



## Post-Traumatic Scrotal Reconstruction with a Pedicled “Extended” Superficial Circumflex Iliac Artery Perforator Flap: A Case Report

Garrido MF, Hernández LS\*, Alarcón PDZ, García CV, Ayala JM, Romero LT, López CC, Díaz LF and Fernández SL

Department of Plastic and Reconstructive Surgery, Hospital de la Santa Creu I Sant Pau, Spain

### Abstract

The Superficial Circumflex Iliac Artery Perforator (SCIP) flap has been used for scrotal reconstruction after Fournier's gangrene, skin cancer or infections. However, there are few publications on regard to penoscrotal reconstruction after a traumatic injury with this flap. In this article, we propose a new SCIP flap variation, the “extended” or “direct” SCIP flap, to effectively reconstruct a wide scrotal defect after a traumatic injury. The “extended” SCIP flap is designed medial and cranial to the Anterosuperior Iliac Spine (ASIS) using the superficial branch of the Superficial Circumflex Iliac Artery (SCIA) as the main pedicle.

**Keywords:** Penoscrotal reconstruction; SCIP flap; Superficial circumflex iliac artery perforator flap; Pedicled flap

### Introduction

Penoscrotal defects can take place for several reasons. Mostly happen after Fournier's gangrene, skin cancer, infections or traumatic injuries [1-3]. Traditionally, several methods have been used for penoscrotal reconstruction, including skin grafts, local flaps (fasciocutaneous or musculocutaneous flaps), tissue expanders, and free flaps [4-8]. However, skin grafts can lead to skin contracture [9]. Thick flaps (like traditional local and free flaps), in contrast, are difficult to insert and give place to poor aesthetic outcomes, causing problems due to their bulk.

To overcome these drawbacks, a thin but reliable flap is required in scrotal and penile reconstruction. Looking over local flaps, the Superficial Circumflex Iliac Artery Perforator (SCIP) flap gathers these requirements [10,11].

Cases have been previously reported where a SCIP propeller flap was used for scrotal reconstruction after Fournier's gangrene, skin cancers such as extramammary Paget's disease, or infections after foreign-body injections [1,12]. The etiology of the defect does not represent a big difference for the choice of the reconstructive technique, but proper functional and cosmetic reconstruction of the penoscrotal tissue is especially important in post-traumatic injuries as they usually happen in younger patients [13]. To our knowledge, up to date there are few publications on regard to reconstruction of penoscrotal defects after a traumatic injury with this flap. The purpose of this article is to propose a new SCIP flap variation, the “extended” or “direct” SCIP flap [14], to effectively reconstruct a wide scrotal defect after a traumatic injury.

### Case Presentation

A 55 years-old male patient was admitted to our institution for wide avulsion of the scrotal skin after a traumatic injury in a bicycle accident (Figure 1). He underwent an emergency surgery with right orchiectomy and relocation of the avulsed scrotum skin flap (Figure 2). Nevertheless, some days after, he developed scrotal flap necrosis that required a wide debridement. It ended up with a 12 cm × 8 cm (96 cm<sup>2</sup>) soft tissue defect over the right scrotum and proximal penis dorsum (Figure 3).

To cover the resultant defect, we proposed a reconstruction with the “extended” or “direct” SCIP flap. This variation of the SCIP flap is solely based on the superficial branch of the Superficial Circumflex Iliac Artery (SCIA) with the skin island designed medial and cranial to the Anterosuperior Iliac Spine (ASIS) [14].

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#### \*Correspondence:

Lucía Sisternas Hernández,  
Department of Plastic and  
Reconstructive Surgery, Hospital de la  
Santa Creu I Sant Pau, Carrer de Sant  
Quintí, 89, 08041 Barcelona, Spain,  
E-mail: lucia.sisternas4@gmail.com

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**Figure 1:** Avulsed scrotum after traumatic injury.



**Figure 2:** Postoperative image after relocation of the avulsed skin flaps.



**Figure 3:** Flap necrosis.

With the aid of preoperative Angio-CT and Doppler sonography we marked the point where the superficial branch of the SCIA crosses over Hesselbach's fascia. According to the angiographic study carried out in our department [14], this exit point is located in within a 21 mm-radius circumference drawn 18 mm medial and 17 mm distal to the ASIS in 90% of the patients.

Then, a SCIP flap 20 cm (long) × 8 cm (wide) was designed in an oblique-vertical fashion medial and cranial to the ASIS using the superficial branch of the right SCIA as source vessel and pivot point (Figures 4, 5). The vascular flap pattern was axial type [15]. After identification and isolation of the superficial branch of the SCIA, the flap was harvested from distal to proximal over the oblique muscle



**Figure 4:** "Direct" SCIP design, medial and cranial to the ASIS.



**Figure 5:** SCIP flap harvested based on the superficial branch of the SCIA dissected until its origin in the SCIA.



**Figure 6, 7:** Immediate postoperative image after reconstruction of the penoscrotal defect with the SCIP flap.

fascia and rotated 160° clockwise to the defect (Figures 6). Flap viability was verified with clinical assessment and indocyanine green angiography. The small remaining dorsal penis defect was covered with a split-thickness skin graft. A satisfactory result was noted at the postoperative 6-month follow-up evaluation with acceptable cosmetic outcomes. Lymphorrhea and wound dehiscence were not



**Figure 8:** 6 months after surgery.

noticed (Figure 7). Furthermore, the function of the testis was normal after the surgery and the blood-free testosterone levels were also within normal limits.

## Discussion

Penoscrotal skin is loose, ample, elastic, expandable and thinner than in other places, with a thin subcutaneous layer. Proper functional and aesthetic reconstruction of the penoscrotal tissue is important for patient confidence, especially after a traumatic injury, as it usually happens in younger patients. Thus, care should be taken to restore the original shape of the penis or scrotum, trying to maintain function. Although small defects can be covered by a scrotal flap, large defects, in the absence of sufficient scrotal tissue, should be reconstructed using other techniques. Split-thickness skin grafts could be an easy and simple procedure, but they are not as stable as flaps, and scar contracture might lead to loss of the normal cremaster muscle reflex [9]. In contrast, local or free thick and bulky flaps can increase the temperature of the testis which may affect spermatogenesis and cosmesis.

Compared to the above-mentioned techniques, the local SCIP flap has several advantages: It is a reliable and naturally thin flap, it is located close to the defect site and it allows for a relatively easy and rapid tissue transfer [1]. Furthermore, using a local pedicled SCIP flap, instead of a free flap, avoids the requirement of microsurgical anastomosis or recipient vessels dissection, shortening surgical time. There are few reports discussing the application of the SCIP as a propeller or pedicled type for penoscrotal reconstruction [1,11,12,16].

We define the flap used in this case as the “extended” or “direct” SCIP flap, and it differs from the conventional SCIP flap in several ways. Our variation of SCIP flap is solely based on the superficial branch of the SCIA (which provides a long and constant vascular pedicle with an axial pattern) and its skin paddle is based on the abdominal skin located medial and proximal to the anterosuperior iliac spine [14]. Therefore, it differs from the “classic” SCIP flap described by Koshima (based on the deep branch perforators with a skin paddle that is lateral and proximal to the anterosuperior iliac spine) and from previously reported variations of this flap [17-21].

It also differs from the proposal made by Hong JP [22]. This last one is a pure perforator flap with short pedicle (based either on a cutaneous perforator from the superficial or deep branch) that needs perforator to perforator anastomosis in free designs. It is dissected in a suprafascial plane (above the superficialis fascia) with a different cutaneous territory (caudal and medial to the ASIS, between this and the pubis). In contrast, the cutaneous territory of our flap can be displaced cranially to obtain a larger flap because we always harvest it

on the superficial branch of the SCIA, which has a constant presence and follows an axial pattern proximal and medial to the ASIS until the 12<sup>th</sup> rib. We also perform, if needed, a complete dissection of the SCIA until its origin in the common femoral artery, which provides us with a longer and larger pedicle for a safer flap mobilization.

Herein, the “extended” SCIP flap variation offers some additional advantages to conventional SCIP flap: larger flaps with direct closure of the donor area, it avoids injury over deep lymphatic nodes (preventing lymphedema development) and it provides thin and more pliable elastic skin. The pedicle is longer, with larger caliber of the vessels, providing a wider and safer pivot point. Also, this surgical method avoids the requirement of supramicrosurgical techniques for flap anastomosis in free designs.

In contrast with other publications [15], in the anatomical and clinical study that we recently performed [14], we found the “extended” SCIP flap pedicle, based on the superficial branch of the SCIA, to be anatomically constant. The skin paddle design that we describe, also differs from other SCIP flap variations previously reported [1,17,20]. As we mentioned before, our flap uses the abdominal skin located medial and proximal to the ASIS and is based solely on the superficial branch of the SCIA.

Although it is a very good option for thin people, in obese patients, the “extended” SCIP flap can be too thick for the ideal reconstruction of the penoscrotal area. This is why we recommend to always check it, prior to surgery, and look for other flap options if necessary.

We also propose the use of the “extended” SCIP flap variation, in a local or free design, as an ideal flap for the repair of complex three-dimensional tissue defects where thin flaps with medium or large dimensions are required. Some of these areas are the leg, foot, forearm, hand, head and neck and penoscrotal area.

## Conclusion

In conclusion, the reconstruction of the penoscrotal area after a traumatic injury using the “extended” or “direct” pedicled SCIP flap is an effective method and especially ideal considering the nature of penoscrotal tissue. However, as with other pedicled flaps, it must be handled with caution to prevent kinking or spasming of the pedicle. Additionally, it should be noted that this flap has relative contraindications in obese patients, and alternative flap options should be considered in these cases.

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