbling micturition	17 (40.4%)
Burning micturition	07 (16.6%)
Fever	05 (11.9%)
Cough	01 (2.4%)
Exposure history	
Polytrauma	05 (11.9%)
Gonococcal infection	02 (4.8%)
Hernioplasty	01 (2.4%)
Tuberculosis	01 (2.4%)
None	33 (78.5%)
Stricture grading	
I	18 (42.8%)
II	11 (26.1%)
III	08 (19%)
Nil	05 (11.9%)
Associated conditions, if any	
Thick walled bladder	06 (14.2%)
Bladder diverticuli	02 (4.8%)
Secondary prostatic enlargement	02 (4.8%)
Vesical calculus and prostatic calcification	01 (2.4%)
None	31 (73.8%)

Table 2: Comparing retrograde urethrography and intraoperative findings.

Stricture characteristics	Retrograde urethrography	Intraoperative findings
Site of stricture		
Bulbar	25 (59.5%)	23 (54.7%)
Penile	12 (28.5%)	13 (30.9%)
Diffuse	05 (11.9%)	06 (12%)
Length of stricture		
<2 cm	28 (66.7%)	21 (50%)
2 to 4 cm	09 (21.4%)	15 (35.7%)
More than 4 cm	05 (11.9%)	06 (12%)

Table 2 compares the findings of RGU and intraoperative findings. Bulbar stricture was observed in 59.5% on RGU and in 54.7% intraoperatively, while penile stricture was observed in 28.5% on RGU and in 30.9% intraoperatively. Less than 2 cm length strictures were observed among 66.7% on RGU and 50% intraoperatively. RGU revealed 2 to 4 cm length strictures among nine patients and more than 4 cm stricture among five patients, while intraoperatively 15 patients had 2 to 4 cm length strictures and six had more than 4 cm strictures. RGU was 100% sensitive in detecting strictures of less than 2 cm, using intraoperative finding as the reference standard (Table 3).

RGU had a specificity of 66.6%, positive and negative predictive value of 75% and 100% respectively. Overall accuracy of RGU in detecting urethral strictures of less than 2 cm was 83.3%.

Table 3: Operating characteristics describing the ability of retrograde urethrography in detecting strictures of length less than 2 cm.

Characteristics	Estimate (95% confidence intervals)
Sensitivity	100% (83.3 to 100)
Specificity	66.6% (43 to 85)
Positive predictive value	75% (62 to 85)
Negative predictive value	100%
Accuracy	83.3% (69 to 93)

DISCUSSION

In the present study, bulbar urethral stricture was the most common. Half of all patients were found to have strictures of length less than 2 cm but RGU identified this in approximately two thirds of the patients. RGU was found to be 100% sensitive and 66.6% specific for detecting urethral strictures of less than 2 cm in length. Maciejewski et al, in a literature review regarding the different techniques in the diagnosis of urethral stricture disease reported that RGU has 75 to 100% sensitivity and 72 to 97% specificity, which is comparable to our findings.⁵ In another study conducted by Peskar et al, the accuracy of sonography compared to RGU in diagnosing

urethra stricture was 92%.⁶ RUG has a tendency to slightly underestimate urethral stricture length.⁷ This is corroborated by our findings as 13% of the patients with stricture length between 2 to 4 cm were missed by RGU.

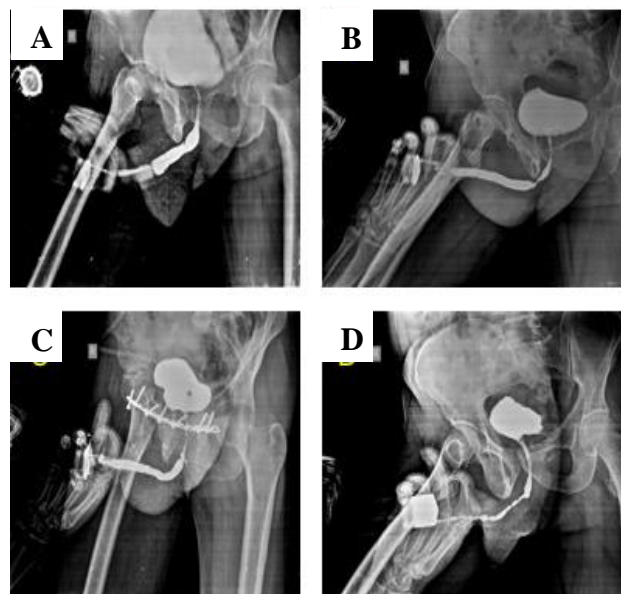


Figure 1: Retrograde urethrography findings in patients with lower urinary tract complaints. (A): multiple short segment stricture involving penile urethra; irregular outlines of bladder suggestive of changes of chronic cystitis, (B): irregular narrowing of proximal penile urethra suggestive of stricture, (C): significant narrowing at prostatic urethra suggestive of stricture, (D): irregular narrowing with beaded appearance of anterior urethra suggestive of long post infective stricture; posterior urethra appears dilated; generalized osteoporosis of visualized bone

One of the alternative methods used for diagnosing urethral stricture is sonography which is known as sonourethrogram (SUG). A sensitivity of 98% and a specificity of 96% was reported for SUG in diagnosing the urethra strictures by Heinrich et al.⁸ Morey et al, reported that the length of the stricture measured through SUG was twice or even more as long as the value reported through urethrography.⁹ Cystoscopy is diagnostic for a stricture but fails to accurately stage stricture location and length. Other modalities such as uroflowmetry and ultrasound can further enhance staging, RGU is still the essential tool for treatment planning.¹⁰

There are a few limitations of this study. First, this is a single centre study and inter-operator variability may affect the readings. This was highlighted by Bach et al, who demonstrated that there appears to be a clear discord in readings between the physician and the urologist or radiologist.¹¹ The authors found that physician reported RGUs missed the diagnosis of stricture in 13% of cases. Secondly, all RGU readings were not done by the same radiology consultant, which can introduce bias.

CONCLUSION

RGU is a reliable means for establishing the diagnosis of a suspected urethral stricture and also provides staging information with regard to stricture number, length, location, and coexistent urethral pathology which the study confirms on comparing these findings with their postoperative findings. This study gives urethral mapping facilitating surgeons to plan their operative treatment. Combining RGU with other imaging modalities like SGU may further improve the diagnostic accuracy and aid in optimal preoperative planning.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Lumen N, Hoebeke P, Willemssen P, et al. Etiology of urethral stricture disease in the 21st century. J Urol. 2009;182:983.
2. Kawashima A, Sandler CM, Wasserman NF, LeRoy AJ, King BF, Goldman SM. Imaging of urethral disease: a pictorial review. Radio Graphics. 2005;24:S145-S216.
3. Breyer BN, Cooperberg MR, McAninch JW, Master VA. Improper retrograde urethrogram technique leads to incorrect diagnosis. J Urol. 2009;182:716-7.
4. Zhang XM, Hu WL, He HX, Lv J, Nie HB, Yao HQ, et al. Diagnosis of male posterior urethral stricture: comparison of 64-MDCT urethrography vs. standard urethrography. Abdominal Imaging. 2011 Dec 1;36(6):771-5.
5. Maciejewski C, Rourke K. Imaging of urethral stricture disease. Translational Androl Urol. 2015 Feb;4(1):2.
6. Peskar DB, Perovic AV. Stricture of the male urethra: how to perform and evaluate radiourethrography and sonourethrography to avoid mistakes. Radiol Oncol. 2008;34(2): 17584.
7. Gallentine ML, Morey AF. Imaging of the male urethra for stricture disease. Urol Clin North Am. 2002;29:361-72.
8. Heinerich A, Derschum W, Bonfig R, Wilbert DM. Ultrasound of urethral stricture disease: a prospective study in 175 patients. Br J Urol. 2011;74:93-8.
9. Morey AF, McAninch JW. Role of preoperative sonourethrography in bulbar urethral reconstruction. J Urol. 2012;158(4):1376-9.
10. Angermeier KW, Rourke KF, Dubey D, Forsyth RJ, Gonzalez CM. SIU/ICUD Consultation on Urethral Strictures: Evaluation and follow-up. Urol. 2014;83(3):S8-17.
11. Bach P, Rourke K. Independently interpreted retrograde urethrography does not accurately diagnose and stage anterior urethral stricture: the importance of urologist-performed urethrography. Urol. 2014;83(5):1190-4.

Cite this article as: Kelkar TS, Joshi A. Comparing retrograde urethrography readings with intraoperative findings in urethral stricture. Int J Res Med Sci 2019;7:2333-6.