Journal of Cardiovascular Disease Research

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE03,2022

Original research article

Response to international index of erectile function (IIEF) questionnaire amongpatients with stricture urethra attending tertiary care hospital

[1]Dr. Rakesh K Janna,[2]Dr. Ravi Shankar THS,[3]Dr. Chandana MH, [4]Dr. N IMDAD Ali, [5]Dr.Shivashankarappa Mudegoudar, [6]Dr. Jayaprakasha Gangadharaiah

[1,6]Assistant Professor, Department of Urology,VIMS, Ballari,Karnataka, India

[2,5]Associate Professor,Department of Urology,VIMS,Ballari, Karnataka, India

[3]Assistant Professor, Department of Anaesthesia,VIMS, Ballari, Karnataka, India

[4]Professor and Head, department of anaesthesia,VIMS, Ballari, Karnataka, India

CorrespondingAuthor:
Dr. Chandana M H

Abstract

Urethral stricture refers to anterior urethral narrowing; urethral stricture is scarring of urethral epithelium which commonly extends into the underlying corpus spongiosum, a column of erectile tissue that surrounds the urethra. Posterior urethral stricture disease is better called as distraction injury and the term 'stricture' is limited to scar disease of only anterior urethra. Urethral stricture disease remains an entity almost confined to males, though it is also seen very rarely in the postmenopausal women. All adult male patient of urethral stricture presenting to our hospital during the study duration were screened for exclusion criteria. The patients compatible for the study were interviewed. After obtaining informed consent they were enrolled in the study. At the time of enrolment patients were allotted detailed clinical history was obtained. Complete physical examination and relevant investigations was done. 38 patients who presented to us had undergone some interventions in the past, while four of them had internal urethrotomies done. Urethral dilatation was done in 15 patients which 3 had undergone anastomotic urethroplasty. Eleven patients underwent supra pubic cystostomy as primary management for retention of urine due to stricture urethra.

Keywords: International index of erectile function, stricture urethra, urethroplasty

Introduction

Male urethra is a tubular structure which carries urine from the bladder to the exterior. It also serves as a channel for semen during ejaculation.

Urethral stricture refers to anterior urethral narrowing; urethral stricture is scarring of urethral epithelium which commonly extends into the underlying corpus spongiosum, a column of erectile tissue that surrounds the urethra.

Posterior urethral stricture disease is better called as distraction injury and the term 'stricture' is limited to scar disease of only anterior urethra[1].

Urethral stricture disease remains an entity almost confined to males, though it is also seen very rarely in the postmenopausal women.

The main symptom, which brings the patient to his doctor, is difficulty in voiding:

'An individual having permanent stricture, first observes a few drops of water remain after the whole seems to have been discharged, then notices a fine spiral or divided stream and, lastly, discharges his water by drops only. In this last state, for the purpose of facilitating the escape of the urine and preventing its being retained by the lacunae of the urethra, he draws out the penis with considerable force'[2].

The earliest records of medicine are much concerned with the management of urethral strictures by means of catheters and sounds. In ancient India Sushruta described the use of a reed catheter lubricated with ghee. In Greece, Socrates was known to joke about the gleet of others, and poor Epicurus committed suicide when he could no longer dilate his own stricture.

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE03, 2022

The treatment of stricture was essentially by means of intermittent bouginage: Bougies are made of either wax, catgut, or silver: and they are usually numbered from 1 to 16 according to their dimension, so that the surgeon may, on each occasion, know the size he is using, and the size last used'[3].

The word bougie is of some interest: Bujiyah was the name of the Algerian town from which came the best wax for candles for, as Castle again writes: 'The wax bougie is the one in general use. with respect to wax bougies, before introducing them into the urethra, you should always warm them by the fire, for the purpose of rendering them soft; when, if they are introduced into the urethra, and pass through the stricture, you will ascertain the distance at which it is situated from the orifice and the form and size of the stricture will be modelled on the bougie'.

When modern pathology was introduced in the wake of the application of the microscope to human tissues surgeons began to realize that any cause of inflammation would lead to granulation tissue formation, and that this would be followed by scarring, which would give rise to contracture in the skin, and stricture in a hollow organ such as the urethra. Unfortunately there seemed no way to hinder the process, and surgeons were obliged to rely on regular dilatation as the standard method of management of a stricture. Indeed, even today, regular gentle and skilful dilatation is still the standard against which any other method must be measured[4].

It is small wonder that generations of surgeons cast about for some more effective method. Of these the use of 'escharotics', i.e. caustic soda or silver nitrate fused to the end of a silver bougie, were in common use in the eighteenth and nineteenth centuries, but with variable success, and with no great permanence.[12]

Again and again surgeons devised new kinds of knife with which to slit the stricture from within: 'Punctuation or division from within, I have employed successfully, and recommend it in impervious stricture situated in the first four inches of the urethra-that is to say, in the part which admits of being drawn into a straight line. At the common situation of stricture this method is dangerous and uncertain'.

In Rome in the first century, Celsus described the operation of external urethrotomy for a calculus impacted behind a stricture, and urethrotomy became part of the canon of classical medicine preserved by the Arabs only to be rediscovered in the Renaissance, when Ambroise Pare (1510-1590) devised an instrument for scraping 'carnosities' from the urethra. Silver catheters armed with a concealed lancet were in use in 1795, and in 1817 Civiale of Paris devised a practical internal urethrotome, improved by Maisonneuve in 1848 to screw on to a filiform guide[5].

The new freedom and indication to explore the urethra coincided with the availability of a revolutionary new endoscopic optical system devised by Professor Harold Hopkins - another unsung British genius of the caliber of Barnes Wallis and Frank Whittle - who had already invented the zoom lens and the flexible fiber glass light and endoscopy systems. The Hopkins rod-lens system, developed by Karl Storz, provided a brilliantly clear view of the inside of the urethra. Again, electronic measuring devices allowed von Garrelts (1956, 1972) to analyze the physical characteristics of normal and disordered micturition. Armed with this new technology, surgeons began to think again about the anatomy and physiology of the urethra, both in the male and the female[6].

Methodology

Inclusion criteria

Patients included in this study were those who had:-

- Stricture urethra (any type-diagnosed by investigations)
- Age > 18years

Exclusion criteria

The study excluded patients with:-

- Stricture following Hypospadias repair
- Age below 18 years
- Post prostatectomy membranous stricture
- Poor general health
- Active urinary tract infection

All adult male patient of urethral stricture presenting to our hospital during the study duration were screened for exclusion criteria. The patients compatible for the study were interviewed. After obtaining informed consent they were enrolled in the study.

At the time of enrolment patients were allotted detailed clinical history was obtained. Complete physical

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE03, 2022

examination and relevant investigations was done.

- Sample size: 106.
- Various urethroplasty techniques have been used to treat urethral stricture.
- Whether the patient's erectile function is affected by this open surgery is still controversial.
- It is postulated that surgical treatment ofurethral stricture itself might affect sexual function.

In the present study evaluation of sexual dysfunction in stricture urethra patients following urethroplasty is taken into account.

- To get a precision of 80% power & 95% confidence interval the study requires a minimum of 106 subjects.

Study design

An observational clinical study

Results

Table 1: Correlation of Questionnaire items according to age in years

Items	Age in years						Total (N=106)	P value
	≤30 (N=28)	31-40 (N=18)	41-50 (N=22)	51-60 (N=25)	61-70 (N=7)	71-80 (N=6)		
Q1.How often were you able to get an erection during sexual activity?								
No sexual activity	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0.046*
Almost never or never	0(0%)	0(0%)	0(0%)	0(0%)	1(14.3%)	0(0%)	1(0.9%)	
A few times (less than half the time)	1(3.6%)	3(16.7%)	3(13.6%)	1(4%)	1(14.3%)	1(16.7%)	10(9.4%)	
Sometimes (about half the time)	14(50%)	11(61.1%)	11(50%)	14(56%)	5(71.4%)	2(33.3%)	57(53.8%)	
Most times (more than half the time)	10(35.7%)	2(11.1%)	8(36.4%)	10(40%)	0(0%)	3(50%)	33(31.1%)	
Almost always or always	3(10.7%)	2(11.1%)	0(0%)	0(0%)	0(0%)	0(0%)	5(4.7%)	
Q2.When you had erections with sexual stimulation, how often were your erections hard enough for penetration?								
No sexual activity	0(0%)	0(0%)	0(0%)	1(4%)	0(0%)	0(0%)	1(0.9%)	0.016*
Almost never or never	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	
A few times (less than half the time)	1(3.6%)	0(0%)	2(9.1%)	1(4%)	2(28.6%)	1(16.7%)	7(6.6%)	
Sometimes (about half the time)	8(28.6%)	9(50%)	11(50%)	6(24%)	5(71.4%)	1(16.7%)	40(37.7%)	
Most times (more than half the time)	18(64.3%)	8(44.4%)	9(40.9%)	16(64%)	0(0%)	4(66.7%)	55(51.9%)	
Almost always or always	1(3.6%)	1(5.6%)	0(0%)	1(4%)	0(0%)	0(0%)	3(2.8%)	
Q3.When you attempted intercourse, how often were you able to penetrate (enter) your partner?								
Did not attempt intercourse	0(0%)	0(0%)	0(0%)	1(4%)	0(0%)	0(0%)	1(0.9%)	0.025*
Almost never or never	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	
A few times (less than half the time)	1(3.6%)	0(0%)	3(13.6%)	0(0%)	3(42.9%)	1(16.7%)	8(7.5%)	
Sometimes (about half the time)	5(17.9%)	6(33.3%)	11(50%)	13(52%)	3(42.9%)	2(33.3%)	40(37.7%)	
Most times (more than half the time)	20(71.4%)	11(61.1%)	8(36.4%)	10(40%)	1(14.3%)	3(50%)	53(50%)	
Almost always or always	2(7.1%)	1(5.6%)	0(0%)	1(4%)	0(0%)	0(0%)	4(3.8%)	
Q4.During sexual intercourse, how often were you able to maintain your erection after you had penetrated (entered) your partner?								
Did not attempt intercourse	0(0%)	0(0%)	0(0%)	1(4%)	0(0%)	0(0%)	1(0.9%)	0.128
Almost never or never	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	
A few times (less than half the time)	1(3.6%)	2(11.1%)	1(4.5%)	1(4%)	3(42.9%)	0(0%)	8(7.5%)	
Sometimes (about half the time)	10(35.7%)	6(33.3%)	13(59.1%)	10(40%)	3(42.9%)	4(66.7%)	46(43.4%)	

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE03, 2022

Most times (more than half the time)	12(42.9%)	8(44.4%)	8(36.4%)	11(44%)	1(14.3%)	2(33.3%)	42(39.6%)	
Almost always or always	5(17.9%)	2(11.1%)	0(0%)	2(8%)	0(0%)	0(0%)	9(8.5%)	
Q5.During sexual intercourse, how difficult was it to maintain your erection to completion of intercourse?								
Did not attempt intercourse	0(0%)	0(0%)	0(0%)	1(4%)	0(0%)	0(0%)	1(0.9%)	0.775
Extremely difficult	0(0%)	1(5.6%)	0(0%)	0(0%)	0(0%)	0(0%)	1(0.9%)	
Very difficult	1(3.6%)	2(11.1%)	5(22.7%)	2(8%)	1(14.3%)	1(16.7%)	12(11.3%)	
Difficult	8(28.6%)	6(33.3%)	7(31.8%)	10(40%)	3(42.9%)	2(33.3%)	36(34%)	
Slightly difficult	15(53.6%)	8(44.4%)	10(45.5%)	11(44%)	3(42.9%)	3(50%)	50(47.2%)	
Not difficult	4(14.3%)	1(5.6%)	0(0%)	1(4%)	0(0%)	0(0%)	6(5.7%)	
Q6.How many times have you attempted sexual intercourse?								
No attempts	0(0%)	0(0%)	0(0%)	1(4%)	0(0%)	0(0%)	1(0.9%)	0.604
One to two attempts	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	
Three to four attempts	2(7.1%)	1(5.6%)	6(27.3%)	3(12%)	2(28.6%)	1(16.7%)	15(14.2%)	
Five to six attempts	13(46.4%)	6(33.3%)	11(50%)	11(44%)	3(42.9%)	2(33.3%)	46(43.4%)	
Seven to ten attempts	10(35.7%)	8(44.4%)	5(22.7%)	9(36%)	2(28.6%)	3(50%)	37(34.9%)	
Eleven or more attempts	3(10.7%)	3(16.7%)	0(0%)	1(4%)	0(0%)	0(0%)	7(6.6%)	
Q7.When you attempted sexual intercourse, how often was it satisfactory for you?								
Did not attempt intercourse	0(0%)	0(0%)	0(0%)	1(4%)	0(0%)	0(0%)	1(0.9%)	0.429
Almost never or never	0(0%)	0(0%)	0(0%)	1(4%)	0(0%)	0(0%)	1(0.9%)	
A few times (less than half the time)	2(7.1%)	1(5.6%)	5(22.7%)	2(8%)	0(0%)	1(16.7%)	11(10.4%)	
Sometimes (about half the time)	7(25%)	11(61.1%)	7(31.8%)	12(48%)	6(85.7%)	2(33.3%)	45(42.5%)	
Most times (more than half the time)	16(57.1%)	5(27.8%)	9(40.9%)	8(32%)	1(14.3%)	3(50%)	42(39.6%)	
Almost always or always	3(10.7%)	1(5.6%)	1(4.5%)	1(4%)	0(0%)	0(0%)	6(5.7%)	
Q8.How much have you enjoyed sexual intercourse?								
No intercourse	0(0%)	0(0%)	0(0%)	1(4%)	0(0%)	0(0%)	1(0.9%)	0.827
No enjoyment at all	0(0%)	0(0%)	0(0%)	1(4%)	0(0%)	0(0%)	1(0.9%)	
Not very enjoyable	2(7.1%)	1(5.6%)	4(18.2%)	4(16%)	2(28.6%)	2(33.3%)	15(14.2%)	
Fairly enjoyable	12(42.9%)	11(61.1%)	11(50%)	10(40%)	3(42.9%)	1(16.7%)	48(45.3%)	
Highly enjoyable	12(42.9%)	4(22.2%)	5(22.7%)	8(32%)	2(28.6%)	3(50%)	34(32.1%)	
Very highly enjoyable	2(7.1%)	2(11.1%)	2(9.1%)	1(4%)	0(0%)	0(0%)	7(6.6%)	
Q9.When you had sexual stimulation or intercourse, how often did you ejaculate?								
No sexual stimulation or intercourse	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0.716
Almost never or never	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	
A few times (less than half the time)	2(7.1%)	0(0%)	2(9.1%)	2(8%)	1(14.3%)	0(0%)	7(6.6%)	
Sometimes (about half the time)	12(42.9%)	12(66.7%)	9(40.9%)	14(56%)	4(57.1%)	3(50%)	54(50.9%)	
Most times (more than half the time)	10(35.7%)	5(27.8%)	10(45.5%)	9(36%)	2(28.6%)	3(50%)	39(36.8%)	
Almost always or always	4(14.3%)	1(5.6%)	1(4.5%)	0(0%)	0(0%)	0(0%)	6(5.7%)	
Q10.When you had sexual stimulation or intercourse, how often did you have the feeling of orgasm or climax?								
Almost never or never	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0.438
A few times (less than half the time)	2(7.1%)	2(11.1%)	1(4.5%)	5(20%)	1(14.3%)	2(33.3%)	13(12.3%)	
Sometimes (about half the time)	14(50%)	7(38.9%)	10(45.5%)	14(56%)	3(42.9%)	3(50%)	51(48.1%)	
Most times (more than half the time)	8(28.6%)	6(33.3%)	10(45.5%)	6(24%)	3(42.9%)	1(16.7%)	34(32.1%)	
Almost always or always	4(14.3%)	3(16.7%)	1(4.5%)	0(0%)	0(0%)	0(0%)	8(7.5%)	
Q11.How often have you felt sexual desire?								
Almost never or never	0(0%)	0(0%)	0(0%)	1(4%)	0(0%)	0(0%)	1(0.9%)	0.812
A few times (less than half the time)	0(0%)	2(11.1%)	1(4.5%)	3(12%)	0(0%)	0(0%)	6(5.7%)	
Sometimes (about half the	14(50%)	7(38.9%)	10(45.5%)	14(56%)	4(57.1%)	4(66.7%)	53(50%)	

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE03, 2022

time)								
Most times (more than half the time)	12(42.9%)	7(38.9%)	10(45.5%)	7(28%)	3(42.9%)	2(33.3%)	41(38.7%)	
Almost always or always	2(7.1%)	2(11.1%)	1(4.5%)	0(0%)	0(0%)	0(0%)	5(4.7%)	
Q12.How would you rate your level of sexual desire?								
Very low or none at all	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	
Low	3(10.7%)	1(5.6%)	2(9.1%)	3(12%)	0(0%)	2(33.3%)	11(10.4%)	
Moderate	13(46.4%)	10(55.6%)	13(59.1%)	18(72%)	2(28.6%)	3(50%)	59(55.7%)	0.014*
High	11(39.3%)	3(16.7%)	7(31.8%)	4(16%)	5(71.4%)	1(16.7%)	31(29.2%)	
Very high	1(3.6%)	4(22.2%)	0(0%)	0(0%)	0(0%)	0(0%)	5(4.7%)	
Q13.How satisfied have you been with your overall sex life?								
Very dissatisfied	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	
Moderately dissatisfied	0(0%)	0(0%)	2(9.1%)	2(8%)	0(0%)	0(0%)	4(3.8%)	
Equally satisfied & dissatisfied	14(50%)	7(38.9%)	12(54.5%)	19(76%)	2(28.6%)	4(66.7%)	58(54.7%)	0.043*
Moderately satisfied	14(50%)	9(50%)	8(36.4%)	4(16%)	5(71.4%)	2(33.3%)	42(39.6%)	
Very satisfied	0(0%)	2(11.1%)	0(0%)	0(0%)	0(0%)	0(0%)	2(1.9%)	
Q14.How satisfied have you been with your sexual relationship with your partner?								
Very dissatisfied	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	
Moderately dissatisfied	3(10.7%)	2(11.1%)	2(9.1%)	3(12%)	0(0%)	2(33.3%)	12(11.3%)	
Equally satisfied & dissatisfied	14(50%)	7(38.9%)	9(40.9%)	14(56%)	4(57.1%)	4(66.7%)	52(49.1%)	0.333
Moderately satisfied	8(28.6%)	6(33.3%)	11(50%)	7(28%)	2(28.6%)	0(0%)	34(32.1%)	
Very satisfied	3(10.7%)	3(16.7%)	0(0%)	0(0%)	1(14.3%)	0(0%)	7(6.6%)	
Q15.How do you rate your confidence that you could get and keep an erection?								
Very low	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	
Low	1(3.6%)	2(11.1%)	2(9.1%)	1(4%)	0(0%)	0(0%)	6(5.7%)	
Moderate	17(60.7%)	9(50%)	7(31.8%)	13(52%)	3(42.9%)	4(66.7%)	53(50%)	0.882
High	10(35.7%)	6(33.3%)	12(54.5%)	10(40%)	4(57.1%)	2(33.3%)	44(41.5%)	
Very high	0(0%)	1(5.6%)	1(4.5%)	1(4%)	0(0%)	0(0%)	3(2.8%)	

Discussion

Management of urethral strictures has always been a difficult task. The advent of various reconstructive urethroplasty has restored the confidence of many urologists who would otherwise have had reservations about the prospects regarding the management of urethral strictures. During the first half of the 19th century, blind internal urethrotomy with a cold knife was mainly used, while during the latter half of the 19th century, the development of urethroscopy made it possible to incise a urethral stricture under direct vision. Dilation and urethrotomy continue to be the most commonly used techniques, but they have a high failure rate with recurrence in 47.6% of patients and many patients progress to surgical repair. Open urethroplasty is regarded as the gold standard treatment for urethral strictures.El-Kasaby first used buccal mucosa for adult urethral reconstruction.Morey and McAninch described the use of oral mucosa as a non-tubularized onlay graft placed on the ventral surface of the bulbar urethra, closing the spongiosum tissue over the graft.Barbagli*et al.* popularized the use of oral mucosa as a non-tubularized onlay graft placed on the dorsal surface of the bulbar urethra.Markiewicz*et al.* reported the anatomic and biologic characteristics of the oral mucosa, suggesting many important steps in the harvesting technique which are standard today.Kulkarni *et al.* described one-sided anterior urethroplasty, which advocated preservation of the one-sided vascular supply to the urethra and its entire muscular and neurogenic support[1, 2].

In our series, patients ranged from 18 years to 80 years, the highest incidence was noted in the 18-30 years and 51 - 60 years group. The older age group also has a higher incidence owing to the popularity of transurethral procedures such as TURP, TURBT etc. Although this was the general trend, no age was immune to urethral strictures. This is in concordance with most studies.Most of the strictures were post inflammatory (34 out of 94 patients).This is largely consistent with many contemporary series from Asian subcontinent. But most of patient series from developed countries have post traumatic stricture most common now.

The incidence of infective urethral strictures is still very high in certain parts of the world. The history of extramarital sexual contact was positive in two of the patients with infective strictures. Six of these patients gave past history of gross pyuria. Lacking personal hygiene and awareness of healthy practices along with better diagnostics and effective antibiotics may be the reasons of high incidence of infective

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE03, 2022

strictures in our country.
With increasing mechanization and fast moving traffic, the incidence of fracture pelvis is also on the rise. Luckily, urethra is injured in only about 10% of these[7, 8].
Seventeen patients gave post-surgical or post instrumentation history for strictures. Among these, in fourteen patients strictures followed trans-urethral resections (11-TURP & 3-TURBT) and in four patients it followed urethroplasty wherein these patients developed strictures at the sites of urethroplasty (Anastomotic strictures). Urethral stricture is one of the common complications of trans-urethral resections.
The strictures following endo-urological procedures usually result in meatal stenosis and anterior urethral strictures and are easily amenable to urethroplasty.
Urethral catheterization following non-urological procedure was found to be responsible for the stricture formation in fourteen patients. The use of urethral catheter is a well-documented cause of urethral stricture.
Following the right principles of catheterization, good catheter care and precautions while removing the catheter can help minimize the incidence associated with this etiology.
Difficulty in micturation, thinning of the urinary stream and dribbling was seen in almost 90% of cases that presented to us. As regards symptomatology, our series is comparable to DrBarbagli series and Dr Kulkarni series[9, 10].
38 patients who presented to us had undergone some interventions in the past, while four of them had internal urethrotomies done. Urethral dilatation was done in 15 patients which 3 had undergone anastomotic urethroplasty. Eleven patients underwent supra pubic cystostomy as primary management for retention of urine due to stricture urethra.

Conclusion

Although there are a lot of series describing the results achieved with various types ofUrethroplasty, the anthological aspects of this pathology and its treatment(s) are clearly insufficiently studied. The available literature is confusing, dispersed, not systematized, and often containing methodological deficits. Although we have been assisting in recent efforts in an attempt to obtain more and better data, there are still obvious gaps that prevent valid conclusions on the subject. Large scale, prospective investigations using standardized validated questionnaires are needed to reliably elucidate the real impact of urethroplasty on the different domains of sexual function.

References

1. Patterson JM, Chapple CR. Surgical techniques in substitution urethroplasty using buccal mucosa for the treatment of anterior urethral strictures. Eur Urol. 2008 Jun;53(6):1162-71.
2. Kulkarni S, Barbagli G, Sansalone S, Lazzeri M.One-sided anterior urethroplasty: a new dorsal onlay graft technique. BJU Int. 2009 Oct;104(8):1150-5.
3. Barbagli G, Palminteri E, Lazzeri M, Guazzoni G. Anterior urethral strictures. BJU Int. 2003;92:497-505.
4. Markiewicz MR, Lukose MA, Margarone III JE, Barbagli G, Miller KS, Chuang SK. The oral mucosa graft: a systematic review. J Urol. 2007;178:387e94.
5. Markiewicz MR, Margarone III JE, Barbagli G, Scannapieco FA. Oral mucosa harvest: an overview of anatomic and biologic considerations. EAU-EBU update Ser. 2007;5:179e87.
6. Kulkarni, S, *et al.*,J Urol. The morbidity of buccal mucosal graft harvest for urethroplasty and the effect of nonclosure of the graft harvest site on postoperative pain.2004 Aug;172(2):580-3.
7. Col DK Jain, WgCdr R Talwar. Outcome of Dorsal Onlay Buccal Mucosa Substitution Urethroplasty in Long Strictures of Anterior UrethraMJAFI. 2007;63:12-14.
8. Özlülerden Y1, Küçüker K1, Zümrütbas AE1, Aybek Z1.Pamukkale University Department of urology the results of treatment of panurethral stricture with one stagebuccal mucosa graft urethroplasty.
9. Kulkarni S, *et al*., Management of Panurethral Stricture. UrolClin North Am. 2017;44(1):67-75.
10. Martins FE, *et al.*, Management of Long-Segment and Panurethral Stricture Disease. AdvUrol, 2015,853914.