ORIGINAL RESEARCH PAPER
Volume-9 | Issue-3 | March-2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

COMPARATIVE STUDY BETWEEN RGU AND SONOURETHROGRAPHY IN EVALUATION OF ANTERIOR MALE URETHRA

Radiodiagnosis

Dr. Pallavi Mannam MBBS Final year Post graduate student; Department of Radio Diagnosis, NRI Medical College & General Hospital, Chinakakani, Mangalagiri Mandal, Guntur District, Andhra Pradesh, India

Dr. D Ankamma Rao* DMRD DNB Professor & HOD Department of Radio Diagnosis, NRI Medical College & General Hospital, Chinakakani, Mangalagiri Mandal, Guntur District, Andhra Pradesh, India *Corresponding Author

ABSTRACT

Background: RGU is the gold standard investigation for assessment of male anterior urethra. SUG is an infrequently used technique for this purpose. Each has its merits and demerits.
Aim and objectives: The aim of the study was to compare the best modality between RGU and SUG in evaluation of anterior urethral strictures.
Materials and methods: This study was conducted in the Department of Radio Diagnosis at NRI General Hospital, Chinakakani, Guntur from 2016-2017.A total of 40 pateints attending urology OPD in the age group 20 to 70 years with complaints suggestive of lower urinary symptoms were studied. Results from both studies were compared for testing the accuracy, ease of performing the study and advantage to the patient.
Results: Out of 40 patients on RGU, 15 patients were normal, 23 patients had strictures. One patient had a urethral tumour and one patient had a false passage in the penile urethra. A total of 24 strictures were demonstrated on SUG. In one of these cases, RGU was normal. Strictures were assessed for location and number. Periurethral fibrosis on SUG. RGU was deemed to be the gold standard test against which SUG results were assessed. SUG showed a sensitivity of 100% and specificity of 93.3%. The positive predictive value was 96.1% and the negative predictive value was 100%. Out of 24 cases of strictures detected by SUG, 4 cases showed evidence of Spongiofibrosis which can be evaluated by SUG alone.
Conclusion: Conventional RGU is the gold standard imaging test for urethral strictures even in the advanced CT and MRI era. Our study with SUG also showed results on par with RGU with the modality being equally efficient in detection of anterior urethral strictures.

KEYWORDS

Sonourethrography, Retrograde Urethrography, Urethral strictures, Urethral Tumours, False Passage.

INTRODUCTION

The male urethra is approximately 18-20 cms long and is divided into anterior (penile and bulbar) and posterior parts (membranous and prostatic) by the urogenital diaphragm.

Retrograde Urethrography (RGU) is the gold standard technique for imaging the male anterior urethra, indicated for the evaluation of strictures, diverticulae, fistulae, tumors and trauma[1].

Inherent limitations include misregistration of stricture length due to patient positioning and penile traction, radiation exposure and contrast extravasation.

Sonourethrography (SUG) was introduced in the mid-1980s **and** several studies have suggested higher sensitivity and specificity in its evaluation of anterior urethral strictures. Inadequate evaluation of the posterior urethra and operator dependence are its major limitations. In the present study, we evaluated the correlation between findings of anterior urethral disease as seen on RGU and SUG.

MATERIALS AND METHODS

This study was conducted in the Department of Radio-Diagnosis at NRI General Hospital, Chinakakani, Guntur from 2016-2017. A total of 40 patients attending urology OPD in age group 20 to 70 years with complaints suggestive of lower urinary symptoms were studied. Informed consent regarding the procedures to be performed was taken from all patients. The patients underwent RGU followed by SUG. Comparative study was performed.

Inclusion criteria

- Men with lower urinary tract symptoms
- Age range 20 - 70 years.

Exclusion criteria

- Age less than 20 and more than 70 years.
- Active genitourinary infection.

Study parameters being monitored

- Incidence of various pathologies among the sample of study.
- Percentage distribution of age group among various pathologies.
- Extent of periurethral fibrosis on SUG.
- Correlation of findings between RGU (gold standard) and SGU.

Brief procedure

Patients with history of lower urinary tract symptoms RGU examination with radiopaque iodinated contrast instilled per urethra Sonourethrography Comparative analysis Conclusion.

Examination technique

The patients were examined after explaining to them the procedure, its indications, benefits and complications in detail. A male chaperone was present during the examination and privacy was ensured.

In all the patients, retrograde urethrography using 300mA Allengers conventional X-ray machine was done initially. Following instillation of 5 to 10 mL of 2% Lignocaine jelly per urethra to prevent reflex spasm of the external urethral sphincter, 15-20 mL of iodinated contrast (Urograffin, 76%) was instilled using a sterile plastic syringe. Spot films were taken at 45 degrees obliquity using moderate penile traction with the operator holding the tip of the penis between his fingers to avoid contrast spillage. Technical factors were set at 60-70 kVp and 10-12 mAs with a FFD of 1 metre. The RGU films were evaluated for stricture site, number, and presence of false tract, filling defects or diverticula. Subsequently the patients underwent sonourethrography on PHILIPS HD CLEAR VUE ultrasound machine with a linear array transducer of 4-12MHz and an intracavitary transducer of 4-9 MHZ after successive instillation of 5 mL 2% Lignocaine jelly and saline into the urethra. The images were obtained in two perpendicular planes after manually pinching the penile tip at external urethral meatus. The penile urethra was evaluated from the fossa navicularis to the root of the penis; the bulbar urethra and membranous urethra upto the external sphincter were evaluated by transperineal and scrotal approach.

RESULTS

A total of 40 patients attending urology OPD in age group 20 to 70 years with complaints suggestive of lower urinary symptoms were studied.

Out of total 40 cases of the present study, most common age group of presentation was between 41-50 years of age (35%) followed by 51-60 years of age (25%).

Out of 40 patients on RGU, 15 were negative cases (37.5%), 23 patients showed penile strictures (57.5%), and 1 case each (2.5%) showed a diagnosis of false passage and urethral tumour on RGU. On

SUG, these findings were closely reflected. One case which was normal on RGU was interpreted as a bulbar stricture on SUG.This might have been due to insufficient dilatation by saline.

In 23 cases of urethral strictures, 14 were located in the bulbar urethra (60.8%), four in the penile (17.3%) and three at the penobulbar junction (13%). Two cases (8.6%) demonstrated multiple strictures.

On SUG out of 24 cases diagnosed as urethral strictures, mild spongiofibrosis was seen in 2(8%), moderate in 1(4%) and severe disease was seen in 1 patient (4%). Majority (84%) of the patients (20) showed no evidence of periurethral fibrosis.

The sensitivity and specificity of SUG was compared to RGU in our study. The sensitivity was 100% and the specificity was 93.3%. The positive predictive value was 96.1% and the negative predictive value was 100%.

Compared to this, the study by Heidenreich A. et al [7] showed a sensitivity of 98% and a specificity of 96% with positive and negative predictive values of 98% and 96% respectively. Samaiyar S.S. et al [8] had sonourethrographic accuracy of 96.44%.

There were no complications encountered during the studies.

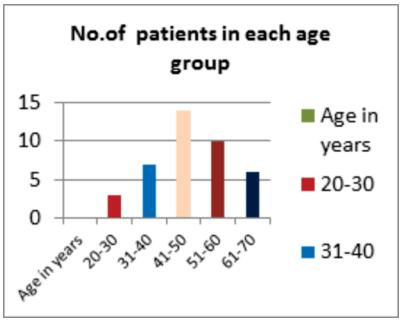

Table - 1:Percentage Distribution of Age Among Patients Studied.

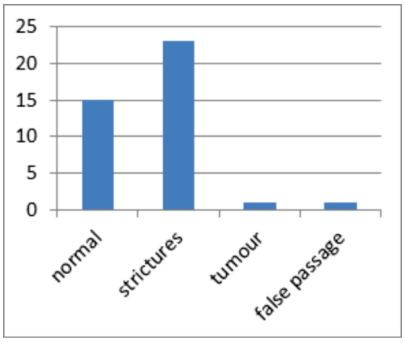

Table -2:Percentage Distribution of cases

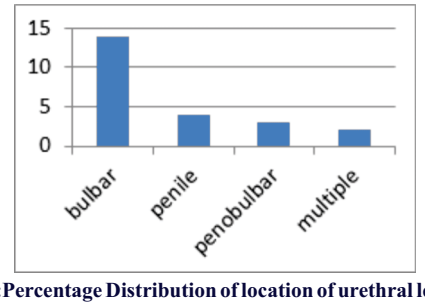

Table - 3:Percentage Distribution of location of urethral lesions

SUG \ RGU	+(disease present)	-(disease absent)
+(test positive)	25	1
-(test negative)	0	14
Total=40	25	15

Table - 4:2X2 plot of the diagnostic performance of SUG vs RGU(gold standard)

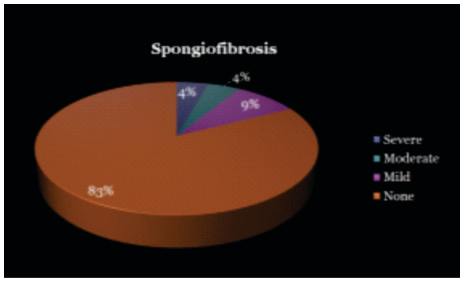

Table - 5:Pie diagram of extent of Spongiofibrosis as determined on SUG

DISCUSSION

RGU is the gold standard investigation in evaluation of male anterior urethra. In 1988, the first ultrasound studies in the anterior urethra in men were described by McAninch *et al*. In their report, the authors believed that US studies were preferable to radiographic studies in the evaluation of patients with suspected anterior urethral strictures[1]. It also gives information about periuretheral tissue and degree of periurtheral spongiofibrosis.

In our study most commonly involved age group is 30-40 years, most common pathology is stricture, and most common site is distal bulbar urethra.

On RGU, reflex contraction of the external urethral sphincter due to forceful instillation may lead to a false positive diagnosis of stricture. The length and depth of strictures are poorly defined. Penile traction and the angle of the X-ray beam relative to the urethra affects estimation of stricture length. Radiographs provide static images, no information about the extent of periurethral fibrosis and expose a patient to ionizing radiation and risk of contrast extravasation causing sepsis and hypersensitivity.

The normal urethral lumen is 4 mm or less in diameter and has small thin walls. A stricture appears as a segment of narrowed lumen with irregularity and thickening of the wall due to fibrosis and scarring. Strictures are more commonly seen in the anterior urethra, secondary to urethritis and trauma.

Strictures can be short (<25 mm) or long (>25 mm). If the stricture is sonographically shorter than 25 mm, it can be treated by anastomotic urethroplasty whereas those strictures longer than 25 mm typically require a graft or flap for reconstruction.[2]

Periurethral fibrosis is identified as regions of greater echogenicity in corpus spongiosum, and is classified as per the classification by Chiou R.K. et al.[10] as:

i. Minimal spongiosal tissue involvement demonstrates either no identifiable spongy tissue involvement or a minimal abnormality.
ii. Moderate spongiosal tissue involvement shows definite areas of abnormal tissue beneath the urethral surface with sonographically normal tissue in the periphery.
iii. Extensive spongiosal tissue involvement consists of a near full-thickness involvement of the corpus spongiosum.

Merkle W et al have speculated that internal urethrotomy is less likely to be successful in patients with periurethral cuffing or spongiofibrosis which is seen only on sonography and which is associated with high rates of recurrence[6].

SUG is a simple convenient, rapid, real time study which can be repeated without radiation exposure or contrast administration to the patients. Both cross sectional and longitudinal images can be obtained and it is a well tolerated procedure. Length of stricture is better assessed on SUG compared to RGU[3].Complex strictures complicated by periurethral abscesses or fistulae can be better assessed[2, 9]. Sonourethrography is operator dependent and needs experience for interpretation.

It is useful as a complementary technique to RGU in the assessment of male anterior urethral pathology.

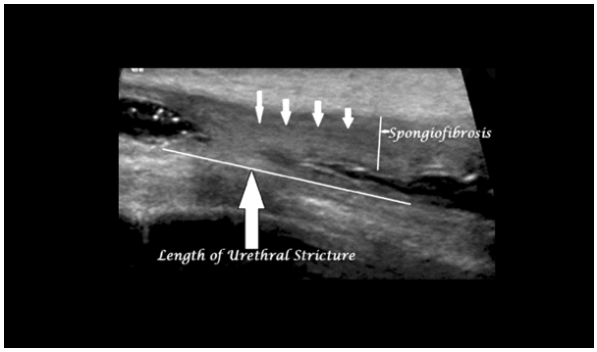

Figure - 1: Case from literature; SUG demonstration of a penile urethral stricture with severe spongiofibrosis[5].

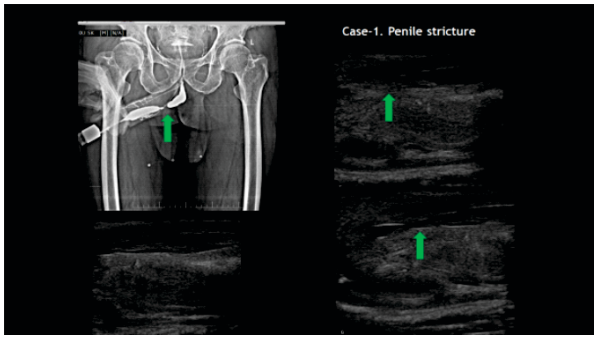

Figure - 2:RGU and SUG demonstration of a penile urethral stricture.

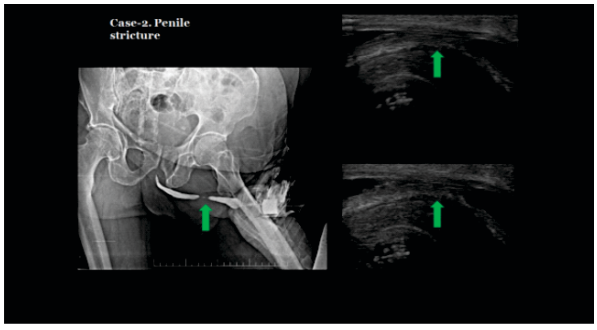

Figure - 3:RGU and SUG demonstration of a penile urethral stricture.

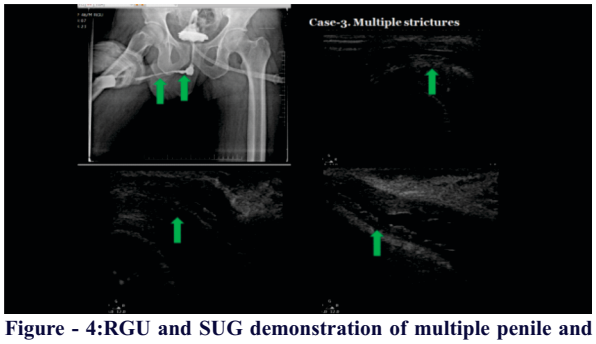

Figure - 4:RGU and SUG demonstration of multiple penile and bulbar urethral strictures. The patient had a history of urethritis.

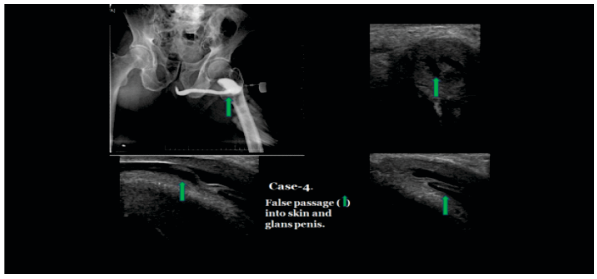

Figure - 5:RGU demonstration of a false passage from the urethra into the skin and glans penis on superior aspect. This was iatrogenically induced due to forceful instrumentation by a Foley's catheter.

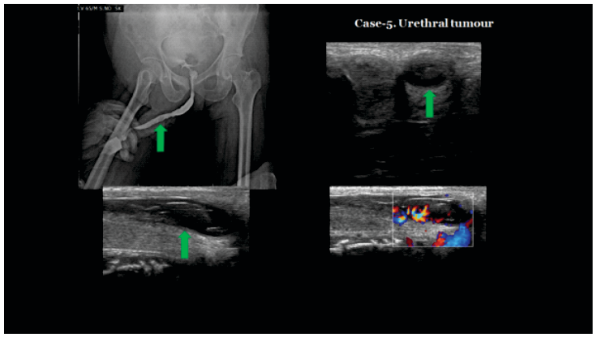

Figure - 6:In a patient who presented with intermittent poor stream, recurrent hematuria and dysuria, RGU and SUG demonstrate a penile urethral tumour seen as a filling defect on RGU and a hypoechoic intraluminal mass with increased flow on colour Doppler interrogation.

CONCLUSION

Conventional RGU is the gold standard imaging test for anterior urethral disease even in the present day era of CT and MRI.

Our study with SUG also showed results on par with RGU with the modality being equally efficient in detection of anterior urethral disease. It is a useful adjunct for evaluating complex periurethral disease and spongiofibrosis.

REFERENCES

1. Pushkarna R, Bhargava SK, Jain M. Ultrasonographic evaluation of abnormalities of the male anterior urethra. Indian J Radiol Imaging 2000;10:89-91
2. The Role of Sonourethrography In the Evaluation of Anterior Urethral Strictures: A Correlation with Retrograde Urethrography. UroToday Int J. 2012 October;5(5):art 46
3. Anil C, Devi B V, Lakshmi A Y, Kumar N A, Rukmangada N. Sonourethrography in evaluation of anterior urethral abnormalities and comparison with retrograde urethrogram. J Clin Sci Res 2019;8:83-8
4. Sonourethrography In The Evaluation Of Anterior Urethral Stricture. IC Akpayak, CC Ani et al. J West Afr Coll Surg. 2012 Jan-Mar; 2(1): 1–13.
5. Rajul R, Pawan J, Yuktika G, Shourya S, Pankaj K D, et al. Can Magnetic Resonance Urethrography (MRU) be a Single-Stop for Male Urethral Stricture Evaluation?. JOJ uro & nephron. 2016; 1(1): 555555
6. Merkle W, Wagner W. Sonography of the distal male urethra-a new diagnostic procedure for urethral strictures: results of a retrospective study. J Urol. 1988;140:1409-11
7. Heidenreich A, Derschum W, Bonfi g R, Wilbert DM. Ultrasound in the evaluation of urethral stricture disease: a prospective study in 175 patients. British Journal of Urology. 1994; 74: 93-98
8. Samaiyar SS, Shukla RC, Dwivedi US. Role of sonourethrography in anterior urethral stricture. Indian Journal of Urology. 1999;15 (2):146-51
9. Anand Hatgaonkar. "A Comparative Study of Sonourethrography and Retrograde Urethrography in Evaluation of Anterior Male Urethral Strictures". Int J Sci Stud. 2014;2(2):5-12.
10. Chiou RK, Anderson JC, Tran T, Ptterson RH, Wobig R, and Taylor RJ. Evaluation of urethral strictures and associated abnormalities using high-resolution and color Doppler ultrasound. Urology. 1996;47:102-07