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COMPRISION OF SURGICAL OUTCOMES OF PERINEAL MIDLINE VERTICAL INCISION, INVERTED-U INCISION AND INVERTED Y OR LAMBDA INCISION IN THE URETHROPLASTY : A PROSPCTIVE RANDOMIZED STUDY

Urology

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ABSTRACT

INTRODUCTION: Urethroplasty, which was initiated in 1876, has become a gold standard treatment for urethral strictures now. Perineal approach is one of the most classic methods to reconstruct bulbar and posterior urethral strictures. Generally, 3 approaches of perineal skin incision were more commonly applied, namely inverted-U and vertical midline and inverted Y or lambda. These incisions have their own merits and demerits and preferred on surgeons choice. At present, numerous urological studies have indicated that the evolution of surgical approaches could improve patients' outcomes to a certain extent. **OBJECTIVE:** This study compare surgical outcomes between the perineal inverted-U, vertical midline and inverted-Y or lambda incision approaches of the urethroplasty to analyze complications and risk factors & to know the superiority of incisions. **METHOD:** All male patients who underwent urethroplasty via a perineal incision due to posterior and bulbar urethra stricture. All patients will be randomized into 3 equal groups. Patient and procedure related factors like age,history of addiction ,any co-morbidity, character of stricture ,operative status ,hospital stay,complications (Infections,UC fistula,Re- stricture) were analysed. Statistical analysis was done by SPSS20 using one way anova **. RESULT:** A total of 36 male patients, from June 2017 to september 2019 were recruited, who underwent the urethroplasty via perineal midline vertical or inverted-U incision approach. Surgical site infection (SSI) in perineal inverted-U group was highest. Other complications are also more in inverted-U group . Mean hospital stay were almost equal in all groups . **CONCLUSION:** Inverted-U incision have higher SSI and higher hospital stay. vertical incision are safer approach

KEYWORDS

Stricture urethra, Perineal incision, Lambda incision, Surgical site infection, Post-operative complications

INTRODUCTION

Stricture urethra is a one of the common entity in our region which impair the patient's quality of life by causing micturition disturbances resulting in the damage of the entire urinary tract[1]. Urethral dialatation, internal urethrotomy, anastomotic and substituition urethroplasty are various treatment options. Urethroplasty is one of the most efficacious and cost-effective option to restore urethral patency in urethral stricture diseases which is the repair of an injury or defect within the walls of the urethra[2]. For urethroplasty surgeon usually opt for easy, simplest and most straightforward technique that gives them the highest success rates with least complications[2]. Break in urethra wall and its proximity to rectum increases chance of complications in urethroplasty. Urethroplasty, which initiated in 1876, through Perineal approach done by perineal skin incision namely inverted-U and vertical midline[3]. Inverted Y or lambda incision is also one type of perineal incision which is used for urethroplasty by many surgeons and in various study outcomes of surgery done by this operation was compared by operation done by other incisions[4,5] . These incisions have their own merits and demerits and preferred on surgeons choice. Inverted U incision longer and wider incision than the midline and easier for surgeons[3]. Lambda incision is bilateral caudal bifurcation of midline incision . Even in perineal hypospadias repair a straight midline incision or inverted U or lambda incision was made in the perineum similar to approach to the posterior urethra in pelvic fracture urethral distraction defect (PFUDD) repair[6]. Various studies have indicated that , with the evolution of surgical approaches outcome can alter e.g in prostatectomy retropubic vs perineal and in perineal urethrostomy done by inverted U or midline to a certain extent[7,8,9]. Then minimally invasive approaches came into picture for lower risk of complications and a slightly shorter length of hospital stay. Two incisions have been compared in few research article but no comparision has been done yet in these three urethroplasty incision approaches for complications, especially the wound infection[3,4,5] . Therefore, we tried to compare the outcomes between these three perineal incision approaches.

METHOD

A total of 36 male patients were recruited in this study from June 2017 to september 2019 in our department. All eligible patients were chosen who underwent urethroplasty via 3 different perineal incision for bulbar urethral stricture.Patients who did not undergo the transperineal urethroplasty,for instance, the dilation and the direct vision internal urethrotomy , patients with involvement of the penile urethra, including penile, panurethral strictures, patients with posterior urethral stenoses, and urethral stenoses secondary to radiation were excluded from the study. All included patients were investigated preoperatively with routine haemogram, urinalysis/urine culture , retrograde urethrography, and cystoscopy. Intravenous antibiotics were prescribed in all patients with positive urine cultures . Figure 1 showing stricture in bulbar urethra in retrograde urethrogram of one of the patients. All patients were prescribed antibiotics one day befor surgery. All patients were instructed to take proper bath and washed the perineum after 5 minutes soaking of perineum with 7.5% povidone iodine scrub to decrease the bacterial load in the operative region. Pre-operative shaving of the skin of suprapubic region, scrotum,and perineum was done just before the operation. All patients were operated under spinal anaesthesia and in lithotomy position. Type of incision was decided by lotterary method. Figure 2, 3 and 4 are image of lambda, inverted U and midline incision.We follow the the standard steps of operative procedure after skin incision for the treatment of a bulbar urethral stricture, which is excision of stricture tissue, spatulation of the two ends of urethra, and an end-to-end anastomosis. Figure 5, Figure 6 and Figure 7 are intra-operative image. Drain was used in all patients . Closure of the perineal incisions was done in a three-layer fashion with absorbable sutures . Figure 8, Figure 9 and Figure 10 are image of stitched incisions. Intravenous antibiotics were routinely given in post-operative period last for 2-day then change to open for more 5 days. Drain was removed on second post-operative day.Figure 11 is the image of wound gap post-operatively . Patients were followed at three weeks postoperatively for catheter removal voiding trial and wound inspection. All patients were

routinely examined especially about postoperative pain, wound healing, urinary tract infections, and any other complications. Follow-up was done at three and 6 months postoperatively. Cystoscopy was done to ensure urethral patency . Routine postoperative imaging with retrograde urethrogram was not adviced. All were analyzed in respect to age, history of addiction ,any comorbidity, character of stricture ,operative status ,hospital stay, complications,like Infections, Urethro-cutaneous fistula, Recurrent- stricture. Statistical analysis was done by SPSS20 using one way anova. Follow-up period is 6 months.

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

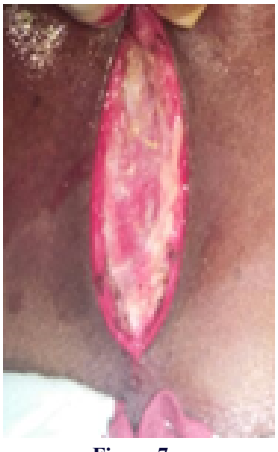

Figure 6

Figure 7

Figure 8

Figure 9

Figure 10

Figure 11

RESULT

During the study period total 36 patients were analyszed. Numbers of patients in inverted-U group , midline & Lambda incisions were 6,17 and 13 respectively. The descriptive statistics for this study of patient population are seen in Table 1. Mean age is 45.17,32.67 & 33 respectively. Most common cause of stricture is post traumatic which were 53.8% in lambda incision group and 41.2% in midline group followed by 33.3% in inverted U groups . Recurrent urinary tract infection was present 41.2% patients in midline group. 50% patients in inverted U group develope stricture due to inflammation.Length of stricture was 2.25cm , 2cm & 1.76cm in inverted U, lambda & midline respectively .

Table 1

Baseline characteristics of the groups of perineal vertical midline , inverted-U and inverted Y or lambda incision

	Vertical midline	Inverted Y or lambda	Inverted-U
Number of patients	17	13	6
Mean age of patients(years)	32.67	33.00	45.17
Aetiology of stricture			
Inflammatory	0	3(23.1%)	3(50%)
Post catheter	3(17.6%)	3(23.1%)	0
Traumatic	7(41.2%)	7(53.8%)	2(33.3%)
Recurrent UTI	7(41.2%)	0	1(16.7%)
Length of stricture(cm)	1.765	2.000	2.250
Site of stricture	0	11(84.6%)	
Proximal bulbar	16(94.1%)	2(15.4%)	0
Mid bulbar	1(5.9%)	0	2(33.3%)
Distal bulbar			4(66.7%)
Co-morbidity of patient	1(5.9%)	2(15.4%)	3(50%)
DM	5(29.4%)	1(7.7%)	0
HTN	11(64.7%)	10(76.9%)	3(50%)
NO			
Addiction of patient	7(41.2%)	6(46.2%)	4(66.7%)
Smoking	6(35.3%)	0	0
Tobacco	4(23.5%)	7(53.8%)	2(33.3%)
No			
Pre-operative status			
OIU	3(17.6%)	6(46.2%)	1(16.7%)
SPC	9(52.9%)	3(23.1%)	4(66.7%)
UD	1(5.9%)	1(7.7%)	1(16.7%)
NO	4(23.5%)	3(23.1%)	0
Intra-operative complications	0	1(7.7%)	0
Rectal injury			
No			
Duration of surgery(minutes)	118.65	124.77	141.83
Drop in Hb%(gm)	2.424	2.708	2.350
post-operative infection	6(35.3%)	5(38.5%)	6(100%)
UC fistula	0	1(7.7%)	1(16.7%)
Clavien-dindo grade for complications			
1	10(58.8%)	8(61.5%)	0
2	5(29.4%)	2(15.4%)	3(50%)
3	2(11.8%)	3(23.1%)	3(50%)
Hospital stay(days)	6.00	8.62	9.33
Recurrence after surgery	2(11.8%)	3(23.1%)	3(50%)
Re-operation	2(11.8%)	3(23.1%)	3(50%)

50% patients who were operated by inverted U incision having diabetes and 35.3% in midline groups were co-morbid. Smoking was major addiction which was 46.2%in lambda , 66.7% in inverted U and 41.2% in midline. 80.5% of the patients having previous history of internal urethrotomy, suprapubic catherization urethral dialation from which maximum in inverted U groups. One patient got rectal injury in lambda group. Rectal injury occurred in patient who

underwent operation by lambda incision in this study whose idea to to prevent extension of incision to anus. Duration of surgery inverted-U group , midline & Lambda incisions were 141.83,124.77 & 118.65 minutes respectively. Inverted U groups took maximum time to complete operation. Blood loss was more in lambda group and Hb% drop were 2.3,2.4 & 2.7 in inverted-U group , midline & Lambda incisions groups respectively. Post-operative infections occurred in all patients with inverted-U group while 35.3% of patients in midline & 38.5%of patients in lambda groups. Hospital stay in inverted-U group is 9.33 days while 6 days in midline & 8.62 in lambda. UC fistula occurred 16.7% in inverted U whereas 7.7% in lambda .Most of the post-operative complications were of clavien-dindo 1& 2 and Clavien – dindo grade 3 occurs 50% of patients in inverted U. There was no significant difference in clavien-dindo grading of complications.Re-operation because of the recurrence done in 50%of patients in inverted U , 23.1% in lambda , 11.8% in midline.. No patients died after the surgery.

DISCUSSION

For all bulbar strictures which is not suitable condidate for internal urethrotomy, some kind of urethroplasty is generally required. The urethra is the best substitute for itself and whenever possible an end-to-end anastomotic urethroplasty provides the best results for bulbar strictures[10]. Urethroplasty is the most efficacious and cost-effective treatment for bulbar urethral strictures, with reported success rates of over 90% in select high-volume centers[11,12,13]. Outcomes of this procedure typically manifested by success, continence , occurence of erectile dysfunction, and major complications such as fistula or recurrent stricture[4]. Wound complications in urethroplasty are likely related to both patient and surgical factors. Age, gender, tissue ischemia, diabetes, obesity,corticosteroids, immunosuppressants, and smoking are risk factors most commonly associated with poor postoperative wound healing[14]. Perineal incisions may be at risk for wound complications, given the proximity to the rectum[15]. Additionally, the type of incision, namely the midline perineal incision (MPI) and the lambda perineal incision (LPI), may impact wound complications4. Bascom, A and colleague[4] found in their study that mean patient age for was 43.9 years[4]. They publish that age, preoperative urinary tract infection , Charlson co-morbidity index ≥ 2, DM, BMI $\geq$ 35, and smoking did not significantly impact postoperative wound complications. Incision type was significantly associated with wound omplications The type of urethroplasty did not differ between the patients undergoing either a midline or lambda incision ($P = .38$). 90-day wound complications occurred in 24.9% of lambda compared to 12.0% of midline. They found that midline is associated with significantly fewer wound-specific complications but had statistically better early (technical) outcomes at 6 months[4].

Lin, Y.et al [3] studied outcome in urethroplasty by Perineal midline vertical incision verses inverted-U incision and found significant difference between the perineal inverted-U group and midline vertical group terms of age (40.86 ± 13.671 vs. 43.70 ± 13.971, $p = 0.037$), smoke patients (43.1% vs. 57.6%, $p = 0.004$), history of urethral surgery (34.6% vs. 22.4%, $p = 0.006$), history of suprapubic catheter (92.2% vs. 84.4%, $p = 0.014$) ($p < 0.001$) . Surgical site infection in perineal inverted-U group was 17.1% while 2.4% in midline vertical group ($p < 0.001$). Hospital stay in inverted-U group is 15.8 ± 9.0 days while 12.7 ± 3.8 days in midline vertical group ($p < 0.001$). Mean operative minutes between perineal inverted-U group and midline vertical group were 169.2 ± 44.8 min and 159.2 ± 46.1 min ($p = 0.179$). There was no significant difference among other postoperative complications, including urinary fistula (2.9%vs. 1.0%, $p = 0.153$) and reoperation because of the recurrence of the stricture (1.0% vs. 0.5%, $p = 0.562$)[3].

A Bascom and colleague[5] presented their research observations in AUA meeting . In their research 540 patients were analyzed; 373 had a lambda while 167 had a midline.Mean patient age was 43.9 years. Majority of complications were Clavien grade ≤ 2, which occurred in 23.3% lambda compared to 11.9% of midline (P=0.0023) .They observe that lambda perineal incision was independently associated with increased 90-day wound complications after urethroplasty, and was associated with more superficial wound edge separation compared to the midline incision[5].

Observation of the present study is comparable to finding of above mention studies. Higher rate of surgical site infection in inverted-U incision group may due to that it caused more damage of tissue, nerves and vessels [16,17,18], but it has a clearer exposure of surgery & easier for surgeon. Midline incision have lowest complications and this can divide and dissect the skin and superficial fascia of perineal region in a bilateral direction [16]. Thus, the superficial or communicating branches of the internal pudendal vessels and nerve can be preserved.

Limitation of this study was that small sample size of the study and randomization of patients into different incision groups was not proper. There was no control group and there was shorter follow-up time also. A proper randomization control study is required to validate the findings of this study and to combat its limitation.

CONCLUSION

Perineal midline vertical approach is a safer and more effective choice fewer incidences of complications and hospital stay. Inverted U have have more incidence of complications and poorer outcome.

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