

Mid-Perineal Scrotal Flap for the Repair of Urorectal Fistulas: A New Technique

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Keywords

Urorectal fistula · Rectourethral fistula · Prostate cancer · Radiotherapy · Urethral stricture

Abstract

Rectourethral fistula (RUF) is an infrequent but severe complication of the treatment of prostate cancer. Herein, we describe a new surgical approach used successfully in 3 patients that incorporates a partially de-epithelialized mid-perineal scrotal flap (MPSF), used as interposition flap, that can be used in almost every patient with RUF after radiotherapy, regardless of having or not a concomitant posterior urethra or bladder neck stricture or contracture that might require a simultaneous urethroplasty. The interposition flap includes well vascularized subcutaneous fat tissue by distal vascular branches of the internal pudendal vessels that reaches without tension the deep perineum up to the posterior bladder neck. The MPSF is a time efficient procedure that allows excellent access to the bulbar urethra and to the surgical plane between rectum and prostate and it does not require a separate incision for the flap harvesting procedure when required.

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Introduction

Rectourethral fistula (RUF) is an infrequent but severe complication of the treatment of prostate cancer. Its frequency has grown during recent years due to an increasing use of multimodal treatments, and salvage treatments.

Nowadays, at least 50% of the cases are associated with radiotherapy, which makes the RUF repair a technical challenge. In these cases, the size of the RUF is usually larger than in nonirradiated patients, tissue elasticity and mobility are grossly limited, and healing is impaired by irradiation. Several RUF surgical techniques have been described, including transrectal (Parks per-anal rectal advancement flap and York-Mason trans-anorectal sphincter splitting approach), perineal, abdominal, and combined approaches.

The use of interposition flaps and grafts, such as dartos, gracilis muscle, tunica vaginalis, omentum, buccal mucosa, or bulbocavernosus muscle, is indicated in cases treated with radiotherapy [1]. Here, we describe a new surgical approach that incorporates a partially de-epithelialized mid-perineal scrotal flap (MPSF), used as interposition flap, that can be used in almost every patient with RUF after radiotherapy regardless of the presence of the posterior urethra or bladder neck concomitant stricture or contracture that might require a simultaneous urethroplasty.

Case Presentation

From March 2019 to March 2021, 3 men with complex RUF underwent surgical repair by means of the MPSF technique. Patients signed a written informed consent to undergo surgery and gave their written informed consent to publish their case. After the approval of the Ethics Committee of La Paz University Hospital, the demographics and perioperative data of patients who had been treated with the MPSF technique were retrospectively reviewed. RUF diagnosis was made by assessing signs and symptoms, combined with cystourethrography, digital examination, cystourethroscopy, proctoscopy, and MRI.

Case 1

A 52-year-old male who underwent a robot-assisted laparoscopic radical prostatectomy in April 2019 in another hospital. After removal of the Foley catheter 15 days after surgery, he developed a rectal fistula and was treated with a colostomy and bladder catheter in May 2019. In November 2019, a perineal repair of the fistula was attempted without success. In January 2020, an abdominal approach was used without success and the patient was sent to us for repair. Flexible cystoscopy demonstrated the presence of a RUF located at the bladder neck that allowed the passage of the cystoscope into the rectum. The ureteric orifices were located about 2 cm away from the fistula. In September 2020, the patient was treated with a trans-perineal approach using the MPSF technique.

Case 2

A 59-year-old male diagnosed of prostatic adenocarcinoma pT3pN1Gleason4+3 who was treated 4 years earlier with open radical prostatectomy and adjuvant radiotherapy in another hospital. Two years later, he developed a vesicourethral anastomosis contracture, and he was treated with an endoscopic incision. A further vesicourethral anastomosis contracture associated with incrustation led to a transurethral resection of the bladder neck. The patient developed chronic pelvic pain and an intervening cavity with incrustation. Thus, he was treated with endoscopic lithotripsy. After, he developed a cavitating fistula between the bladder neck and the rectum and was sent to us for surgical treatment. The patient was treated with a trans-perineal approach using the MPSF technique.

Case 3

A 72-year-old male treated for prostatic adenocarcinoma with external beam radiotherapy in 2002 in another hospital. Due to biochemical recurrence, he was treated with cryotherapy in 2006 and developed a urethral stricture that was managed with dilations. During one dilatation, a rectal perforation accidentally occurred. The patient was treated with chronic indwelling bladder catheter. Urinary output through the rectum was negligible, and 1 year later he received an inflatable penile prosthesis. The patient had multiple urinary tract infections during the following years and developed a left renal staghorn stone. Thus, the patient underwent a left nephrectomy in 2019. Urinary output through the rectum increased, pneumaturia appeared and the patient was referred to us in February 2021. Urethroscopy revealed the presence of a stricture of the membranous urethra that could only be surpassed with a rigid ureteroscope. A 1.5 cm stone located in the left prostatic apex impacted in the recto-prostatic fistula. In November 2021, the patient was treated with a trans-perineal approach using the MPSF technique.

Surgical Technique

With the patient on the lithotomy position a cystourethroscopy was performed, the ureteric orifices localized, and its position related to the fistula assessed. If the ureteric orifices were located near to the fistula, they were stented with regular ureteric catheters to avoid inadvertent damage during surgery. In all cases, RUF was stented leaving a ureteric catheter inserted through the urethra and exteriorized through the anus.

An inverted trapezoidal incision centered over the mid-raphé is made in the perineum with the proximal aspect of the lateral

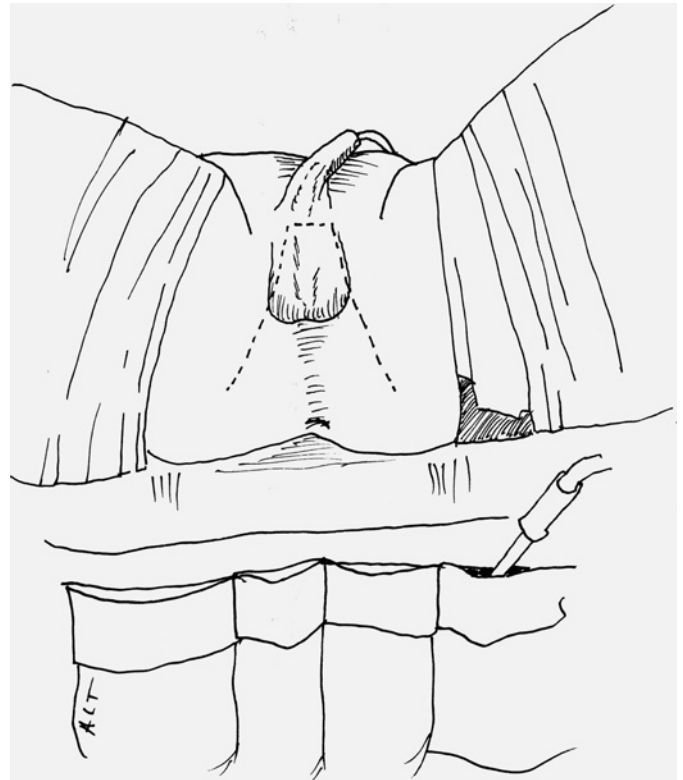


Fig. 1. An inverted trapezoidal incision centered over the mid raphe is made in the perineum with the proximal aspect of the lateral incisions starting at the level of the ischial tuberosities. The distal aspect of the trapezoidal flap reaches up to the mid portion of the scrotum.

incisions starting at the level of the ischial tuberosities. The distal aspect of the trapezoidal flap reaches up to the mid-portion of the scrotum (Fig. 1).

A MPSF was harvested incorporating all the subcutaneous tissue between the skin and the bulbar urethra following the surgical technique described by Gil Vernet et al. [2] for the elevation of scrotal skin flaps for urethroplasty. During this maneuver, the testicles, surrounded by the tunica vaginalis, were completely freed and positioned temporarily over the lower abdomen. The newly formed flap had a wide trapezoidal perineal base and a wide rectangular shape along the scrotal raphe and includes dartos, subcutaneous tissue, and scrotal septum. The flap was elevated following the ventral aspect of the urethra starting at the penoscrotal angle and dissecting up to the central tendon of the perineum (Fig. 2a-e).

The complete bulbar urethra was visible at this stage of the surgical technique and allows a complete dissection of its proximal aspect and the exposure of the surgical plane between the rectum and the posterior aspect of the prostate (Fig. 3). Fistula can be identified by the previous insertion of the ureteric catheter through the fistula (Fig. 4).

The fistulous tract was resected, the borders of the rectal orifice refreshed and closed with a single or double layer of absorbable stitches. Although two-layer closure is always advisable, the

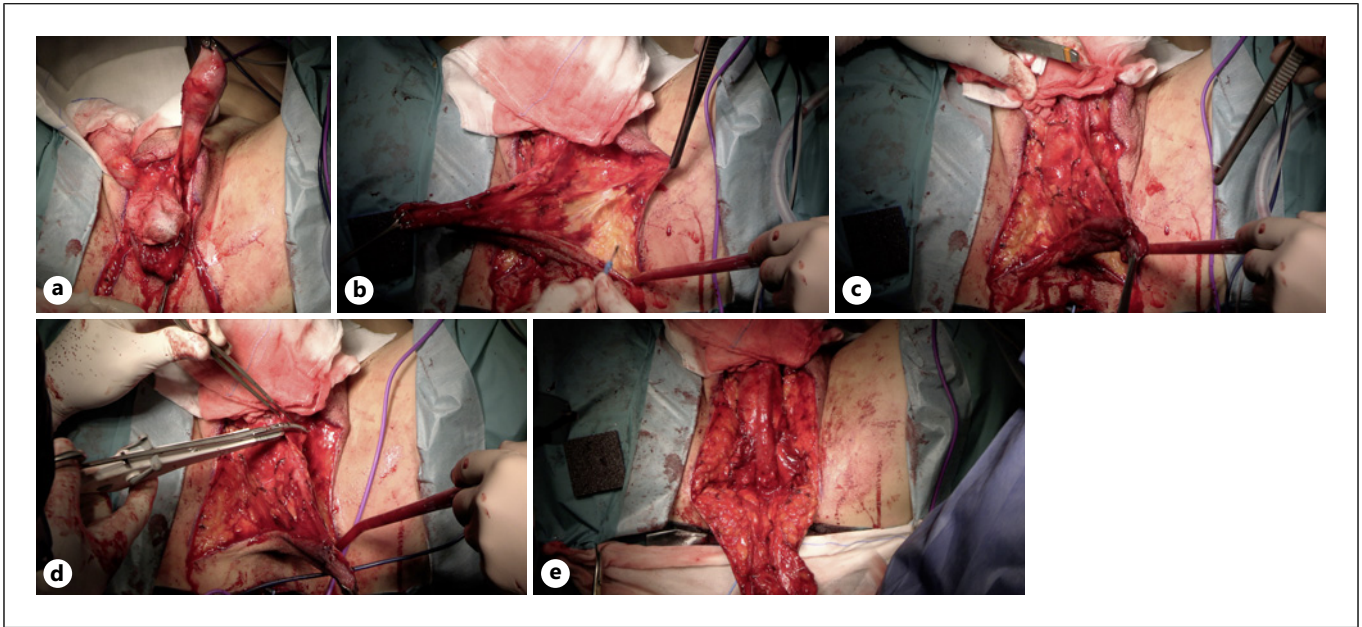


Fig. 2. The testicles surrounded by the tunica vaginalis are completely freed and positioned temporarily over the lower abdomen (a). The newly formed flap has a wide trapezoidal perineal base and a wide rectangular shape along the scrotal raphe and includes dartos, subcutaneous tissue, and scrotal septum (b, c). The flap is elevated closely following the ventral aspect of the urethra starting at the penoscrotal angle and dissecting up to the central tendon of the perineum (d, e).

flexibility and mobility of the tissues often allow only a one-layer closure. In cases when the fistula is not associated with a urethral stricture, a simple transverse closure of the urethral orifice after being refreshed is enough. In case that a urethral stricture was associated with the fistula, an anastomotic urethroplasty was performed, either bulbo-prostatic or urethro-vesical in case that the patient had previously undergone a radical prostatectomy. Stepwise maneuvers of the elaborated perineal posterior urethroplasty may be used as necessary to achieve a tension-free bulbo-prostatic anastomosis [3] (Fig. 5a, b).

To avoid recurrence of the fistula, the distal aspect of the MPSF is de-epithelialized and used as interposition flap (Fig. 6a–d). De-epithelialization can be done with scalpel or scissors and care should be taken to avoid damage of the subcutaneous vascularization.

The distal aspect of the de-epithelialized MPSF was fixed with 3 or 4 stitches to the anterior rectal wall, proximally to the location of the fistula to provide complete coverage of the rectal suture (Fig. 7a–c). The elasticity of the fat tissue allowed the flap to adapt well and efficiently to the space created between the rectum and the prostate. In our experience, it adapted better than the bulky gracilis flap.

A drain was left, the testicles are repositioned to its original position and the skin is closed. The remnant scrotal skin has enough elasticity to allow a tension-free closure of the scrotal skin (Fig. 8a, b).

The mean duration of surgery was 315 min (300–360 min), mean days with drainage was 4 days, and mean hospital stay 5.7 days. Patients were instructed to get out of bed 48 h after surgery. The patients were kept on full dose of antibiotics for 7 days and with low dose of prophylactic nitrofurantoin until Foley catheter was removed.

Results

The 3 patients that underwent MPSF surgery had the fistula removed and there was no recurrence (Table 1). Case 1 was treated with a resection of the fistulous tract and transverse closure of the rectal orifice and urethral orifice in a single layer. MPSF interposition was done and 6 months later, an AMS 800 urinary sphincter was inserted. The patient is free from fistulous recurrence 22 months after surgery.

Case 2 was treated with a resection of the fistulous tract, simple closure of the rectal orifice, and vesicourethral anastomosis was repeated. The latter was necessary because the RUF was located at the vesicourethral junction and resection of the fibrotic tissue left the anastomosis not viable to be closed only with a transverse closure. MPSF interposition was used. A covering colostomy was performed in the same setting. Twenty months after surgery, the patient showed mild stress urinary incontinence, did not leak urine through the rectum, and did not want further surgeries to correct the incontinence nor closure of the colostomy.

Case 3 was treated with a resection of the fistulous tract, closure of the rectal orifice in a single layer, and bulbo-prostatic anastomosis with urethral rerouting

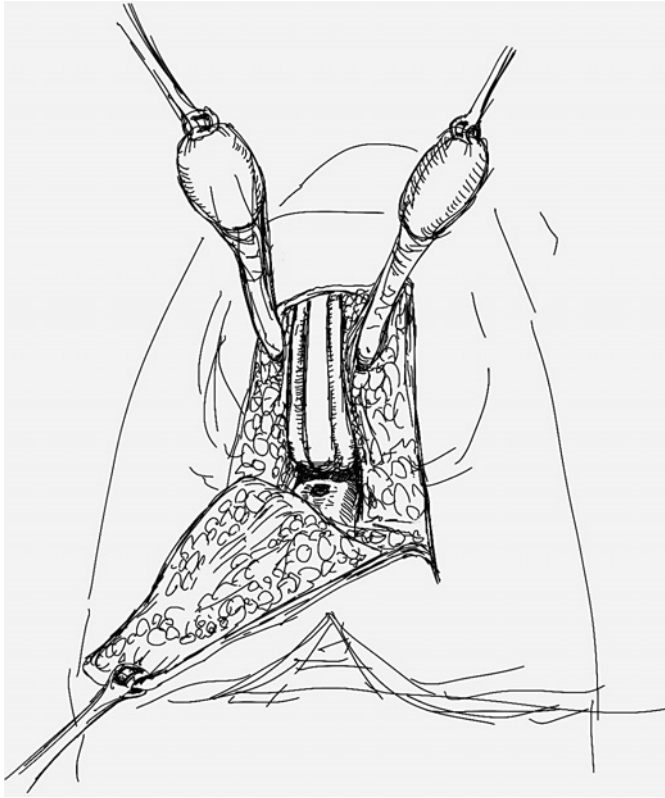


Fig. 3. The mid-perineal scrotal flap (MPSF) incorporates all the subcutaneous tissue between the skin and the bulbar urethra. The testicles surrounded by the tunica vaginalis are completely freed and positioned temporarily over the lower abdomen. This approach allows a complete dissection of the proximal aspect of the urethra and exposure of the surgical plane between the rectum and the posterior aspect of the prostate.

around the left corpus cavernosum. MPSF was used as interposition flap and a temporary colostomy was done. The patient is free from fistulous recurrence 12 months after closure of the colostomy. He has stress urinary incontinence and implantation of an AMS 800 urinary sphincter is pending.

Discussion

This is the first report about the use of the de-epithelialized MPSF to treat RUF. Surgery was performed in 3 patients with complex RUF, and healing was achieved in all of them. Temporary colostomy was necessary in all 3 cases.

Several surgical repair techniques for RUF have been described, including transrectal (Parks per-anal rectal advancement flap and York-Mason trans-anorectal

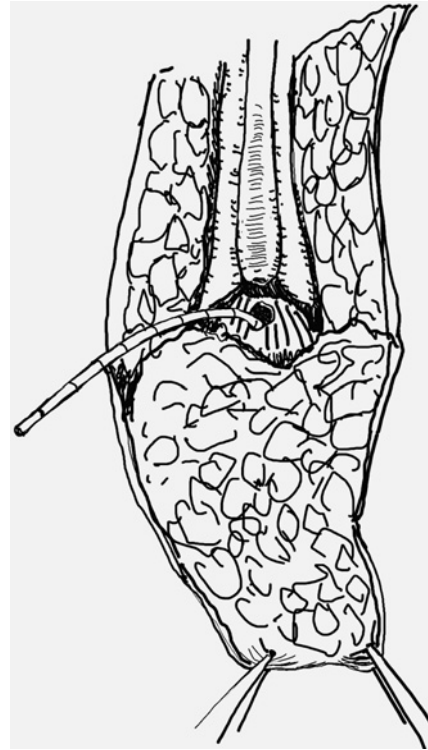


Fig. 4. Identification of the fistula is facilitated by the previous insertion of the ureteric catheter through the fistula.

sphincter splitting approach), perineal, abdominal, and combined approaches [1]. It is recommended that in complex RUFs interposition flaps, such as dartos, gracilis muscle, tunica vaginalis, omentum, or bulbocavernosus muscle are used to avoid recurrence. Flaps of dartos, tunica vaginalis, or bulbocavernosus muscle are often too short and have limited volume to cover deep defects of tissue in the perineum. In these cases, gracilis flap or omentum are better options, which we have used in the past. The drawback of gracilis muscle is that it is quite rigid and bulky, what makes its adaptation to the created perineal space morphology after the resection of the fistula challenging. It also requires several incisions on the thigh, adds complexity to the surgical procedure, and is time consuming. Omentum is a great tissue for interposition but requires a combined abdominoperineal approach and in some patients with a previous abdominal surgery may not be easily available. The MPSF is a less complex procedure that allows excellent access to the bulbar urethra and the surgical plane between rectum and prostate. It does not require a separate incision for the flap harvesting procedure. The interposition flap includes well vascularized subcutaneous fat tissue by

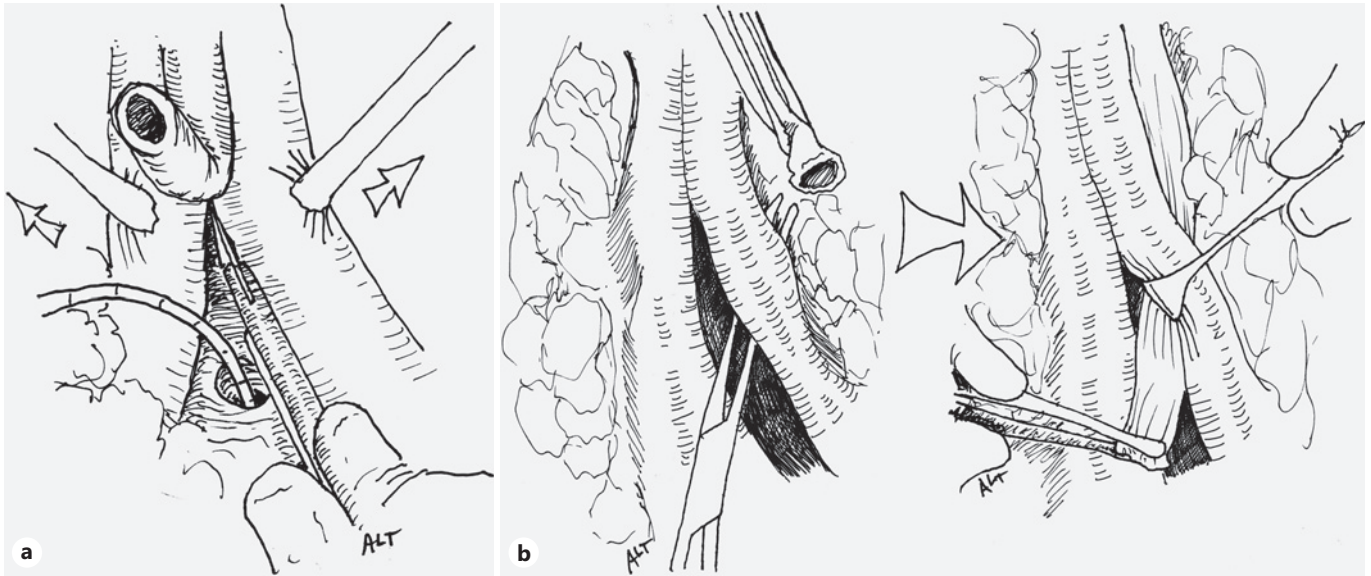


Fig. 5. In case that a urethral stricture is associated with the fistula, an anastomotic urethroplasty is performed, either bulbo-prostatic or urethro-vesical in case that the patient had previously undergone a radical prostatectomy. Stepwise maneuvers of the elaborated perineal posterior urethroplasty may be used as necessary to achieve a tension-free anastomosis. The urethra is transected at the point of the fistula and mobilized distally beyond the crus as far as the penoscrotal junction. Then

corporal body separation in bloodless plane is performed from the crus distally for 3–5 cm (a). If after corporal body separation, and inferior wedge pubectomy, a tension-free anastomosis cannot be achieved, the urethra is routed around the lateral side of the left corporal body. A small furrow of the bone should be gouged from the left ischiopubic ramus where the urethra runs, to avoid its compression between the corpus and bone (b).

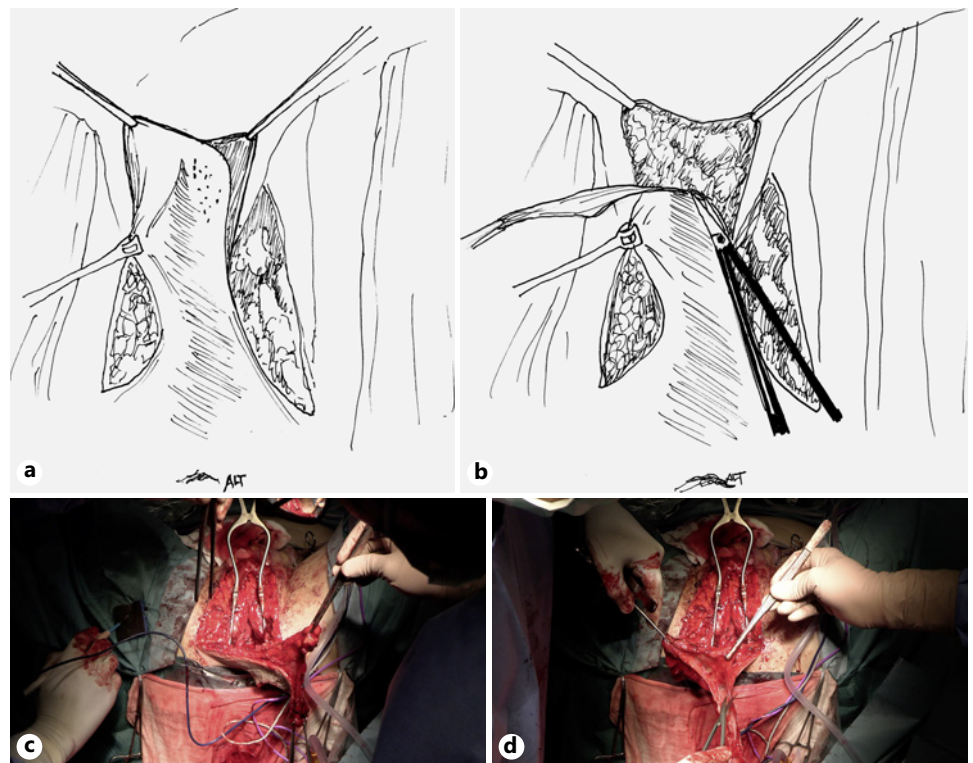


Fig. 6. To avoid recurrence of the fistula, the distal aspect of the MPSF is de-epithelialized and used as interposition flap. De-epithelialization can be done with scalpel or scissors and care should be taken to avoid damage of the subcutaneous vascularization (a–d).

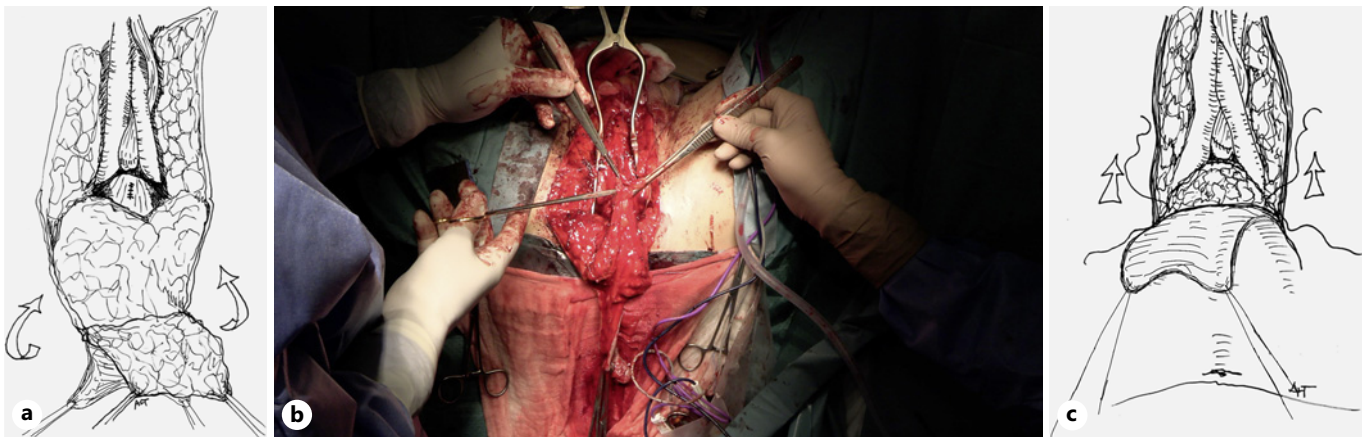


Fig. 7. The fistulous tract is resected, the borders of the rectal orifice refreshed and closed with a single or double layer of absorbable stitches (a). The distal aspect of the de-epithelialized MPSF is fixed with 3 or 4 stitches to the anterior rectal wall, proximally to the location of the fistula to provide complete coverage of the rectal suture. The elasticity of the fat tissue allows the flap to adapt well and efficiently to the space created between the rectum and the prostate (b, c).

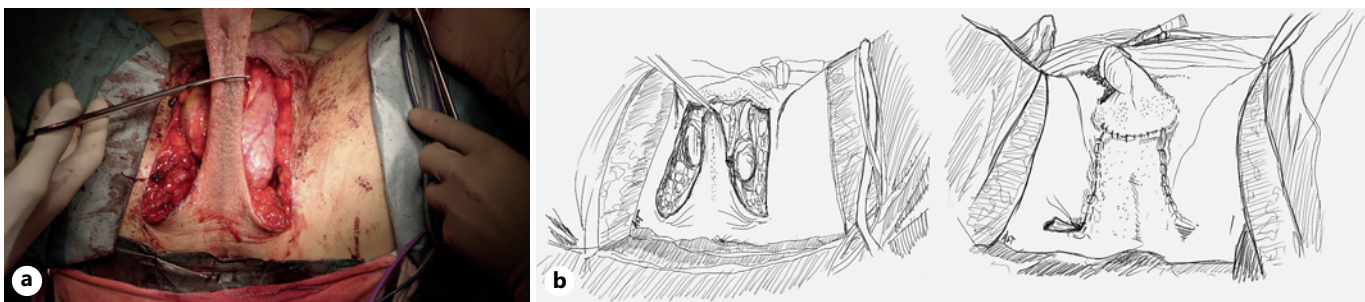


Fig. 8. The distal skin of the flap devoid of subcutaneous fat tissue is resected (a). A drain is left, the testicles are repositioned to its original position, and the skin is closed. The remnant scrotal skin has enough elasticity to allow a tension-free closure of the scrotal skin (b).

Table 1. Summary of the cases

Case	Age	Etiology	Previous fistula repairs	Previous urinary diversion	Colostomy	Use of MPSF	Urethral or bladder reconstruction	Outcome	Follow-up, months
1	52	RARP	Transperineal, abdominal	Bladder catheter	Preoperative	Yes	Bladder closure	Cured	24
2	59	Open prostatectomy + adjuvant radiotherapy + TUR	No	Suprapubic tube	During repair	Yes	New urethro-vesical anastomosis	Cured	20
3	72	Radiotherapy, cryotherapy, urethral dilatations	No	No	During repair	Yes	Bulbo-prostatic anastomosis	Cured	12

RARP, robot-assisted laparoscopic radical prostatectomy.

distal vascular branches of the internal pudendal vessels that, without tension, reaches the deep perineum up to the posterior bladder neck. It is elastic, has enough volume to adapt, and ideal for the space created between the anterior rectal wall and the prostatic urethra or bladder neck. Based on our successful experience, MPSF is our choice as interposition flap for all our perineal RUF repairs.

Conclusions

The MPSF is a time efficient procedure that allows excellent access to the bulbar urethra and to the surgical plane between rectum and prostate. It does not require a separate incision for the interposition flap harvesting procedure when required.

Statement of Ethics

This research complied with the guidelines for human studies and was conducted ethically in accordance with the World Medical Association Declaration of Helsinki. This study protocol was reviewed and approved by (Comité de Ética de la Investigación con medicamentos del Hospital Universitario La Paz), approval number (Código HULP PI-5703). Written informed consent was obtained from patients for publication of the details of their medical case and any accompanying images.

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Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

No co-authors. Luis Martínez-Piñeiro as one author is responsible for:

- Substantial contributions to the conception or design of the work, the acquisition, analysis, and interpretation of data for the work
- Drafting the work and reviewing it critically for important intellectual content
- Final approval of the version to be published
- Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author and will be readily available to editors, reviewers, and readers without unnecessary restriction wherever possible.