

AN ANALYTICAL STUDY OF STRICTURE URETHRA BY RETROGRADE URETHROGRAPHY

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ABSTRACT

Stricture urethra in males is a common health problem encountered by the urologists. It is associated with a significant financial cost and potentially debilitating outcomes. The present study aims at analysis of stricture urethra in male population so as to provide guidelines for the urologists to decide better treatment option for patients. This study was done in the period from 1st Jan. 2015 to 31st Dec.2016 including 121 male patients with diagnosis of stricture urethra, (diagnosed by Retrograde Urethrography - RGU). RGU has proved to be gold standard primary investigation for evaluation of entire urethra which can serve as a roadmap for urologists to treat the disease. In this male population study, the 30-40 years of age group was commonly affected and the common etiological factor was active or healed infections of urethra. The average stricture length observed was upto 3mm and the common location was bulbo-membranous urethra. In cases of stricture urethra, RGU has proved to be a baseline imaging modality to assess urethra proximal and distal to the strictures.

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INTRODUCTION

Urethral stricture disease remains a common cause of morbidity among men. It is associated with significant health care expenditure and morbidity in terms of urinary tract infection and incontinence.⁽¹⁾ Stricture urethra is a narrowing of urethra usually caused by fibrotic scarring. The most common causes are inflammatory, traumatic and less commonly congenital.⁽²⁾

Several imaging modalities are available for visualization of urethra such as retrograde urethrography, magnetic resonance urethrography, sonourethrography; out of which RGU is the baseline imaging modality for evaluation of urethral stricture disease. Radiographic evaluation of the urethra with contrast studies is best achieved by retrograde Urethrography (RGU). This study can be used effectively to diagnose and to localize the extent of the urethral stricture. Accurate documentation of the extent and location of the stricture is important for a urologist so that he can decide the most effective treatment option for the patient. So also the entire urethra, both proximal and distal to the stricture, must be evaluated radiographically prior to any surgical intervention⁽¹⁾; which is possible by RGU. The aim of this study was to determine the etiological factors and morphology like length, location, severity of stenosis etc. of urethral stricture disease in males.

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MATERIALS AND METHOD

In the present study 121, male patients with clinical diagnosis of bladder outlet obstruction were evaluated. This study was done in the period from 1st Jan 2015 to 31st Dec. 2016. Patients were explained about the procedure and a written consent was obtained from all of them. RGU was performed and results were interpreted by a senior radiologist (self) who has 30 years of experience in doing RGU. Institutional review board approval was obtained prior to the start of the study by the research committee for ethics.

Examination technique

The foreskin of patient's penis was retracted and the tip of penis was cleaned with antiseptic solution and betadine. A small amount of topical local anesthetic (e.g. lignocain gel) was introduced into the urethra with 2ml syringe. Local anesthetic helps to relax the sphincter as the patient may contract it during the procedure thus leading to a diagnosis of false stricture. Patient's position should be oblique to visualize full length of urethra. 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 tip of the metallic adaptor or feeding tube No.6-8 was placed in the urethral orifice and the contrast loaded syringe (20 ml of non-ionic, water soluble, iodinated contrast media and 30ml of normal saline) was attached to it. After 30 ml of contrast was

injected, 3-4 images were obtained till 40-45 ml of contrast was being introduced into urethra.

Before procedure AP film was obtained as scout film. Ideal images demonstrate the entire length of the urethra with contrast beginning to fill the bladder.

The procedure time was approximately 15-20 min.

The following data was recorded

- Stricture location, length and diameter were measured using a scale. 20% deduction was made to correct for magnification.
- Other peri-urethral pathology and complications if any.

Observations and Result

A total of 121 male patients with proven urethral strictures were evaluated in the period from 1st Jan. 2015 to 31st Dec. 2016. The findings were tabulated as well as graphically represented as follows -

Table No 1 Showing Age Distribution of Patients

Age (Years)	No. of Patients	Percentage (%)
0 - 10	3	2
10 - 20	0	0
20 - 30	0	0
30 - 40	49	40
40 - 50	33	27
50 - 60	16	14
> 60	20	17
Total	121	100

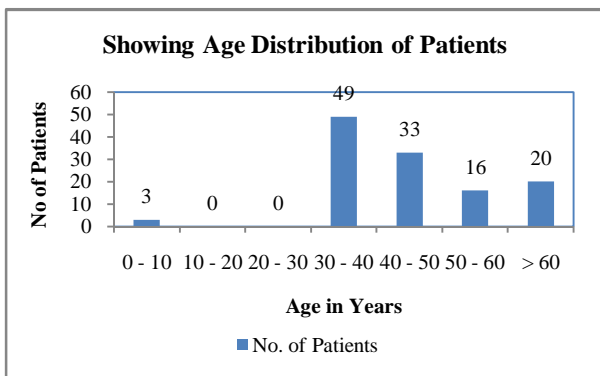
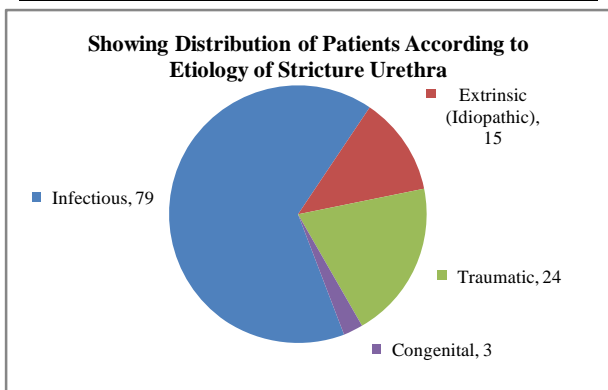


Table No. 2 Showing Distribution of Patients According to Etiology of Stricture Urethra

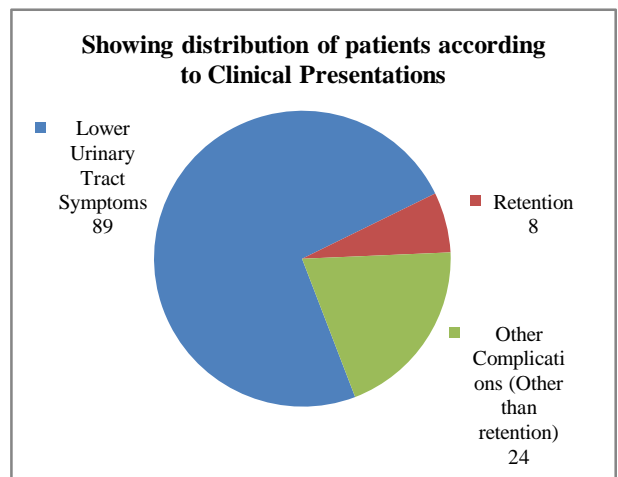
Cause	No. of Patients	Percentage (%)
Infectious	79	65
Extrinsic (Idiopathic)	15	13
Traumatic	24	20
Congenital	3	2
Total	121	100



In the present study, it was observed that the patients of 30-40 years of age were most affected by urethral stricture disease. The next common affected age group was between 40-50 years. In this study as shown in Table No.2 the most common cause of stricture urethra was infectious (65%) in population study. The next common etiological factor was traumatic (20%). This could be related to increased use of catheterization and transurethral urological procedures. The external trauma was mainly due to road traffic accidents. In the present study, patients with history of external trauma like road traffic accidents and other pelvic injuries were included. The patients who had earlier intervention and urethral catheterization, cystoscopy, surgery for hypospadias etc were excluded. Only 2 % cases were having congenital stricture which possibly could due to incomplete rupture of the urogenital membrane. In 13% of cases, cause was not found / known. They were included in idiopathic group.

Table No. 3 Showing distribution of patients according to Clinical Presentations

Presenting Symptom	No. of Patients	Percentage (%)
Lower Urinary Tract Symptoms	89	74
Retention	8	7
Other Complications (Other than retention)	24	19
Total	121	100



According to clinical data obtained, most of the patients (74%) presented with lower urinary tract symptoms such as weak stream, dysuria, frequency, nochiria, post-micturition dribbling, incontinence, hesitancy, urgency, hematuria etc. The most common symptom noted was sensation of incomplete evacuation. According to Mundy *et. al.*⁽³⁾, the strongest association of any of these lower urinary tract symptoms with stricture disease is a sense of incomplete emptying. The 7% patients had retention of urine while rest of the patients (19%) had other complications like para-urethral abscess, bladder stones, tuberculosis etc.

Table No. 4 Showing Location of Stricture

Location of Stricture	No. of Patients	Percentage (%)
Bulbo - Membranous Urethra	98	81
Prostatic Urethra	24	20
Penile Urethra	15	12
Total	137	113

(Note - One patient can have pathology at two locations)

In maximum number of patients (81%) the location of stricture was bulbo-membranous urethra. In these cases

etiological factor was infection of urethra (acute or healed). In idiopathic cases, penile strictures (12%) were observed. The prostatic strictures (20%) were noted in patients with prostatic hypertrophy as well as post traumatically.

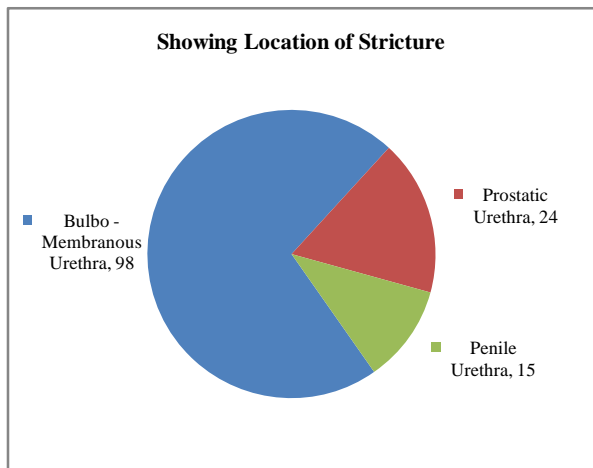
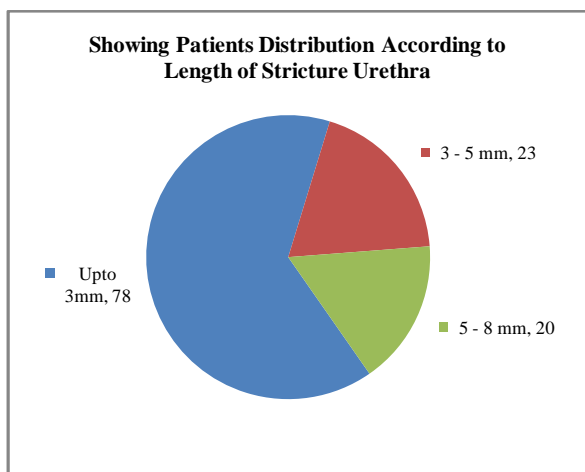


Table No. 5 Showing Patients Distribution According to Length of Stricture Urethra

Length of Stricture	No. of Patients	Percentage (%)
Upto 3mm	78	64
3 - 5 mm	23	19
5 - 8 mm	20	17
Total	121	100



The average stricture length observed was upto 3mm. (64% of cases). In rest of the cases stricture length varied between 3 to 8mm.

Table No. 6 Showing Distribution of Associated Pathology in Patients

Associated Pathology	No. of Patients	Percentage (%)
Ca. Prostate	3	2
Neurogenic Bladder	6	5
Phymosis	4	3
Ectopic Urethra	1	1
PUV	3	2
Prostatic Hypertrophy	15	12
Without Associated Pathology	90	74
Total	121	100

This table is showing distribution of associated pathologies in patients of urethral stricture disease. But majority of the patients (74%) were not having any associated pathologies.

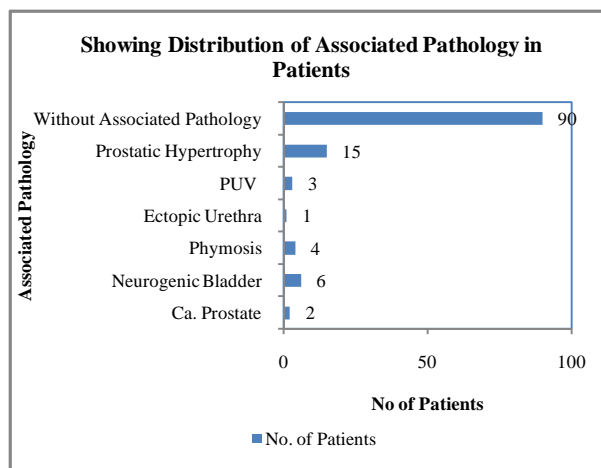
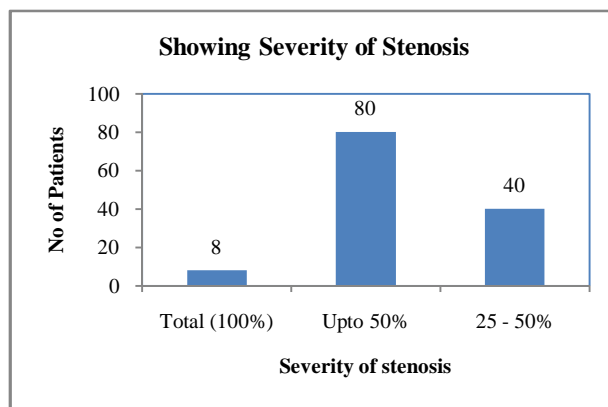


Table No 7 Showing Severity of Stenosis

Severity of Stenosis	No. of Patients	Percentage (%)
Total (100%)	8	7
Upto 50%	80	66
25 - 50%	40	33
Total	128	106

Note - One patient can have multiple strictures with different severity

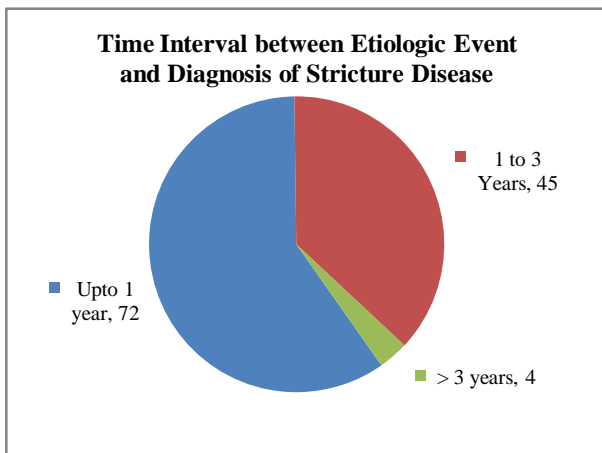


Stricture is the narrowing of urethra causing obstruction. The severity of narrowing or stenosis was found upto 50% in maximum no. of patients (66%) in the present study. 25 to 50% of narrowing was found in 33% of cases while total obstruction (100% stenosis) was observed in 7% of patients. Knowing the severity of stenosis will guide the surgeon in determining mode of treatment and judging the severity of stenosis is best achieved by RGU.

Table No. 8 Time Interval between Etiologic Event and Diagnosis of Stricture Disease

Time Interval between Etiologic Event and Diagnosis of stricture Disease	No. of Patients	Percentage
Upto 1 year	72	60
1 to 3 Years	45	37
> 3 years	4	3
Total	121	100

The time required for the development of clinical features of stricture was upto one year in 60% of patients. It was found more than 3 years in only 3% of cases.



DISCUSSION

Urethral stricture is generally defined as any obstructive fibrous scarring of the urethra.⁽⁴⁾ It is caused by collagen and fibroblast proliferation. As urethral stricture causes progressive narrowing of the urethral lumen, symptoms and signs of urinary obstruction arise gradually and with increased severity. Patients complain of weak stream, straining to micturate, hesitancy, incomplete emptying, post void dribbling, urinary retention and recurrent urinary tract infections. The symptoms resemble those of other causes of bladder outlet obstruction such as benign prostatic hypertrophy. That's why urethral stricture needs to be ruled out in all these patients. So also stricture urethra may be complicated in some patients. Such as it may be associated with diverticulum, stones, false tracts and abscesses which may complicate the surgery. Hence identifying these complicating factors before surgery is very important. Great effort should be taken preoperatively to clarify the stricture length as it is the most critical factor to decide treatment option for the patient. RGU the full length of the urethra up to the stricture and past it through the urethral sphincter, prostatic urethra and bladder neck and into the bladder.

Endoscopy does not show the length of the stricture or the state of the urethra proximal to the stricture. On the contrary RGU gives a more complete assessment. So also, in a trauma situation RGU should be performed first. A Voiding Cystourethrography (VCUG) or Micturating Urethrography (MCU) should not be performed first because blindly trying to introduce a Foley catheter into the bladder in a trauma setting may lead to creating additional urethral damage with the catheter.

In 2006, Osman *et al.* reported the clinical relevance of RGU to evaluate male urethral stricture.⁽⁵⁾ RGU is OPD procedure, painless, less invasive, do not require hospitalization or general anesthesia during procedure or major post procedure management. It is economical and can easily be performed. It is an excellent imaging modality in diagnosis of all types of partial strictures and in patients with multiple strictures. Hence RGU is proved to be a preliminary investigation of choice in stricture urethral disease. In this population study, the leading cause of urethral stricture found was infection of urethra (65%). Currently in developed countries most of the urethral strictures are idiopathic with urethritis causing minority of strictures.^(6,7,8) This could be due to education, awareness, improved treatment of sexually transmitted

diseases. In the present study, the next common etiological factor found was traumatic. Different previous reports also suggest that trauma is the cause of urethral stricture disease in 9.6-36.1% of cases^(6,7,8) which are comparable with the present study (20% of cases). The traumatic injuries include straddle injuries, pelvic fractures and iatrogenic injuries secondary to instrumentation. However, the patients with previous history of catheterization, cystoscopy, surgeries like circumcision, surgery for hypospadias etc. were excluded from the present study.

Lichen sclerosis (LS) is considered a chronic inflammatory condition of unknown etiology.⁽⁹⁾ Genital LS is known to be an important cause of urethral stricture. It can affect any age group. A case series demonstrated the urethral stricture rate secondary to LS to be 8-16%.⁽¹⁰⁾ All forms of prostate cancer treatments may be associated with differing degrees of urethral stricture development. An important complication of surgical procedure circumcision is meatal stenosis. The reported rate is 23%.^(11,12) In the present study, no case of lichen sclerosis, post-prostate cancer treatment or meatal stenosis secondary to circumcision was found during study period.

In the present study, the most common age group affected by urethral stricture was between 30 to 40 years. And the bulbo-membranous urethra being the most common site constituting 81% of the cases. Both these findings were comparable with the previous studies done by Palminteri *et al.*⁽⁶⁾ and Fenton *et al.*⁽⁸⁾ Thus, from this analytical study of stricture urethra, we have established that Retrograde Urethrography (RGU) has been the gold standard investigation in the evaluation of stricture urethra.

CONCLUSION

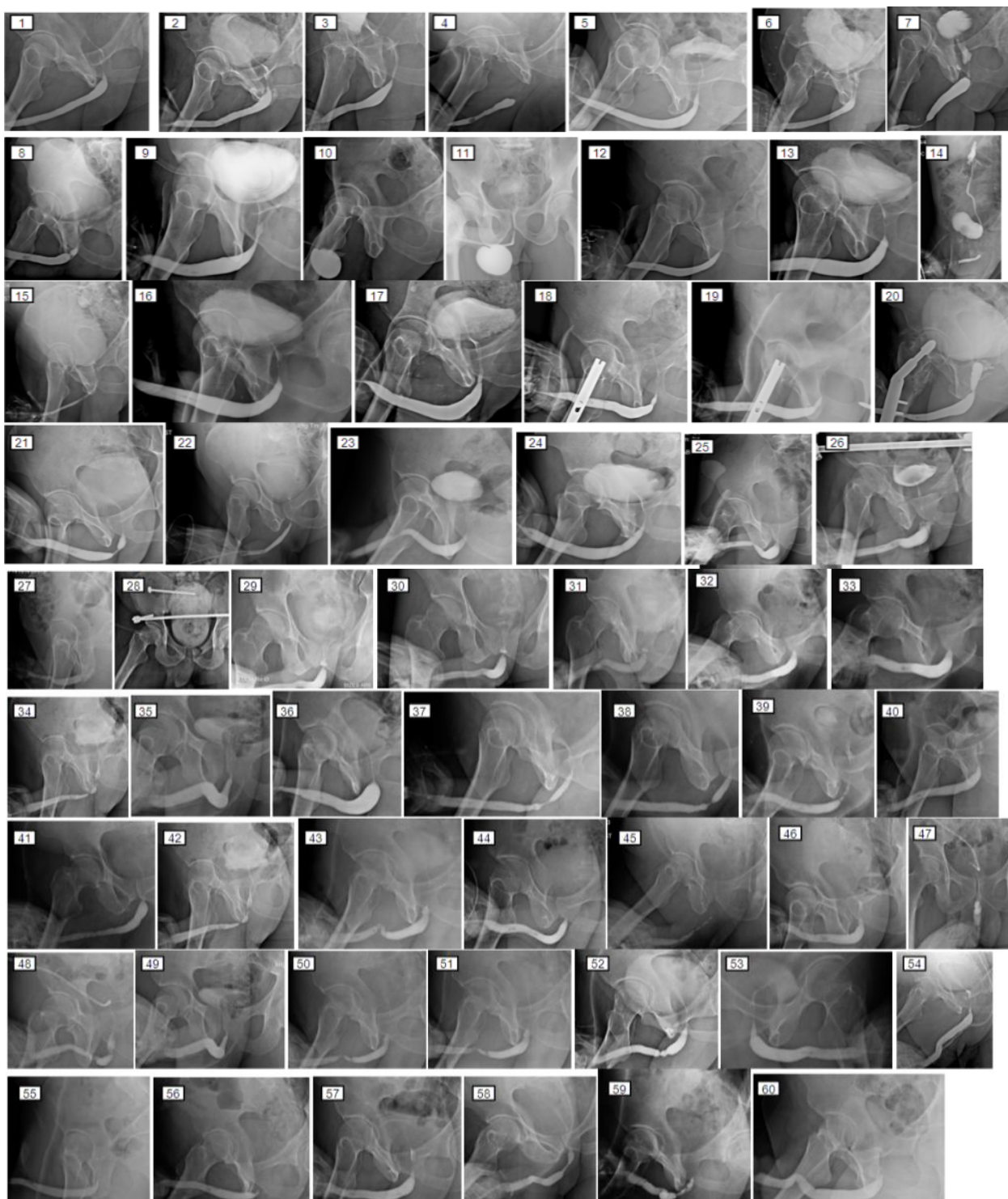
Urethral stricture disease is relatively common in males and in many cases debilitating. Identifying cause in these cases will help to determine treatment option. To establish diagnosis of stricture urethra and for its surgical treatment morphological roadmap of entire urethra is necessary. Retrograde urethrography is undoubtedly a baseline investigation of choice to know etiology and morphology of stricture urethra, due to its easy availability, low cost and being a OPD procedure. In the present study, the most common etiological factor of stricture urethra was found to be infectious, the 30-40 years of age group was commonly affected and lower urinary tract symptoms were common clinical presentation. The bulbo-membranous urethra was affected more and average stricture length found was upto 3mm. Thus in this analytical study of stricture urethra, reliability of RGU is established beyond doubt as a primary investigation of choice.

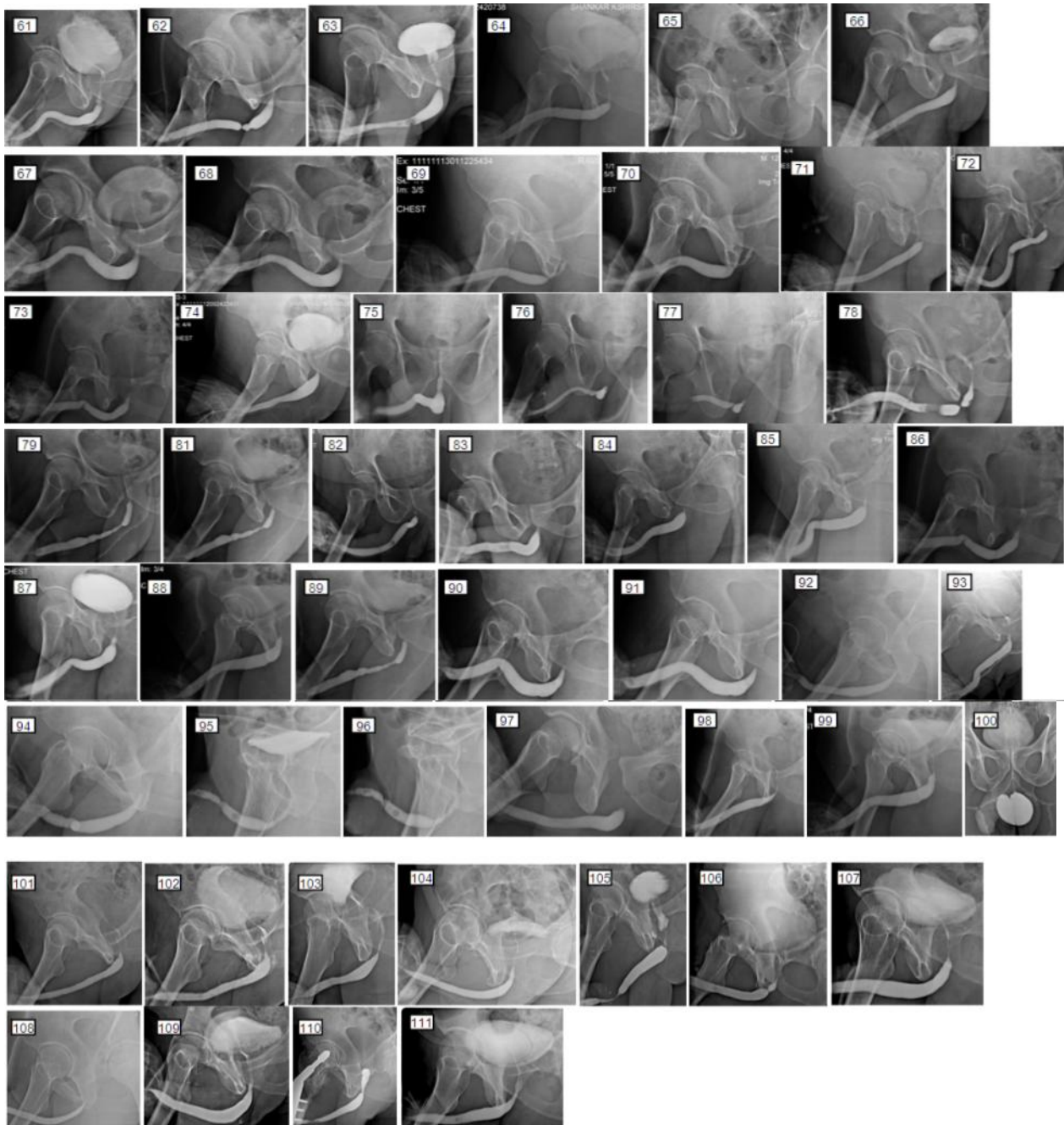
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Different Retrograde Urethrography (RGU) images showing stricture urethra at various sites





STRICTURE BULBOUS / MEMBRANOUS-04, 08, 09, 12, 13, 16, 17, 21, 23, 25, 26, 27, 29, 30, 31, 32, 33, 34, 39, 44, 46, 47, 49, 53, 55, 56, 57, 58, 59, 60, 61, 64, 66, 67, 68, 69, 70, 71, 72, 73, 74, 77, 78, 82, 83, 84, 87, 88, 91, 92, 94, 95, 97, 98, 99, 101, 102, 105, 107, 109, 111.
STRICTURE PROSTATIC URETHRA -01, 02, 03, 05, 06, 07, 24, 28, 35, 36, 40, 41, 47, 50, 53, 54, 61, 75, 76, 79, 80, 93, 106.
STRICTURE PENILE URETHRA -07, 10, 11, 41, 43, 45, 48, 51, 52, 62, 78, 79, 89, 100, 105.
POST TRAUMATIC STRICTURE -18, 19, 20, 110.
CA PROSTATE WITH STRICTURE - 103, 104
FALSE PASSAGE WITH STRICTURE BULBOUS URETHRA -02, 27, 101, 102
DIVERTICULUM STRICTURE PENILE - 10.
PUV VALVE WITH REFLUX - 14
BLADDER CALCULUS WITH STRICTURE PROSTATIC URETHRA - 29

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