

CASE REPORT

Bilateral SCIP flaps to large scrotoperineal defect reconstruction

Francisco Sebastián Carvajal Flechas^{1*} and Daniel Larrarte-Arenas²¹Plastic and Reconstructive Surgery Department, Hospital Regional de Duitama, Duitama, Colombia; ²Faculty of Medicine, Pontifical Xavierian University, Bogotá, Colombia*Abstract*

Background: Scrotoperineal defects reconstruction can be related to multiple etiologies, being Fournier's gangrene one of the most important etiologies due to its rapidly progressive nature and high mortality rates. Therefore, new reconstruction techniques have been developed and analyzed over the past few years to achieve good functional and esthetic results, among these techniques are the perforator flaps.

Objective: Presenting this case, we want to prove that using bilateral SCIP (*superficial circumflex iliac artery perforator*), flaps can be a satisfactory option for reconstruction of scrotoperineal defects, without major post-operative complications and adequate functional and esthetic results.

Design: This article describes the use of the bilateral SCIP flaps as a reconstructive alternative in scrotum and perineum large defects.

Results: SCIP flaps can achieve good results in the reconstruction of large scrotoperineal defects at the functional and esthetic levels, with minimum morbidity in the donor site.

Discussion: Multiple alternatives for perineoscrotal defects reconstruction have been described in the literature. The proposed surgical treatment algorithms depend on various factors such as the location and extension of the compromised areas.

Conclusions: The discussed SCIP flap proves a very good alternative in the analyzed cases and can be used in a unilateral or bilateral way depending on the extension of the defect to be reconstructed.

Keywords: *perforator flap; reconstructive surgery; fournier's gangrene; necrotizing fasciitis; perineum; scrotum; scrotoperineal defect*

Received: 25 November 2021; Revised: 29 December 2021; Accepted: 11 March 2022; Published: 27 May 2022

Scrotoperineal defects can be secondary to large resections resulting from oncological or infectious (e.g. Fournier's Gangrene) diseases, traumatic injuries, congenital malformations, among others (1). Fournier's gangrene is one of the most relevant etiologies due to its rapidly progressive nature and high mortality rates.

Scrotoperineal defects are often challenging for reconstructive surgeons (2). There are multiple reconstruction alternatives for these kinds of defects, among which the more frequently used are the primary or secondary closure, skin grafts, fasciocutaneous flaps, musculocutaneous flaps, and muscular flaps (3). However, choosing the right reconstructive method is a challenge for surgeons given the patient status, associated comorbidities, defect extension, and the involvement of various anatomical regions, making it necessary to personalize each case to set the best therapeutic alternative.

Perforator flaps have been broadly accepted among surgeons to cover scrotoperineal defects; among these,

the SCIP (*superficial circumflex iliac artery perforator*) flap is described by Koshima in 2004 (4). The SCIP flap benefits are the low morbidity in the donor site (5), minimum secondary contraction, immediate covering of the skin defects both medium and large (6), it is thin and flexible, ensuring satisfactory esthetic and functional results and thus sidestepping the shortcomings of the traditional groin, gracilis, and abdominal (Transverse Rectus Abdominis Myocutaneous flap [TRAM], Vertical Rectus Abdominis Myocutaneous flap [VRAM], Deep Inferior Epigastric Artery Perforator [DIEAP]) flaps (7).

This article describes the use of the bilateral SCIP flaps as a reconstructive alternative in large defects that compromise the scrotum and perineum.

Surgical technique

The SCIP flap is a fasciocutaneous flap based on the perforator branches of the superficial circumflex iliac artery (SCIA). Its axis is a line that runs from the inguinal groove to the

anterior superior iliac spine (ASIS). It can be based on the lateral (deep) perforator branch or on the medial (superficial) perforator branch, being the preferred option given its direct fasciocutaneous course. The flap's design must follow the mentioned axis with sufficient length to allow its interpolation and rotation in a propeller fashion to reach the perineal region and a width until 10 cm to allow primary closure, assuming the resulting defect is bilateral. The medial (superficial) perforator branch penetrates the deep fascia in 95% of the cases with a well-circumscribed area 4.5 cm lateral and 1.5 cm cephalic from the pubic tubercle (Fig. 1). The perforator branch can be searched and marked prior to surgery with the use of a manual doppler; moreover, the examination with angiotomography before surgery can also help find the exact location of both the medial and lateral branches.

The incision and elevation of the flaps start from lateral to medial in a plane above the Scarpa's fascia, in some cases, the dissection continues following the visible vessels through the elevated flap, preserving the superficial vein, until reaching the point where the lateral and medial perforator branches are visualized piercing the deep fascia. Once the perforator branches are identified, the incision and elevation of the flap are completed on its medial portion. A mini-clip is left clamping the lateral perforator branch as the contralateral flap is elevated, in order to verify the suitability of the medial branch to base the entire flap, which can be also assessed with the thermography help.

The vascular pedicle dissection to its origin at the SCIA can be completed once the best branch to base the flap is determined (septocutaneous in the case of the medial

branch or intramuscular in the case of the lateral branch), thus increasing its mobility arch (Fig. 2). Once the pedicle is dissected, the flaps can be interpolated or rotated 180° so the left propeller flap completes the coverage of the upper scrotum and the right propeller flap covers the lower scrotum and perineum, forming a yin-yang (Fig. 3). Drainages are left on the donor site that are subsequently closed primary. A full skin graft is taken and attached to the penis defect.

Case report

A 72-year-old male patient presented to the hospital with edema, erythema, blisters, and pain in the perineoscrotal and penis region, with a fever up to 39°C. Patient denies any previous medical conditions. Paraclinical analyses show neutrophilic leukocytosis and elevated acute phase reactants. Wide-spectrum antibiotics were prescribed. Patient was initially examined by the urology team who considered the symptoms are compatible with Fournier's Gangrene, and the patient was taken for emergency surgical debridement of the affected area where a large extension of compromised tissue is identified. The debridement is realized without complications but leaves a large defect compromising the scrotum and exposing the testicles, spermatic cords, penis and perineum. A sample taken from the tissue was positive for *Streptococcus pyogenes*.

Postoperative management included daily wound care and dressing. Application of antibiotics continued, and the patient showed adequate clinical response and infection control, without increasing the extension

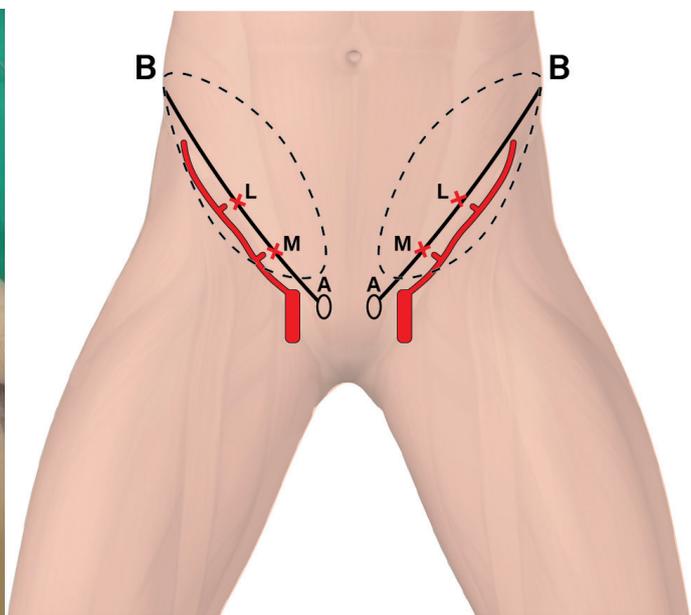


Fig. 1. Preoperative marking of the flaps.



Fig. 2. Elevation of bilateral SCIP flaps.



Fig. 3. Flaps interpolation to cover the defect and form a 'Yin-Yang'.

of the compromised soft tissue. Afterward, the patient was examined by the Plastic and Reconstructive Surgery team to cover the defect. The patient was then taken to reconstructive surgery with the use of bilateral SCIP flaps to scrotoperineal area and a skin graft to the penis (Figs. 4, 5).

Results

Clinical evolution was adequate; no severe complications on the flaps or patients were seen during follow-up. The wound showed small dehiscence in the left flap's donor site, which was closed primary again. No further complications occurred. Furthermore, no material findings were discovered in follow-up appointments and the patient returned to their normal routine after 3 months. The reconstruction had satisfactory functional and esthetic results, attaining the use of underwear without movement limitations (Fig. 6).

Discussion

Most cases of scrotoperineal defects can be secondary to infectious or oncological diseases (1). Fournier's gangrene is a rare entity that results in a rapidly evolving necrotizing fasciitis at the tissue around the genitoperineal area. Fournier's gangrene mostly affects males over 50 years of age; however, women and patients of any age can be affected (8, 9). Most cases are associated with polymicrobial infections that are easily propagated through the fascia causing necrosis and gangrene in the adjacent tissue (10). This entity can be lethal if the infection is not controlled, having mortality rates between 15 and 20% (9).

The diagnosis of Fournier's gangrene is essentially clinical. Patients present symptoms such as edema, sudden genital or perineal pain, fever, progressive tissue necrosis, purulent secretions, crepitus, and septic shock (9, 11). For treatment purposes, it is key to achieve early diagnosis,

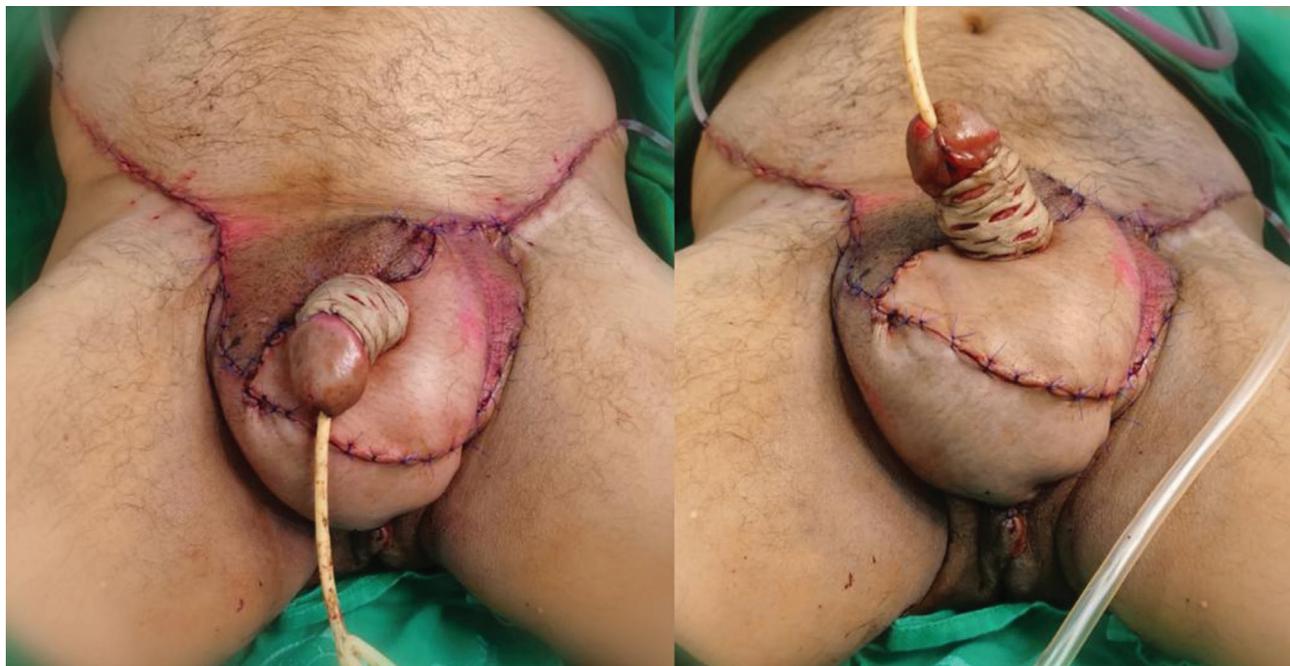


Fig. 4. Postoperative result of scrotoperineal reconstruction with bilateral SCIP flaps and penis skin grafts.

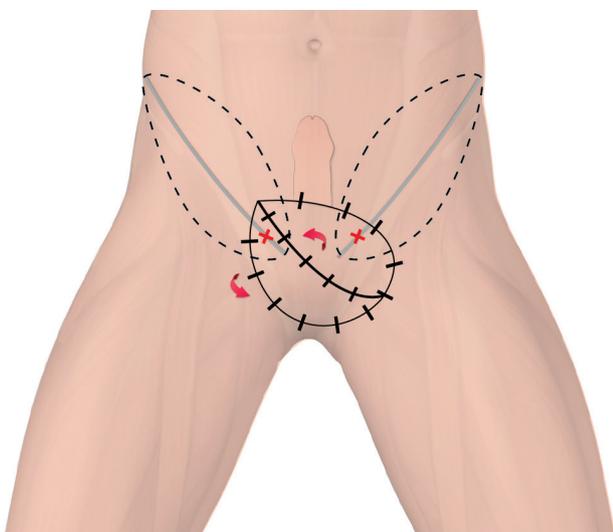


Fig. 5. Drawing of the postoperative result of scrotoperineal reconstruction with bilateral SCIP flaps and penis skin grafts.

intensive fluid resuscitation, and surgical debridement and to use wide-spectrum antibiotics covering gram-positive, gram-negative bacteria, aerobes and anaerobes. Early exploratory surgery is mandatory, which implies considerable debridement areas of necrotic tissue that result in large coverage defects (6, 8, 9).

Multiple reconstructive alternatives have been described for perineoscrotal defects, among which are the primary closure, secondary intention closure, skin grafts, fasciocutaneous flaps, musculocutaneous flaps, and muscular flaps (3). Primary and secondary closure is used in

relatively small defects (12). In turn, skin grafts are one of the most popular alternatives and are useful to cover large scrotum defects with partial thickness and perineum defects; these are considered technically simple, require a short operative time and result in low morbidity of the donor site with acceptable functional and cosmetic results (13, 14). However, skin grafts show secondary contraction, scarring retraction, and high risk of graft failure by high contamination risk due to the location (urinary or fecal contamination, excessive humidity), thus requiring optimal conditions prior to surgical intervention, which can lead to delays in the coverage and long reconstructive process (6). Full skin grafts, as shown in our case, are ideal to cover penis defects.

Reconstruction with flaps has proven advantageous in comparison with skin grafts and is useful in defects more than 50% of the scrotum or that surpass the scrotum area (12). The main types are the scrotal and preputial flaps, fasciocutaneous thigh flaps, and myocutaneous flaps. Use of scrotal and preputial flaps has been described mostly in defects that encompass less than 50% of the scrotal area; these are technically simple and show good cosmetic results (15). Fasciocutaneous thigh flaps include the superomedial thigh flap, described by Hirschowitz et al. in 1980, the medial thigh fasciocutaneous flap, described by Hallock in 1990 (16) and the pudendal flap (17). This kind of fasciocutaneous flap offers scrotum coverage without sacrificing muscular function and shows acceptable esthetic results with the possibility of donor site primary closure (15, 18). Other authors have described myocutaneous flaps, including gracilis and



Fig. 6. Postsurgical results on the 6-month follow-up.

rectus abdominis myocutaneous flaps; however, these have a bulky appearance at the perineoscrotal level limiting its uses (15, 17, 19).

Use of perforator flaps has been increasing in recent years due to a better understanding of skin's vascular anatomy and physiology, following the perforasome concept as the basic unit (20), also the advancement in diagnostic imaging. In the case of scrotoperineal reconstruction, the most explored flap types in literature are the anterolateral thigh (ALT) flap and the DIEAP flap. These are useful for large defects with low morbidity (17). The Keyhole design has been described in some cases as an alternative for reconstruction around structures such as the anus and penis (21). Its large volume and bulkiness in overweight patients make it a deficient option for reconstructive surgery.

Use of SCIP flaps in reconstructive surgery has increased due to the better anatomical understanding and the possibility to predict the location of the perforator branches assisted by imaging techniques before the surgery, among which the most relevant are the doppler ultrasound and computerized angiotomography. This flap is irrigated by one or more perforator branches of the SCIA, which is a direct branch of the common femoral artery (4, 22). One of its main advantages is its versatility combined with persistent anatomy and relatively easy harvesting without compromising major

vessels. Additionally, it is thin, flexible, and leaves minimal morbidity in the donor site (5, 23), which are ideal characteristics for the reconstruction of the scrotoperineal area. Despite its advantages, the use of bilateral SCIP flaps for perineoscrotal reconstruction is rarely described in the English literature with only a few published clinical cases (2, 3, 5, 24). Medium-sized defects can be reconstructed with unilateral flap and large defects can be corrected with bilateral flaps, as described in this article, achieving stable, functional, and esthetically acceptable reconstructions.

Conclusion

Although literature rarely describes the use of SCIP flaps in the reconstruction of medium to large scrotoperineal defects, it has been shown that this perforator flap has characteristics that make it ideal for coverage with minimal morbidity in the donor site and good functional and cosmetic results. Depending on the size of the defect, this flap can be used unilateral or bilateral.

In the case described in this article, the use of bilateral SCIP flaps proved to be a satisfactory option without major postoperative complications and adequate functional and esthetic results. The patient showed quick recovery and returned to his daily activities. It is important to note that, as of today, there is no consensus on which is the best reconstructive alternative for genital and perineal

defects, and each case needs to be customized. However, the use of SCIP flaps must be considered among the top reconstructive options in this type of defect.

Acknowledgements

No acknowledgements to present.

Conflict of interest and funding

The authors declare no potential conflicts of interest. There are no external sources of funding for this article.

Ethical conflicts

The information contained herein was obtained from the patient's clinical history. The authors have obtained signed consent for this publication.

References

- Guler KG. Perineum and genitalia reconstruction. *Rev Méd Clín Las Condes* 2016; 27(1): 76–82. doi: 10.1016/j.rmcl.2016.01.010
- Boissière F, Luca-Pozner V, Vaysse C, Kerfant N, Herlin C, Chapat B. The SCIP propeller flap: versatility for reconstruction of locoregional defect☆. *J Plast Reconstr Aesthetic Surg* 2019; 72(7): 1121–8. doi.org/10.1016/j.bjps.2019.03.016
- Aydin T, Feyzi K, Tayfun T, Berna T. Reconstruction of wide scrotal defect using groin fasciocutaneous island flap combined with a strip of deep fascia. *J Plast Reconstr Aesthetic Surg* 2010; 63: 1394–5. doi: 10.1016/j.bjps.2010.01.006
- Koshima I, Nanba Y, Tsutsui T, Takahashi Y, Urushibara K, Inagawa K, et al. Superficial circumflex iliac artery perforator flap for reconstruction of limb defects. *Plast Reconstr Surg* 2004; 113(1): 233–40. doi: 10.1097/01.PRS.0000095948.03605.20
- Atik B, Tan O, Ceylan K, Etlik O, Demir C. Reconstruction of wide scrotal defect using superthin groin flap. *Urology* 2006; 68(2): 419–22. doi: 10.1016/j.urology.2006.04.003
- Eksua-Pereira I, Ferreira PC, Teixeira S, Barreiro D, Silva Á. Fournier's gangrene: a review of reconstructive options. *Cent Eur J Urol* 2020; 73(1): 74–9. doi: 10.5173/cej.2020.0060
- Myung Y, Yim S, Kim B-K. A comparison of axial circumference between superficial circumflex iliac artery perforator flap and other workhorse flaps in dorsal foot reconstruction. *J Plast Surg Hand Surg* 2017; 51(6): 381–6. doi: 10.1080/2000656X.2017.1279621
- Hagedorn JC, Wessells H. A contemporary update on Fournier's gangrene. *Nat Rev Urol* 2017; 14(4): 205–14. doi: 10.1038/nrurol.2016.243
- Eke N. Fournier's gangrene : a review of 1726 cases. *Br J Surg* 2000; 87: 718–28. doi: 10.1046/j.1365-2168.2000.01497.x
- Erol B, Tuncel A, Hanci V, Tokgoz H, Yildiz A, Akduman B, et al. Fournier's Gangrene: overview of prognostic factors and definition of new prognostic parameter. *Urology* 2010; 75(5): 1193–8. doi: 10.1016/j.urology.2009.08.090
- Mallikarjuna MN, Vijayakumar A, Patil VS, Shivswamy BS. Fournier's Gangrene: current practices. *ISRN Surg* 2012; 2012: 1–8. doi: 10.5402/2012/942437
- Karian LS, Chung SY, Lee ES. Reconstruction of defects after Fournier gangrene: a systematic review. *Eplasty* 2015; 15: e18.
- Maguiña P, Palmieri TL, Greenhalgh DG. Split thickness skin grafting for recreation of the scrotum following Fournier's gangrene. *Burns* 2003; 29(8): 857–62. doi: 10.1016/j.burns.2003.07.001
- Vincent MP, Horton CE, Devine CJ Jr. An evaluation of skin grafts for reconstruction of the penis and scrotum. *Clin Plast Surg* 1988; 15: 411–24. doi: 10.1016/S0094-1298(20)31418-8
- Ferreira PC, Reis JC, Amarante JM, Silva ÁC, Pinho CJ, Oliveira IC, et al. Fournier's gangrene: a review of 43 reconstructive cases. *Plast Reconstr Surg* 2007; 119(1): 175–84. doi: 10.1097/01.prs.0000244925.80290.57
- Hallock G. Scrotal reconstruction following Fournier's gangrene using the medial thigh fasciocutaneous flap. *Ann Plast Surg* 1990; 24: 86–90. doi: 10.1097/00000637-199001000-00016
- Chen SY, Fu JP, Chen TM, Chen SG. Reconstruction of scrotal and perineal defects in Fournier's gangrene. *J Plast Reconstr Aesthetic Surg* 2011; 64(4): 528–34. doi: 10.1016/j.bjps.2010.07.018
- Horta R, Cerqueira M, Marques M, Ferreira P, Reis J, Amarante J. Gangrena de Fournier: de urgencia urológica hasta el departamento de cirugía plástica. *Actas Urol Esp* 2009; 33(8): 925–9. doi: 10.4321/S0210-48062009000800017
- Hsu H, Lin CM, Sun TB, Cheng LF, Chien SH. Unilateral gracilis myofasciocutaneous advancement flap for single stage reconstruction of scrotal and perineal defects. *J Plast Reconstr Aesthetic Surg* 2007; 60(9): 1055–9. doi: 10.1016/j.bjps.2006.09.005
- Saint-Cyr M, Wong C, Schaverien M, Mojallal A, Rohrich RJ. The perforasome theory: vascular anatomy and clinical implications. *Plast Reconstr Surg* 2009; 124(5): 1529–44. doi: 10.1097/PRS.0b013e3181b98a6c
- Sirimahachaiyakul P, Orfanotis G, Gesakis K, Kiranantawat K, Ciudad P, Nicoli F, et al. Keyhole anterolateral thigh flap: a special way of partition for reconstruction around a protruding structure or cavity/tunnel. *Microsurgery* 2015; 35(5): 356–63. doi: 10.1002/micr.22377
- Kimura N, Saitoh M, Hasumi T, Sumiya N, Itoh Y. Clinical application and refinement of the microdissected thin groin flap transfer operation. *J Plast Reconstr Aesthetic Surg* 2009; 62(11): 1510–6. doi: 10.1016/j.bjps.2008.06.039
- Brown E, Suh HP, Han HH, Pak CJ, Hong JP. Best new flaps and tips for success in microsurgery. *Plast Reconstr Surg* 2020; 146: 796E–807E. doi: 10.1097/PRS.00000000000007331
- Tagliatalata Scafati S, Lalinde Carrasco E. Microsurgically thinned groin flap for partial scrotal reconstruction. *J Plast Reconstr Aesthetic Surg* 2012; 65(5): 690–1. doi: 10.1016/j.bjps.2011.09.042

*Francisco Sebastián Carvajal Flechas

Plastic and Reconstructive Surgery Department, Hospital Regional de Duitama
Avenida de las Américas Carrera 35
Duitama, Boyacá
Colombia
Email: franciscocarvajal.cxplastic@gmail.com