

## The McGregor Pedicled Groin Flap for Hand Skin Defects

José Manuel Gómez Pérez<sup>1</sup>, Reynaldo Martínez Borraz<sup>1</sup>, Pablo Alberto Mendoza Sánchez<sup>2</sup>, Ricardo Sotomayor Tuquerrez<sup>1</sup>, José David Rodríguez Enríquez<sup>1</sup>, Genaro Alejandro Trujillo Franco<sup>1</sup>, Víctor Manuel Márquez Ramón<sup>1</sup>

<sup>1</sup>Hospital de alta especialidad Gustavo A Rovirosa Pérez

<sup>2</sup>Hospital general Dr Miguel Silva

### ABSTRACT

The groin flap is a surgical method used to cover soft tissue defects in the hand and forearm, such as wounds, traumatic amputations, degloving injuries, burns, burn scar release, and tumor excision. It is effective in covering extensive and intricate defects, such as wounds, traumatic amputations, degloving injuries, burns, burn scar release, and tumor excision. The procedure involves a remote autoplasty supported by the vascular territory of the superficial iliac circumflex artery. The flap's boundaries are defined using the "2 fingers width" criterion, and the flap is raised from lateral to medial, transferring subcutaneous tissue while keeping it above the fascia. The flap is closed using drain suction, and the patient is allowed to walk on the 5th day after surgery. Effective preoperative planning is essential for preventing the creation of too big or too tiny flaps and ensuring the fabrication of appropriate tubing to avoid complications. The McGregor groin flap is a commonly used technique for hand deformity reconstruction due to its extended pedicle and quick execution. It is adaptable, repeatable, and can be performed by less-experienced surgeons without microsurgery expertise. The flap covers significant tissue loss with pliable tissue, making it suitable for joints. It can cover abnormalities on the back or palm, and can be used for early wrist and hand rehabilitation. However, it has drawbacks, such as shoulder stiffness in older patients, discomfort during the upper limb positioning, and the need for multiple phases. Despite these, the groin flap remains relevant in the age of microsurgery and can be improved with technical modifications.

**KEYWORDS:** McGregor flap, hand reconstruction, skin defects

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### INTRODUCTION

Surgically addressing hand and forearm soft tissue abnormalities is a challenging task. The methods and procedures have advanced continuously, especially with the introduction of free flaps and microsurgery. Nevertheless, the acquisition of microanastomosis procedures remains inaccessible to many teams, particularly in underdeveloped nations. The groin flap continues to be a helpful method in reconstructive procedures of the hand and forearm, particularly in emergency situations. It is used for initial covering of soft tissue before a secondary microsurgical treatment or as a backup option if free flaps are unsuccessful. McGregor initially described it after collaborating with Jackson on the vascularization of the deltopectoral flap. They were searching for a cutaneous area with independent blood

supply, where the arteries and veins are closely connected at their starting and ending points. Their goal was to suggest the creation of a dependable and sizable skin flap, relying on a consistent arteriovenous pedicle. The groin flap meets these requirements by allowing for a remote autoplasty, which is supported by the vascular territory of the superficial iliac circumflex artery. It is effective in covering extensive and intricate soft tissue defects in the hand and forearm, such as wounds, traumatic amputations, degloving injuries, burns, burn scar release, and tumor excision. This technique is particularly useful when important structures like tendons, nerves, and blood vessels are exposed.

### Surgical Procedure

The groin flap is a kind of axial flap that relies on the superficial circumflex iliac artery, namely the anterolateral

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branch of the femoral artery. The trajectory of its path remains consistently slanted, moving both upwards and sideways, and its initial size is 1.5-2 mm in diameter. The occurrence of anatomical changes in the pedicle's arterial and venous structures is common. The patient is positioned in a dorsal decubitus posture under general anesthesia, with a block inserted beneath the ipsilateral buttock to improve access to the donor site. The key features we found are the anterior superior iliac spine, pubic bone, inguinal ligament, and femoral artery. The boundaries of this flap may be defined using the "2 fingers width" criterion, which refers to the transverse diameter of the patient's index and middle fingers at the level of the distal interphalangeal joint. This rule identifies the precise location of the superficial circumflex iliac artery, which branches off from the femoral artery. It is found around two finger-widths below the inguinal ligament. The superior boundary of the flap is located 2 fingers' breadth above the inguinal ligament, running parallel to a line formed by the path of the superficial circumflex iliac artery from its starting point to the anterior superior iliac spine. This line also serves as the axis of the flap. The lower limit is located 2 fingers width below the point where the superficial circumflex iliac artery emerges, along a line that is parallel to the previously indicated axis. The lateral boundary is established based on the dimensions of the recipient site's imperfection. An alternative method for depicting this flap is to position it over the iliac crest, with one-third of the flap situated above and two-thirds below. Initially, we conducted debridement and preparation of the recipient site by amputating the finger at the base of the 2nd metacarpal using Chase's method. Then replaced it with the middle finger to improve pollicy-digital prehension. Finally, the damaged tendon structures are repaired. Precise assessment of the specific amount of tissue loss that has to be addressed is crucial, and it should always be determined after a thorough removal of dead tissue in cases of hand and forearm injuries, as well as after the resolution of scar contractures resulting from burns. By palpating the common femoral artery is identified the development of the superficial iliac circumflex artery. Then is lifted the flap from lateral to medial, transferring all subcutaneous tissue while keeping it above the fascia. However, in close proximity to the sartorius muscle, we took care to include the fascia into the flap to prevent any harm to the arteriovenous package. Precise dissection should be limited to the medial border of the sartorius muscle, however it is feasible to make a deeper incision in the skin to enhance its suppleness. The lateral cutaneous nerve of the thigh is safeguarded along the outside border of the sartorius muscle. The dimensions of the raised flap are 20 cm in length and 12 cm in width. The skin paddle may have a maximum size of 30-35 cm in length and 15-20 cm in width. Next, we proceeded to close the donor site using drain suction-However, if encountered with any challenges, can resort to separating the skin from the abdominal wall and bending the hip. At this stage, several teams, such as Naalla et al., choose

not to tube the flap base. Instead, they choose to retain the base of the flap thin. This allows for more comfortable postoperative posture and preserves the more dependable portion of the flap for future insertion. However, in the majority of situations, including our own, tubing is performed, ideally for an extended duration, to enable the hand to be taken away from the abdominal area and engage in exercises that include a full range of motion for the hand, as well as the elbow and shoulder. If the flap is too thick, a thinning procedure may be done in the distal region while ensuring the artery network remains undamaged. In our particular situation, it was not necessary to carry out a thinning procedure on the distal portion of the flap. Next, we position the hand in the inguinal area and adjust the flap to fit the defect. We next secure the flap to the receiving site, beginning from the corner point. Subsequently, we stitched the challenging posterior edge prior to the anterior edge. Prior to positioning the flap, the fat around the skin's border is contoured to create a beveled edge. This technique reduces the strain on the suture line and minimizes the likelihood of tissue death at the borders. Ultimately, we used tulle gras dressings on all the sutures, which were replaced every 3 days. Additionally, we created a supportive device to adequately stabilize the upper limb and prevent any tension on the flap's pedicle in the event of restless awakening. The hip on the side of the inguinal flap was maintained in a flexed position by putting the lower leg on a separate splint. Once the discomfort subsided, the movement of the fingers, elbow, and shoulder was allowed. Patients were allowed to walk on the 5th day after the surgery, and the procedure was performed during the 3rd week. Effective preoperative planning is essential for preventing the creation of flaps that are either too big or too tiny, as well as ensuring the fabrication of tubing that is of appropriate length to avoid complications such as twisting at its base or ischemia due to being too short.

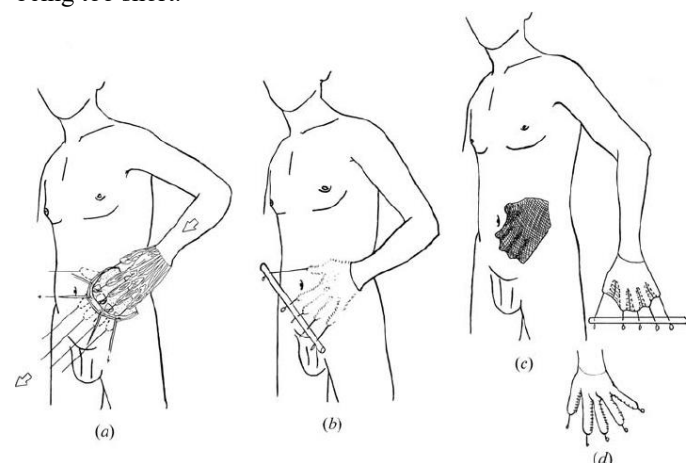
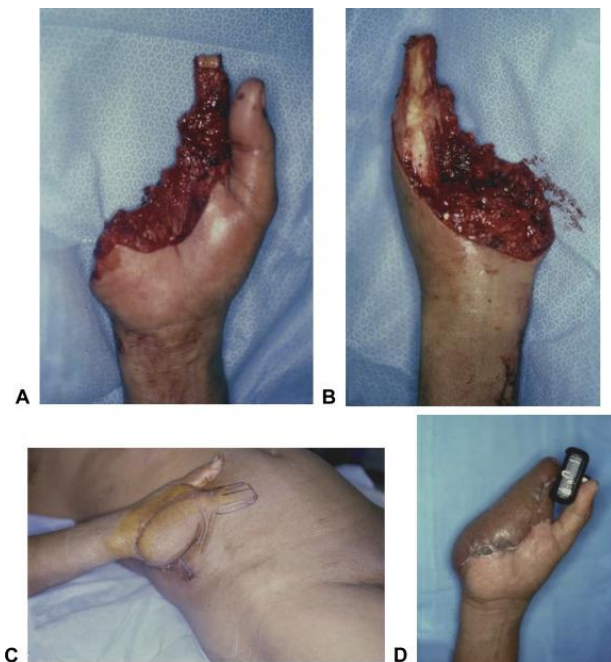


Figure 1. Schematic of the flap design

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**Figure 2. McGregor groin flap for hand reconstruction**

### DISCUSSION

Although there has been a rise in the use of free and local flaps for hand deformity reconstruction, the groin flap remains a commonly employed technique. The McGregor flap, because to its extended pedicle, does not need complex preoperative preparation and may be promptly implemented in emergency situations. However, Baron et al. argue that the risk of infection, however modest, is still associated with the timeliness of the procedure. Additionally, he notes that by tubing the flap at its base, it reduces maceration and hence minimizes the likelihood of infection.

#### Benefits

The flap is very adaptable and may be performed by less-experienced surgeons without the need for microsurgery expertise. This product is highly repeatable, demonstrating outstanding repeatability without compromising muscle function. The vascular dependability of the structure is attributed to the consistent nature of its vascular pedicle, even in the presence of anatomical variances. As a remote flap, it does not need significant vascular sacrifice like the Chinese flap, therefore conserving the radial artery that may be needed for future reconstructive procedures. Due to its rapidity of execution (ease of harvesting and application) and its ability to cover a significant area of skin, it is often used in emergency situations. Indeed, this flap permits the elevation of a skin paddle that has proportions greater than those of the local flaps of the forearm, thus permitting the covering of significant tissue loss with very pliable tissue, which is particularly suitable for joints. The length of the object may be three times more than its width, providing enough tubing for early and vigorous wrist and hand rehabilitation. Due to its high stability, it may effectively cover abnormalities on either the back or the palm. Additionally, the close proximity to the iliac crest enables the extraction of a complex

osteocutaneous groin flap without the need for an additional scar. The closure of the donor site is performed using direct means, without the need for skin grafting. This results in a scar that is deemed acceptable, and may be readily concealed by wearing underwear. Ultimately, this procedure offers the benefit of grafting hairless skin onto those with abundant hair, allowing for aesthetic restoration of the hands.

#### Drawbacks

The groin flap has many drawbacks, with the primary one being the development of shoulder stiffness in older patients after surgery. However, several authors have shown that this stiffness may be prevented by using early physiotherapy. Undoubtedly, the positioning of the upper limb prior to the division is unpleasant. The inclined position of the hand, which is wrapped to the trunk for a duration of 3 weeks, further adds complexity to postoperative care and may result in temporary swelling of the hand. However, this swelling is soon resolved due to the effective drainage of veins and lymphatic vessels in the groin region. Another drawback of using this flap for covering is the need for many phases, including division and thinning, which is commonly necessary for patients with a substantial panniculus adiposus. Ultimately, there is a diminished sensitivity associated with this flap, particularly when the thumb or other fingers are affected. Several writers argue that the groin flap remains relevant in the age of microsurgery and, when executed well, may be a preferred option to the free flap, especially for treating numerous and intricate hand injuries. Specific technical modifications enhance its capacity to cover both the top and bottom surfaces of the hand and forearm by creating a two-lobed flap or by utilizing one of its potential extensions: a lower extension based on the descending branch of the superficial circumflex iliac artery, a lower-lateral extension based on the artery that accompanies the lateral femoral cutaneous nerve, or an upper extension based on the superficial inferior epigastric artery. Goertz et al. conducted a research to assess the efficacy of pedicled groin flaps for treating hand abnormalities. They found that the outcomes were generally favorable and the majority of patients were content with the results.

### CONCLUSION

The McGregor groin flap is a simple and replicable surgical procedure that is very dependable in terms of blood supply and does not need complex preoperative preparation, enabling the creation of a substantial flap. The procedure is executed quickly and requires a standard level of technical expertise that is accessible to all surgeons. It provides a practical solution for treating extensive tissue damage in the hand, wrist, and forearm. This may be done in emergency situations or planned surgeries, as long as a lengthy tube is used that allows for early physiotherapy. Every orthopedic physician should possess the capability to execute this procedure, especially in cases when microsurgery is not an option.

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