



Sutureless Treatment of Ultra-Micro Urethro-Cutaneous Fistulas (UMUCFs): A Technical Innovation

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Abstract

Purpose: To assess feasibility and success of a sutureless, cost effective and time saving minimal invasive surgical technique for the treatment of Ultra-Micro Urethro-Cutaneous Fistulas (UMUCFs) measuring up to 1 mm or less in diameter.

Aims and Objectives: To devise minimal invasive procedure for closure of Ultra-Micro Urethro-Cutaneous Fistulas (UMUCFs) measuring one millimeter or less in diameter.

Material and Methods: Since 2006 to 2016, ten patients aged between 15 to 20 years reported in Hypospadias and VVFs Clinic with 6 months to one year history of leakage of urine either in the form of few drops (n=4) or a thin jet of urinary stream (n=6) through UCFs sized less or up to one millimeter in diameter located in distal penile shaft (n=8) and mid-penile shaft (n=2) having developed after hypospadiac urethroplasties. The tracts of the fistulas were approached indirectly through dartos-deep 5-millimeter incision given in the lateral coronal sulcus in 8 patients having UCFs in their distal penile shaft and through surgical scar in the mid-penile shaft of 2 patients having UCFs in mid-penile region. The fistula tracts were completely transected (tractotomy) after having them dissected circumferentially using blunt and sharp dissection by a pair of scissors passed through skin incision. Infant feeding tube was inserted across the urethra for continuous drainage of urinary bladder for 3 days. A snugly fitted circumferential dressing under moderate compression was applied to facilitate intimate contact of dissected tissues to prevent leakage and collection of urine in the surgical field. The UCFs associated with stricture, diverticulum, stones, hairs, metaplasia and the thin-walled attenuated UCFs were excluded from undergoing this surgical technique.

Results: All the ten UCFs healed uneventfully and patients were discharged on 5th day of surgery. However, none of these patients reported in follow-ups after having been discharged.

Conclusion: The innovation is technically least demanding, safe, cost and time effective and promotes healing of transected tracts of ultra-micro UCFs and the skin incisions without application of sutures (sutureless UCFs repair).

Keywords: Urethro-Cutaneous Fistulas (UCFs); Ultra-Micro Urethro-Cutaneous Fistulas (UMUCFs); Sutureless; UCFs repair

Introduction

Development of Urethro-Cutaneous Fistulas (UCFs) having varying characteristics is the commonest post-operative complication following hypospadiac urethroplasties with an incidence ranging from 4% to 25% [1]. The treatment of UCFs ranges from simplest non-operative to most complex surgical dissection and flap applications. The authors have devised a technically simple, safe, cost and time effective minimally invasive sutureless surgical technique for treatment of UCFs up to one millimeter or less in diameter without co-existence of stricture, diverticulum, stones, hairs and metaplasia in the re-constructed neo-urethra. Ultra-Micro Urethro-Cutaneous Fistulas (UMUCFs) are formed where vascularized water-proofing flaps have been used as wide spread apron to re-enforce hypospadias repair.

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Material and Methods

Ten patients aged between 15 to 20 years, having undergone different kinds of urethroplasties, reported in Hypospadias and VVFs Clinic of Postgraduate Institute of Medical Sciences (PGIMS), Rohtak-HR-India between 2006 to 2016 with 6 months to one year history of having leakage of urine either in few drops (n=4) or a thin jet (n=6) of urinary stream through UCFs of less or up to one millimeter in diameter with abundant peri-fistular soft tissue in distal (n=8) and mid-penile shaft (n=2) developing after hypospadiac urethroplasties. The details of previous urethroplasties were not available for perusal. Presence of abundant peri-fistular soft tissue facilitated risk-free dissection of one centimeter all around the fistula tract without button-holing in the under-lying urethra and over-lying penile skin. The tracts of these ultra-micro UCFs were approached indirectly through a 5 millimeter transversally curved sub-dartos incision in the lateral aspect of coronal sulcus for distal penile UCFs and an oblique sub-dartos incision through a pre-existing surgical scar on lateral aspect of penile shaft for mid-penile UCFs. Fistula tracts were probed antegradely through external urethral meatus using fine lacrimal probe to assess the length and direction of fistula tracts (Figures 1-3). Diluted methylene blue dye was injected into the urethra after proximal digital compression to detect presence of other fistulas (Figure 4).

For circumferential dissection of fistula tract, the lacrimal probe was passed through the meatus and taken out through skin opening of the fistula. After 7 min of infiltration of 1:200,000 adrenaline-normal saline solutions, a 5-millimeter dartos deep skin incision was given in the lateral side of coronal sulcus for distal UCFs and similar incision was given in the lateral side of the mid-penile shaft for approaching fistula tract in the mid-penile region (Figure 5). A pair of scissors with long prongs was inserted through skin incision (Figure 6). With slow opening (dissection and tissue separation) and slow closing (incising and dividing intervening tissue between the underlying urethra and the overlying penile skin) of the prongs of scissors, the fistula tract was dissected circumferentially all around the lacrimal probe for about one centimeter, and thereafter, the opened prongs of scissors were positioned on either side of the fistula tract, the lacrimal probe was removed and the skeletonized fistula tract lying between the prongs of scissors was transected completely (Figure 7). Complete transection of fistula tract was confirmed by free movements of the lacrimal probe up and down (Figure 8), failing to negotiate the probe with ease through the tract and out on the skin surface because the internal and external openings of tract do not remain superimposed, rather have become eccentric to each other and absence of leakage of normal saline through skin opening of the tract when injected through meatus after perineal digital compression. Methylene blue was not injected for fear of tattooing of tissues in the surgical field. A trans-urethral Infant feeding tube was inserted for continuous and un-interrupted drainage of urinary bladder for three days. A secured and snugly fitted circumferential dressing was applied to achieve hemostasis and firm apposition of dissected tissues to prevent dead space and collection of leaking urine (urinoma) or blood (hematoma). Lateral coronal sulcus incision, lateral penile shaft skin incision and skin-sided fistula opening were left un-sutured to heal spontaneously. The infant feeding tube was removed on 4th day of surgery and thereafter patients were discharged on 5th day of surgery without urethral tube or leakage. None of these patients reported in follow-ups after discharge.

Results

All the UMUCFs healed un-eventfully. None had recurrence in de-novo or elsewhere.

Discussion

The hypospadias is the commonest congenital anomaly of urethra. Multiple surgical techniques have been described in literature for repair of hypospadias. These techniques adhere to common basic principles of hypospadias repair except for having minor modifications devised by different hypospadiologists, and same holds true while repairing urethro-cutaneous fistulas. Despite use of any surgical technique for repair of hypospadias, formation of Urethro-Cutaneous Fistulas (UCFs) remains the commonest post-operative complication [2]. The step-ladder for the treatment of UCFs starts

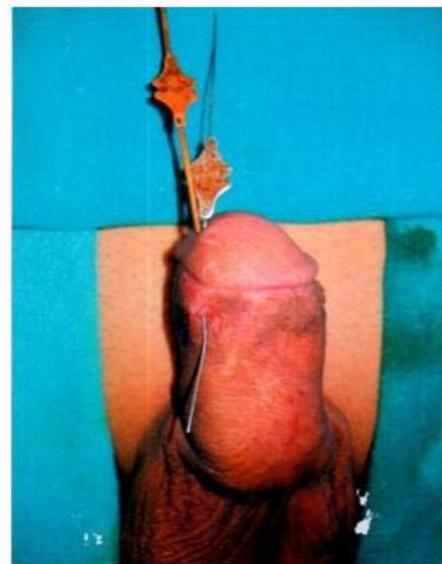


Figure 1: Distal penile ultra-micro Urethro-Cutaneous Fistula (UCF). Lacrimal probe inserted.



Figure 2: Mid-penile eccentrically located ultra-micro Urethro-Cutaneous Fistula (UCF). Lacrimal probe inserted.



Figure 3: Mid- penile centrally located ultra-micro Urethro-Cutaneous Fistula (UCF). Lacrimal probe inserted.



Figure 5: Coronal sulcus incision marked to circum-dissect and transect fistula tract with scissors.



Figure 4: Methylene blue dye injected in to the urethra to exclude presence of other fistulas.



Figure 6: Fistula tract being circum-dissected all around lacrimal probe.

from simple conservative treatment by short term continuous trans-urethral bladder drainage to less technically demanding surgical procedures like excision (fistulectomy) and multi-layered closure of fistula (fistulorrhaphy) and further to most complex, sophisticated and highly technically demanding surgical procedures using different skin and water-proofing flaps to further strengthen the closed fistulas (fistuloplasty) to prevent re-fistulizations. Number of such water-proofing flaps have been described, both for hypospadias and urethro-cutaneous fistula repair [3]. The ultra-micro UCFs having enough peri-fistular soft tissues and diameter up to one millimeter in the absence of urethral stricture, diverticulum, stones, hairs and metaplasia were considered ideal for sutureless technique.

The principles behind this minimally invasive indirect surgical approach for the treatment of such fistulas have been to prevent: (i)

super-imposition of proximal and distal transected ends of fistula tract to avoid re-establishment of communication between them, (ii) delayed healing by obliteration of dead space and prevention of collection of urine (urinoma), blood (hematoma) or serum (seroma), (iii) early re-epithelialization of the transected fistula tract, (iv) formation of foreign body granuloma, stitch abscess or blind sinus and tract by not using sutures, (v) use of strong antibiotics in the absence of foreign matters, (vi) extra cost of suture material and prolonged hospital stay, (vii) un-necessary scarring on penile shaft by giving incision in lateral coronal sulcus or through pre-existing penile skin scar, (viii) complex procedure requiring flap-closure of fistulas (fistuloplasty), (ix) need of removal of sutures, (x) interference with the lining of urethral lumen by not putting sutures, which might cause narrowing or stricture, (xi) increase of size of fistula by no direct dissection and excision of fistula, which might require flap



Figure 7: Fistula tract positioned between prongs of scissors. Lacrimal probe removed and tract transected.



Figure 8: Complete transection of fistula tract ascertained by free up and down movements of the lacrimal probe.

procedures due to its iatrogenically increased size, (xii) ischemia of overlying skin or underlying urethra due to pre-existing soft tissue around the fistula tracts and (xiii) dis-satisfaction of patients and parents regarding post-operative discomfort, down time, expenses, scarring and hospital stay.

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