ORIGINAL RESEARCH ARTICLE

Role of Sonourethrogram in Evaluation of Anterior Urethral Stricture and its Correlation with Retrograde Urethrogram

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ABSTRACT

Introduction: Retrograde urethrography, Voiding cysto-urethrography, Sonourethrography, Urethral strictures, Urethral Diverticulum, Urethrocutaneous fistula and sinuses. Conventionally the imaging modality of choice for anterior and posterior urethral strictures. Alternatively for this include the Sonourethrogaphy, Ultrasound to assess the lumen of the urethra and the periurethral tissues. This study was undertaken to find out the role and efficacy of sonourethrography in the evaluation of male anterior urethral lesions and its comparison with conventional radiographic retrograde urography.

Material and methods: In our study, 50 male patients were examined by the both modalities retrograde urography and sonourethrography referred to our department of radiodiagnosis NSCB medical college, Jabalpur.

Results: Out of 50 patients, seventeen patients were normal while 33 patients had urethral findings. Amongst them 31 had urethral strictures at various sites and one each had urethral diverticulum and urethrocutaneous fistula. Strictures were then further characterised as per its location, number, length and other findings.

Conclusion: With this study we found that sonourethrograhy is quite competent, inexpensive and sensitive in picking up the anterior urethral lesions providing excellent view of the distal urethra, infact it is better than conventional radiographic retrograde urography, is easy to perform, doesn't require iodinated contrast media and doesn't have any radiation hazards.

Keywords: Sonourethrogram, Evaluation of Anterior Urethral Stricture, Retrograde Urethrogram

INTRODUCTION

Traditionally Imaging of the anterior male urethra has been performed by fluoroscopic contrast conventional retrograde urethrography and antegrade urethrography along with voiding cysto-urethrography or Micturating cysto-urethrography were the standard studies for the anterior urethra and posterior urethra as well [1] however these contrast studies, provide only the luminal anatomy, carry certain limitations such as they may only poorly define the length of the stricture, cannot define the depth of scar formation, periurethral strictures and periurethral fibrosis [2]

The initial experiences with ultrasound evaluation of the urethra were described separately in the late 1980s by McAninch et al [3] and Merkle and Wagner[4], apart from demonstrating the strictures it also demonstrated the presence and degree of periurethral fibrosis can be shown with a view to guiding surgery[5,6]

Ultrasound having the obvious advantages of relative non-invasiveness, ready availability and lack of ionising radiation exposure. In terms of comparison between the two methods in assessing stricture disease, a number of studies have demonstrated that ultrasound is at least as effective as contrast urethrography in assessing length and extent of stricture[7-9]

Current research aimed to find out the role and efficacy of sonourethrography in the evaluation of male anterior urethral lesions and to compare conventional radiographic retrograde urography and sonourethrography, in detection of anterior urethral lesions.

MATERIAL AND METHODS

Source of data collection is from patients referred to Department of Radio diagnosis at NSCB Medical College Jabalpur with history of voiding difficulties, trauma, Foleys bulb injury and infection.

Method of collection of data: Patients presenting with voiding difficulties were examined by conventional radiographic retrograde urethrogram followed by sonourethrogram.

Method of examination: Selected patients for the study were explained about the procedure of retrograde urethrography and sonourethrography along with the purpose of conducting both examinations. Written consent was obtained from patients.

ascending ultrasound technique whereby a catheter was placed distally in a similar manner to contrast urethrography with a balloon inflated in the fossa navicularis and the urethra distended with either saline or, if a conventional urethrogram was also required, contrast medium

Ultrasound was performed using a high-frequency linear array transducer 7.5-10 MHz Mindray DC30, with direct

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skin contact along the ventral surface of the penis, subscrotal and perineal views were obtained wherever necessary. Acoustic shadowing from the very distal tip of the catheter beyond the balloon was found to obscure pathology in the distal urethra, therefore the catheter tip was trimmed to avoid this pitfall.

The findings of the study were then subjected to statistical tests of significance. Unpaired't' test was used. The sensitivities were statistically calculated. The findings of both examinations were analyzed in terms of Percentage sensitivities of pathology detection rates.

RESULTS

Out of 50 male patients examined by both modalities, average age observed was 38.2 years with maximum number of patients from the age group 31-40 (table-1)

Amongst them, 33 cases were detected with pathology of urethral obstruction of varying types whereas rest 17 patients were reported as normal. Out of detected pathologies of urethral obstruction 31 cases were identified as strictures, one with urethral diverticulum and one with urethra cutaneous fistula. (Table 2)

Out of the strictures identified by both the modalities bulbar urethral stricture was the most common site of stricture notes that too in 19 cases followed by penile urethral strictures in 9 cases and 2 cases were identified as a complex stricture. The individual distribution of the sites of strictures observed is shown in (table-3/chart-2), in our study all strictures were correctly diagnosed by the both modalities except in a case of one penile and one bulbar urethral stricture which were wrongly diagnosed by RGU as normal and SUG misdiagnosed one case of bulbar urethral stricture as normal. Urethritis was detected in total 20 of the cases amongst which RGU missed one of the cases which was detected on SUG (table-2). Urethral diverticulum and urethro-cutaneous fistula was detected by RGU as well as SUG both with 100% sensitivity (table 2)

In our study we also measured the length of the stricture in RGU as well as SUG which was compared thereafter. The mean and standard deviation by individual modalities observed was 1.03+- 0.52 by RGU and 1.51+- 0.52 by SUG (cms); (chart-1). Short segment stricture was noted in 29 cases while only 2 cases in our study had long segment of stricture.

Out of 50cases examined, pathology was detected in 33 of the patients which includes 31 cases for stricture urethra and one cases each had diverticulum and urethrocutaneous fistula respectively. Urethritis was seen in 20 of the examined cases. Bulbar urethral strictures were the commonest found in 18 patients with both the modalities. One extra bulbar stricture was diagnosed on RGU which was missed on SUG another one was diagnosed by SUG but was missed on RGU. one being in the penile region wrongly detected as normal by RGU

Out of 31 cases short segment stricture was seen in 29 of the

Age (Years)	No. of patients	Percentage (%)
11-20	5	10.00
21-30	15	30.00
31-40	20	40.00
41-50	5	10.00
51-60	2	04.00
61-70	3	06.00
Total	50	100

Table-1: Distribution of patients as per age

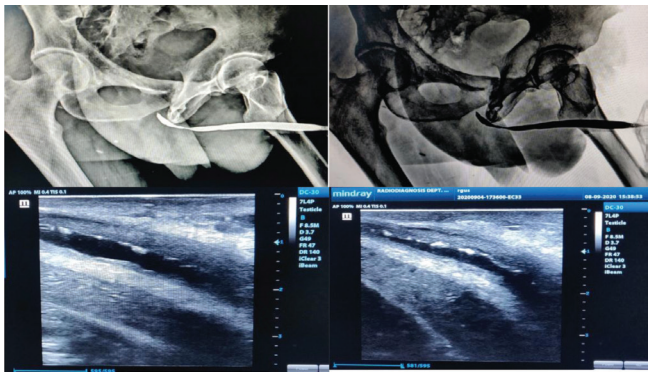

Figure-1: On contrast imaging, there is narrow stricture seen at the junction of bulbar and membranous

	On RGU	On SUG	Total detected	Percentage by SUG (%)
Stricture	29	30	31	96.77
Urethritis	19	20	20	100
Diverticulum	1	1	1	100
Urethra-cutaneous fistula	1	1	1	100

Table-2: Various pathologies detected by both modalities

RGU / SUG	Penile	Bulbar	Complex	Others	Normal	Total
Penile	8	0	0	0	1	9
Bulbar	0	18	0	0	1	19
Complex	0	0	2	0	0	2
Others	0	0	0	2	0	2
Normal	0	1	0	0	17	18
Total	8	19	2	2	19	50

Table-3: Distribution of patients according to location of strictures.

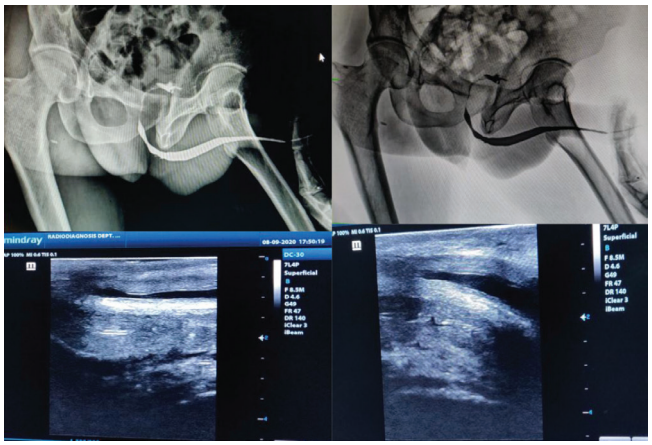

Figure-2: Multiple strictures seen

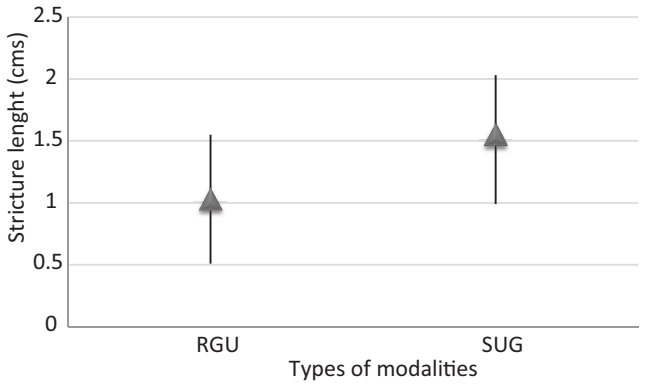

Chart-1:

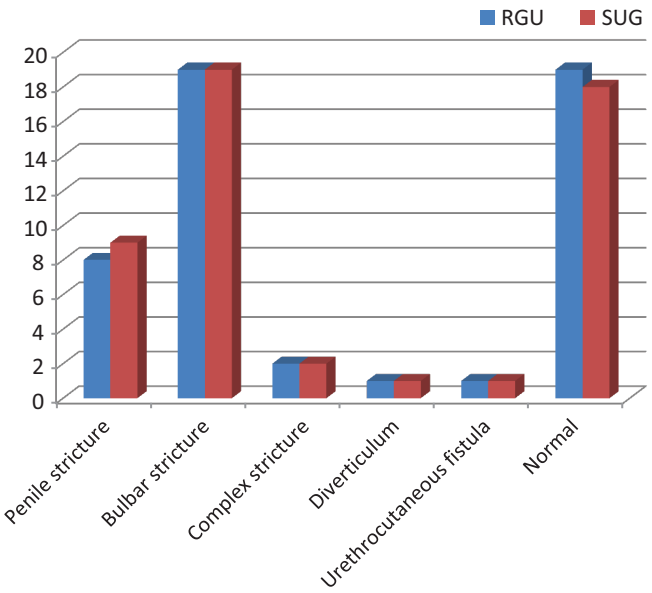

Chart-2:

cases out of which 24 were bulbar and 6 were penile urethral strictures. 2 cases had long segment of strictures both being the penile. (2.5cms was used as the cutoff criteria chiouRK et al.[6] and morey A et al.[10])

DISCUSSION

Retrograde urethrography has been the standard imaging technique for the evaluation of anterior urethral pathologies which involve contrast media and radiation. It gives very limited information about the periurethral structures.

In this study we asscessed the role and efficacy of sonourethrography as a adjunct to conventional methods of urethral examination which was performed with the urethra distended by normal saline and the use of high frequency ultrasound probe over the ventral surface of penis and scrotum to visualize the anterior urethra.

We studied 50 pateints presented to us with voiding difficulties pertaining to anterior urethra. All patients were studied by both conventional radiographic retrograde urethrography and sono urethrography. The findings of both study were analysed and comapared

Out of 50 male patients studied, average age observed was 38.2 years with maximum number of patients from the 3rd decade (table-1/chart-1). Chiou R.K. et al[6]., Bearcroft P.W.P. et al[11]., Gluck C.D. et al.[1], Gupta S. et al.[12], Samaiyar S.S. et al.[13] also had mean age of patients around 3rd decade.

Bearcroft P.W.P. et al.[11] studied 24 patients of which 11 were normal. Three cases demonstrated diverticula however only two of these were seen on SUG. A shallow diverticulum was found in case of complex strictures only on contrast study. Alanen A, Nurmi M[14] studied 16 male patients out of which one had diverticulum. Most of the previous studies underestimated these findings. We had similar findings in which we found 31 cases with urethral strictures, one each with findings of diverticulum and urethrocutaneous fistula which were equally seen with both methods.

Locations of the strictures were categorized as penile, bulbar and complex. in our study all strictures were correctly diagnosed by the both modalities except in a case of one penile and one bulbar urethral stricture which were wrongly diagnosed by RGU as normal, Pushkarna R. et al.[15] reported similar finding, one patient had normal RGU showed 2 mm stricture on SUG.

SUG misdiagnosed one case of bulbar urethral stricture as normal similarly studies such as McAninch JW et al., Bearcroft P.W.P. et al. and Gupta S. et al.[3,11,12] had similar problem regarding the posterior urethra which is difficult to evaluate with SUG owing to its inability to scan the urethra in a perpendicular fashion.

Length of the stricture was measured by both modalities The mean and standard deviation by individual modalities observed was 1.03+- 0.52 (cms) by RGU and 1.51+- 0.52 (cms) by SUG (t=3.63 P<0.001, chart-2). Gupta et al.[12] in the study including 30 patients reported poor correlation between the two techniques in estimation of stricture length, RGU underestimating the length in most cases. S. Choudhary, P. Singh et al.[15] in their study of 70 patients reported similar findings. Samaiyar S.S. et al.[13] found that contrast urethrography underestimated the length by 50% or by 0.6 mm, mainly in the bulbar region.

CONCLUSION

With this study we found that sonourethrograhy is quite competent, inexpensive and sensitive in picking up the anterior urethral lesions providing excellent view of the distal urethra, infact it is better than conventional radiographic retrograde urography, is easy to perform, doesn't require iodinated contrast media and doesn't have any radiation

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hazards. It is three dimensional real time study that can be done repeatedly without any hazards. The only drawback of the study is it will not demonstate the entire urethra in single panoramic view.

Our conclusion are based on a limited number of patients and should be validated on a larger series.

REFERENCES

1. Clifford d Gluck, Albert l Bundy, calliope fine, Kevin r. Loughlin and Jerome p Richie. Sonographic urethrogram: comparison to roentogenographic techniques in 22 patients. Journal of Urology 1988; 140(1): 1404-1408
2. Paul W Klosterman, Faye C Laing, Jack W Mc Aninch. Sonourethrography in evaluation of urethral stricture disease. Urologic Clinics of North America 1989; 16(6); 4: 791-797.
3. McAninch JW, Laing FC, Jeffrey Jr RB. 226. Sonourethrography in the evaluation of urethral strictures: a preliminary report. J Urol 1988;139(3):294–7
4. 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(4):1409–11
5. Klosterman PW, Laing FC, McAninch JW. Sonourethrography in the evaluation of urethral stricture disease. Urol Clin North Am. 1989; 16(4):791-7.
6. Chiou RK, Anderson JC, Tran T, Patterson RH, Wobig R, Taylor RJ. Evaluation of urethral strictures and associated abnormalities using high-resolution and color Doppler ultrasound. Urology. 1996; 47(1):102-7.
7. ultrasonographic evaluation of urethral stricture disease. Das S Urology. 1992; 40(3):237-42.
8. Arda K, Basar M, Deniz E, Yildiz S, Akpìnar L, Olçer T. Sonourethrography in anterior urethral stricture: comparison to radiographic urethrography. Arch Ital Urol Androl 1995;67(6):249–54
9. Akano AO. Evaluation of male anterior urethral strictures by ultrasonography compared with retrograde urethrography. West Afr J Med 2007;26(1):102–5
10. Morey AF, McAninch JW. Role of preoperative sonourethrography in bulbar urethral reconstruction. J Urol. 1997;158 (4):1376-79
11. Bearcroft PW, Berman LH. Sonography in the evaluation of the male anterior urethra. Clin Radiol. 1994;49 (9):621-28.
12. Gupta S, Majumdar B, Tiwari A, Gupta RK, Kumar A, Gujral RB. Sonourethrography in the evaluation of anterior urethral strictures: correlation with radiographic urethrography. J Clin Ultrasound. 1993;21 (4):231-39.
13. Samaiyar SS, Shukla RC, Dwivedi US. Role of sonourethrography in anterior urethral stricture. Indian Journal of Urology. 1999;15 (2):146-51.
14. Alanen A, Nurmi M. Sonographic technique in diagnosis of urethral strictures in men. Bildgebung. 1994;61 (1): 25-7
15. Pushkarna R, Bhargava S K, Jain M. Ultrasonographic Evaluation of Abnormalities of the Male Anterior Urethra. Ind J Radiol Imag. 2000;10:2(5):89-91.
16. Choudhary S, Singh P, Sundar E, Kumar S, Sahai A. A comparison of sonourethrography and retrograde urethrography in evaluation of anterior urethral strictures. Clin Radiol, England. 2004;59 (8):736-42.

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