

1 Introduction

Grade IV pressure ulcers in the ischiatic region are frequent complications in patients with chronic neurological limitation and represent a complex reconstructive problem due to the depth of the defect, frequent bone exposure, and high risk of infectious complications and recurrences [1, 2]. Reconstructive options include: muscular, musculocutaneous and perforating flaps, each with specific advantages and limitations depending on the regional anatomy and clinical characteristics of the patient [3, 4].

The isolated muscle flap of the femoral biceps, although less frequently used than the gluteus major or the piercing flaps, has particular anatomical characteristics, such as a constant vascular pedicle and adequate muscle volume, resulting in the option of choice in certain selected cases [1, 3]. The objective of this report is to describe the surgical technique of the biceps femoral muscle flap with or without distal skin island for the coverage of a grade IV ischiatic ulcer, evaluating specific intraoperative decisions and immediate complications observed.

2 Materials and Methods

We performed the surgical intervention in a 50-year-old male patient, with a history of cerebrovascular event and prostrate for 8 years, who presented grade IV pressure ulcer in the left ischiatic region, without response to multidisciplinary management. As a relevant surgical background, we highlight a contralateral ischiatic ulcer managed 4 years earlier with a muscle flap of the biceps femoris muscle.

Placed the patient under balanced general anesthesia in right lateral decubitus with slight flexion of the left hip. We start with direct incision on the ulcer (Figure 1), performing wide debridement up to viable tissues, with complete bursectomy and partial superficial osteotomy of the ischial tuberosity through gouge and scope, until obtaining homogeneous bone bed with uniform active bleeding. Performed an exhaustive washing of the bloody area with saline solution.

The preoperative marking of the hamstring cutaneous flap with distal cutaneous island in the left distal femoral region was previously performed. After the debridement and partial osteotomy of the ischiatic tuberosity, we intraoperatively verify said marking, adjusting it according to the definitive dimension of the defect (Figure 2a). Initial skin incision on the distal island in the left femoral region was started with conventional cold scalpel, deepening by subcutaneous dissection with monopolar electro scalpel in coagulation mode, preserving

Figure 1: Intraoperative marking of incision at the hamstring level with cutaneous island. Marking adjusted intraoperatively after assessing the final defect obtained.



Source: Elaborated by the author (2025).

the anatomical integrity of the lateral femoral cutaneous nerve visualized intraoperatively (Figure 2b). We then access the deep plane by longitudinal opening of the muscular fascia using a monopolar scalpel, exposing the aponeurosis of the biceps muscle with the help of Farabeuf type separators (Figure 3).

Figure 2 – (a) Intraoperative marking of incision at the hamstring level with a cutaneous island. Marking adjusted intraoperatively after assessing the final defect obtained. (b) Subcutaneous dissection and preservation of the lateral femoral cutaneous nerve. Intraoperative visualization of the preserved nerve during the initial dissection of the flap.



(a)



(b)

Source: Elaborated by the author (2025).

Then we proceed with the circumferential subfascial dissection of the muscle in the distal direction, using a combination of monopolar electrical and blunt dissection with Metzembauaum scissors, anatomically separating it from the semimembranous and semitendinosus muscle, ensuring the preservation of the proximal neurovascular pedicle originating in the deep femoral artery and its muscular perforatorants (Figure 4a).

We perform the distal section of the femoral biceps using monopolar cautery in pure cut mode, ensuring immediate hemostasis at the sectioned distal end. Subsequently, we perform a retrograde dissection in the distal to proximal direction, combining monopolar and blunt maneuvers with Metzembauaum scissors, preserving the muscle perforating vessels and the anatomical integrity of the main proximal vascular pedicle (Figure 4b).

Once the muscular belly is released, we mobilize the flap proximally towards the ischiatic defect, visually evaluating the extension and effective coverage on the bloody area by direct intraoperative measurement, corroborating the absence of excessive tension or compromise in the vas-

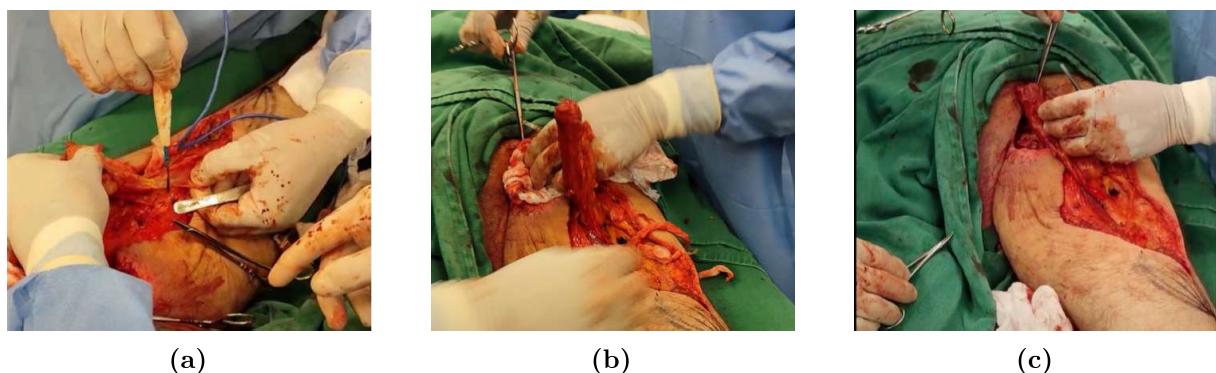
Figure 3: Deep fascia opening of the biceps femoral muscle. Anatomical exposure of muscle aponeurosis using Farabeuf retractors.



Source: Elaborated by the author (2025).

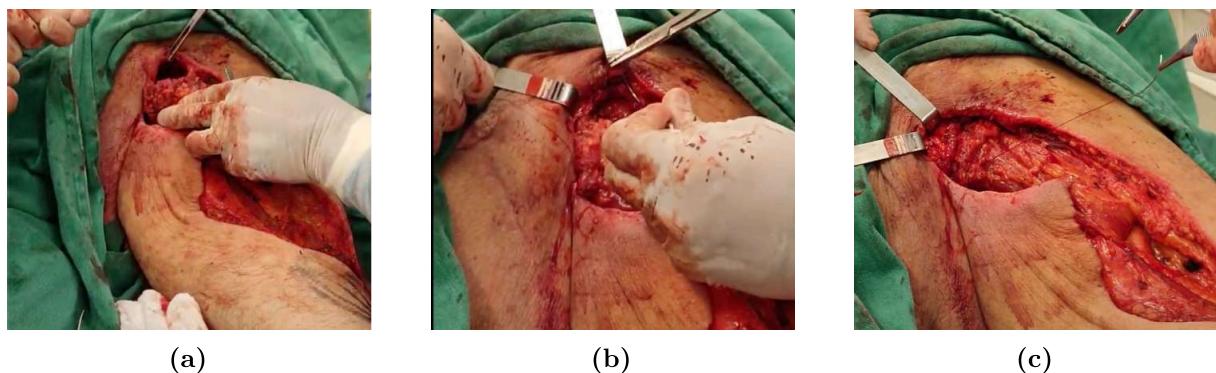
cularization of the mobilized flap. (Figure 4c). We configure the free distal end of the muscle flap by means of a purse suture, using 2-0 caliber absorbable monofilament material (nylon), optimizing its volume and shape for an anatomical adjustment on the defect. Immediately, we perform the definitive fixation of the muscular flap, placing separate cardinal points with resorbable suture caliber 2-0 (nylon), anchoring it on the upper and lower edges to the aponeurosis of the gluteus major muscle, ensuring a stable fixation, without undue tension on the neurovascular pedicle (Figures 5a and 5b). Likewise, we visually and instrumentally verify the coverage and anatomical stability of the muscle on the surgical defect, confirming again the absence of excessive tension or torsion of the proximal vascular pedicle (Figure 5c).

Figure 4— (a) Initial dissection of the biceps femoris muscle. Partial lifting of the muscle, preserving the proximal vascular pedicle. (b) Distal section and retrograde muscle lift. Proximal retrograde dissection with strict preservation of the muscle perforating vessels. (c) Intraoperative evaluation of the scope of the flap. Direct measurement of the range and coverage of the muscle on the ischial defect without tension.



Source: Prepared by the author (2025).

Figure 5— (a) Upper fixation of the muscle flap. Upper cardinal suture of the flap on the aponeurosis of the gluteus majorus. (b) Lower fixation of the muscle flap. Inferior cardinal point fixed on the greater gluteal aponeurosis. (c) Definitive coverage of the defect with biceps femoral muscle flap. Fixed flap covering the surgical defect prior to skin closure.



Source: Prepared by the author (2025).

Finally, we perform the closure of the skin defect by mobilization and local advance of the previously dissected fasciocutaneous flap. We perform the deep closure by means of continuous subdermal suture with 3-caliber monofilament absorbable material (Monocryl®), followed by definitive skin coping with separate simple points using non-absorbable monofilament suture caliber 3-0 (Nylon®), visually verifying the coaptation of edges and absence of tension (Figure 6). Given the intraoperative hemostatic control, we decided not to place closed surgical drainage.

3 Results

The patient evolved favorably in the immediate postoperative period, leaving without incident 12 hours after the procedure, in accordance with the routine postoperative protocol of the hospital unit. In the subsequent controls performed during the first and second week, under joint follow-up with physiotherapy specialized in postural rehabilitation and prevention of secondary complications, we detected the formation of a minor seroma, probably related to a residual dead space after the extensive resection of the bursa. This seroma was successfully managed by percutaneous drainage by aspiration puncture under aseptic conditions, avoiding the need for additional surgical intervention. The stitches were removed on the tenth postoperative day without additional local or systemic complications.

4 Discussion

The surgical reconstruction of grade IV pressure ulcers in patients with chronic neurological injury involves specific technical decisions, mainly aimed at eliminating deep cavities, controlling local infection and providing viable tissue, adequately vascularized, to minimize early recurrences and postoperative complications such as infections or seromas [1, 2].

In this context, we selected the pediculated muscle flap of femoral biceps isolated with initially distal cutaneous island, Mathes and Nahai Type 2 classification, due to specific technical advantages such as the length and constant vascularization provided by muscle branches of the deep femoral artery, sufficient muscle volume to obliterate dead spaces and minimize complications derived from residual devitalized tissue, important aspects confirmed by the specialized literature [3, 5, 6].

Among the various reconstructive alternatives proposed for the management of ischial ulcers, the biceps femoral flap has specific anatomical advantages over other frequently used flaps, such as the gluteus majoris or the perforator flaps based on the upper and lower

Figure 6– Final cutaneous closure with local advancement of fasciocutaneous flap. Final coaptation of the defect without visual evidence of excessive tension.



Source: Prepared by the author (2025)

gluteal arteries [7, 8]. Particularly, the morbidity at the donor site associated with the femoral biceps is significantly lower, with a reduction in post-surgical functional alteration, especially in patients previously functionally limited by chronic neurological lesions [9, 10].

Unlike pure perforating flaps, whose risk of venous congestion and secondary ischemia is considerably higher, the biceps femoral muscle flap ensures effective filling of the deep defect due to its intrinsic muscle volume and lower risk of postoperative vascular involvement, critical considerations in patients with complex surgical history [2, 10].

A relevant technical decision in our procedure was the superficial partial osteotomy of the ischion, which is essential, according to the international literature, to eliminate devitalized bone tissue, avoid recurrences associated with underlying osteomyelitis and provide a homogeneously hemorrhagic receptor bed, optimizing the incorporation of the mobilized muscle flap [11, 12].

Another particularity was the intraoperative adjustment of the initial presurgical marking, a technical decision that allowed to adapt the final dimension of the flap to the exact anatomical characteristics of the surgical defect obtained after the initial debridement, increasing the reconstructive precision and minimizing the risk of excessive tension in the fixation of the flap, factors identified by multiple authors as crucial to prevent early complications and improve functional results [2, 3, 9].

The retrograde dissection from distal to proximal muscular belly, a technique used in our procedure, has been widely endorsed because it facilitates the preservation of the minor vascular perforators and the main neurovascular pedicle of the biceps femoral muscle, ensuring its viability and decreasing the risk of partial necrosis of the transplanted tissue, a complication frequently described in elevated muscle flaps through less thorough techniques [2, 10, 13]. In relation to the observed complication (minor seroma), its direct association with residual dead spaces after extensive reconstructive procedures is widely known, being common to resolve it through minimally invasive methods such as percutaneous aspiration, avoiding the need for additional surgical procedures that increase postoperative morbidity and the risk of secondary infection [1, 14].

Finally, we highlight the critical importance of early post-surgical management through specialized physiotherapy, adequate measures for pressure reduction in the operated area and close monitoring of the surgical site, determining factors identified to significantly minimize early recurrences frequently observed in patients undergoing reconstructive surgery for deep and complex pressure ulcers [2, 15].

In summary, the specific use of the isolated muscle flap of biceps femoris with optional distal cutaneous island in this particular case, supported by intraoperative technical decisions and multidisciplinary postoperative management, demonstrates a solid agreement with current recommendations based on recent surgical evidence [2, 3], representing a technically safe and effective option for patients with complex history and grade IV ischiatic ulcers. However, additional prospective studies with extensive follow-ups will be necessary to definitively evaluate its technical superiority and sustained clinical efficacy compared to other reconstructive alternatives [13, 16].

5 Conclusion

The pedicled muscle flap of the femoral biceps with distal skin island was a technically adequate and justified reconstructive option for the initial surgical treatment of a grade IV ischiatic ulcer in a patient with chronic neurological compromise and contralateral reconstructive history. The surgical procedure described showed specific anatomical advantages, such as adequate vascularization, sufficient volume to obliterate the defect and lower potential morbidity at the donor site, compared to other techniques reported in the literature. Objective intraoperative decision-making, such as the adjusted marking of the flap after the initial debridement and the partial superficial osteotomy of the ischiatic tuberosity, helped to minimize immediate complications. However, the available follow-up period, limits our ability to determine the sustained clinical efficacy of this technique or late complications, important aspects in patients neurologically compromised with recurrent deep ulcers. Consequently, although this initial report provides useful technical information and supports the immediate surgical viability of the femoral biceps flap, additional studies with prolonged clinical follow-ups and greater sample size will be necessary to evaluate its long-term clinical effectiveness, the actual incidence of recurrences and late complications, and establish its superiority over other reconstructive alternatives described in the specialized literature.

Competing Interests

The authors declare no competing interests.

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