

The McGregor Pedicled Groin Flap for Complex Hand Soft-Tissue Defects: Anatomy, Surgical Technique, Indications, And Reconstructive Outcomes

Marisela Silva García*¹, Cristian Sandoval Cervantes¹

¹General Surgery, Universidad Nacional Autónoma de México.

ABSTRACT

Complex soft-tissue defects of the hand remain among the most demanding challenges in reconstructive surgery because successful treatment requires durable coverage, protection of exposed structures, preservation of tendon glide, restoration of mobility, and acceptable donor-site morbidity. Although microsurgical free tissue transfer and perforator flap techniques have expanded the reconstructive armamentarium, the McGregor pedicled groin flap remains a reliable, technically accessible, and versatile option for selected hand, digital, wrist, and distal forearm defects. Based primarily on the superficial circumflex iliac artery (SCIA) vascular territory, the flap provides robust soft-tissue coverage without requiring microvascular anastomosis. This makes it particularly useful in traumatic injuries, degloving wounds, exposed tendons or bone, contaminated wounds, resource-limited settings, and patients who are poor candidates for prolonged microsurgery. Its limitations include staged division, temporary immobilization, bulkiness, stiffness risk, donor-site morbidity, and the need for structured postoperative rehabilitation. This review summarizes contemporary evidence regarding the anatomical basis, indications, surgical technique, postoperative care, outcomes, complications, and modern role of the McGregor pedicled groin flap in hand reconstruction. A modern reconstructive approach should not consider the groin flap obsolete; rather, it should define its optimal role within a patient-centered algorithm that balances defect characteristics, available expertise, institutional resources, functional goals, and rehabilitation capacity.

KEYWORDS: McGregor flap, pedicled groin flap, hand reconstruction, upper-extremity reconstruction, soft-tissue defect.

ARTICLE DETAILS

Published On:
26 August 2026

Available on:
<https://ijmscrs.com>

INTRODUCTION

Soft-tissue defects of the hand present a unique reconstructive challenge because the hand is simultaneously a functional, sensory, expressive, and aesthetic organ. Coverage must protect exposed tendons, nerves, vessels, joints, and bone while preserving mobility, tendon excursion, sensibility, and grip function. Contemporary outcomes data continue to support pedicled groin flaps as useful options for selected upper-extremity injuries, particularly when robust coverage is required and microsurgical reconstruction is unavailable, contraindicated, or unnecessary [1].

Degloving injuries and complex traumatic wounds remain among the most important indications for pedicled groin flap reconstruction. These injuries often involve extensive skin loss, irregular wound geometry, contamination, exposed critical structures, and limited local reconstructive options. In

this setting, the groin flap provides a broad and vascularized soft-tissue envelope capable of covering defects that are not suitable for skin grafting alone [2].

The modern role of the McGregor pedicled groin flap must be interpreted within the broader comparison between pedicled and free flaps. Although free tissue transfer offers important advantages in selected patients, pedicled flaps remain valuable when operative time, patient comorbidities, recipient vessel status, institutional resources, or microsurgical availability limit free flap reconstruction [3].

Reconstructive decision-making for hand soft-tissue defects should follow an algorithmic approach based on defect size, location, depth, exposed structures, tissue requirements, and functional priorities rather than a rigid reconstructive ladder. The McGregor flap remains relevant because it occupies a

The McGregor Pedicled Groin Flap for Complex Hand Soft-Tissue Defects: Anatomy, Surgical Technique, Indications, And Reconstructive Outcomes

practical position between local reconstructive options and microsurgical free tissue transfer [4].

Flap selection should also account for donor-site morbidity, tissue thickness, need for staged reconstruction, rehabilitation capacity, expected hand function, and patient-specific factors. In this context, the McGregor pedicled groin flap should be viewed as a dependable component of the reconstructive armamentarium rather than as an outdated technique [5].

REVIEW METHODOLOGY

This narrative review was developed through a PubMed/MEDLINE-focused literature search of articles published within the last five years. Search terms included “McGregor flap,” “pedicled groin flap,” “groin flap hand reconstruction,” “upper extremity groin flap,” “hand degloving injury,” “superficial circumflex iliac artery flap,” “SCIA flap,” “superficial circumflex iliac artery perforator (SCIP) flap,” “hand soft tissue reconstruction,” and “free versus pedicled flaps.” Articles were selected if they addressed pedicled groin flap reconstruction, McGregor flap applications, superficial circumflex iliac artery-based reconstruction, complex hand or digital soft-tissue defects, upper-extremity reconstruction, abdominal pedicled flaps, perforator flaps, or microsurgical alternatives. Case series, retrospective studies, systematic reviews, narrative reviews, technical reports, and clinically relevant case reports were prioritized. Non-English articles, articles without a DOI, articles not available in PubMed, and publications not directly related to upper-extremity soft-tissue reconstruction were excluded when possible. Because this is a narrative review, no PRISMA-based search strategy, pooled quantitative synthesis, or formal risk-of-bias assessment was performed.

Anatomical Basis and Flap Design

The McGregor pedicled groin flap is classically designed in the groin region and is based on the superficial circumflex iliac vascular territory. Its axis is generally oriented from the femoral artery region toward the anterior superior iliac spine, allowing elevation of a sizeable skin paddle with dependable perfusion. Contemporary experience with pedicled superficial circumflex iliac artery perforator flaps has renewed interest in the groin donor region as a source of reliable, versatile, and relatively concealed tissue for reconstructive use [6,7].

The anatomical relationship between the traditional groin flap and superficial circumflex iliac artery-based flaps is clinically important. Free superficial circumflex iliac artery flaps have been used successfully for hand injuries, illustrating that the same vascular territory can be adapted to either pedicled or microsurgical reconstruction depending on patient needs, surgeon expertise, and institutional resources [8].

Superficial circumflex iliac artery perforator flap reconstruction has expanded the reconstructive possibilities of the groin region by offering thinner and more pliable tissue options for upper-extremity coverage. These perforator-based

approaches are particularly relevant when microsurgical expertise is available and when the reconstructive goal requires a more refined contour than that traditionally achieved with a classic pedicled groin flap [9].

Recent advances in upper-extremity microsurgery have shifted many reconstructive algorithms toward perforator-based free flaps. Nevertheless, these advances should complement rather than replace pedicled options, especially in settings where a simple, reliable, and non-microsurgical flap provides the safest or most practical reconstructive solution [10].

Preoperative vascular mapping may improve flap planning. Doppler or ultrasound-based assessment can help identify perforators, refine flap design, reduce uncertainty during elevation, and support safer reconstruction of upper-extremity defects. This is particularly useful when a thinner flap, extended design, or perforator-based modification is being considered [11].

Indications and Patient Selection

Traumatic hand degloving injuries are a classic indication for groin flap reconstruction because they frequently produce broad soft-tissue loss with exposed tendons, bone, joints, or neurovascular structures. In these cases, the groin flap provides durable vascularized coverage when local tissue is inadequate and when skin grafting would fail due to lack of a suitable vascularized bed [12].

Clinical outcomes of groin flap coverage for soft-tissue defects of the hand support its continued usefulness, particularly in complex wounds where local flap options are limited. Its large skin paddle, consistent vascularity, and ability to cover exposed structures make it useful for dorsal, palmar, digital, and wrist defects that cannot be managed with simpler techniques [13].

In total or near-total digital degloving injuries, groin flap coverage may be used as part of a staged reconstructive strategy. This is especially relevant when skeletal preservation, replantation, or tendon protection requires reliable soft-tissue resurfacing and when local tissues are too damaged to provide stable coverage [14].

Ultra-thinned groin flap techniques have been described for complete digital ring avulsion injuries. These modifications aim to reduce bulk while maintaining circumferential coverage for complex digital defects, which is important because excessive flap thickness can impair finger contour, tendon glide, and functional recovery [15].

Inguinal pedicled flaps may also be useful for chronic hand ulcers or complex wounds in which local tissue quality is poor, reconstructive resources are limited, or microsurgical reconstruction is not available. In such cases, the groin flap offers a pragmatic solution that balances technical simplicity and durable tissue coverage [16].

Thumb reconstruction may require both skeletal support and soft-tissue coverage. In selected acute injuries, groin flap coverage can be combined with structural reconstruction,

The McGregor Pedicled Groin Flap for Complex Hand Soft-Tissue Defects: Anatomy, Surgical Technique, Indications, And Reconstructive Outcomes

such as iliac crest bone grafting, to restore length, stability, and a protective soft-tissue envelope for functional thumb preservation [17].

Sensate or osteocutaneous groin flap modifications may be considered when composite tissue requirements exist. These variants expand the utility of the groin donor region beyond simple skin coverage, although they require careful patient selection because they may increase technical complexity and donor-site morbidity [18].

Surgical Technique and Perioperative Planning

Successful McGregor flap reconstruction begins with adequate wound debridement, stabilization of skeletal injuries when necessary, assessment of tendon and

neurovascular structures, and careful planning of limb positioning. The flap should be designed to provide tension-free coverage while avoiding excessive bulk, pedicle kinking, venous congestion, or postoperative immobilization in a functionally disadvantageous position. The operative sequence includes flap marking over the groin vascular territory, careful elevation while preserving the pedicle, inset into the upper-extremity defect, staged immobilization, monitoring, and delayed division once adequate neovascularization has occurred [19].

Representative clinical examples of McGregor pedicled groin flap reconstruction and tubed groin flap coverage are shown in Figures 1-4.



Figure 1. Intraoperative McGregor pedicled groin flap for upper-extremity soft-tissue reconstruction.

Intraoperative appearance of a McGregor pedicled groin flap used for coverage of an upper-extremity soft-tissue defect. The image demonstrates flap inset and temporary attachment of the upper limb to the groin region, illustrating the staged

nature of this regional pedicled flap. Reproduced from Tripathi et al. [19] under the Creative Commons Attribution 4.0 License.



Figure 2. Postoperative result after McGregor pedicled groin flap reconstruction.

Postoperative appearance after reconstruction with a McGregor pedicled groin flap. The image shows flap integration and soft-tissue coverage after staged reconstruction, supporting the role of the McGregor flap as a

reliable option for large upper-extremity defects when local tissue is insufficient or microsurgical reconstruction is not feasible. Reproduced from Tripathi et al. [19] under the Creative Commons Attribution 4.0 License.



Figure 3. Tubed pedicled groin flap for circumferential digital soft-tissue coverage.

Tubed pedicled groin flap enveloping circumferential soft-tissue defects of the index and middle fingers. This technique

provides vascularized coverage for complex digital defects when exposed bone, tendon, or extensive soft-tissue loss

The McGregor Pedicled Groin Flap for Complex Hand Soft-Tissue Defects: Anatomy, Surgical Technique, Indications, And Reconstructive Outcomes

precludes simple grafting. Reproduced from Mohd Amin et al. [20] under the Creative Commons Attribution 4.0 License.



Figure 4. Two-month postoperative outcome after tubed pedicled groin flap reconstruction of digital defects.

Two-month postoperative appearance after tubed pedicled groin flap reconstruction of circumferential digital soft-tissue defects. The image demonstrates flap integration and durable soft-tissue coverage of the reconstructed digits during early postoperative follow-up. Reproduced from Mohd Amin et al. [20] under the Creative Commons Attribution 4.0 License.

Postoperative Management and Rehabilitation

Postoperative management should focus on flap monitoring, pain control, edema reduction, prevention of infection, protection of the pedicle, and early involvement of hand therapy. The staged nature of groin flap reconstruction requires patient counseling because temporary immobilization can be uncomfortable and may increase the risk of stiffness, especially if rehabilitation is delayed or poorly coordinated. Secondary debulking, contour refinement, scar care, and functional therapy may be necessary to optimize final hand use after flap division [21].

Contemporary Outcomes

Recent multicenter data have helped define success and failure patterns in groin flap reconstruction for upper-extremity soft-tissue defects. These outcomes reinforce the importance of patient selection, appropriate flap design, careful monitoring, infection control, staged rehabilitation, and anticipation of secondary procedures. Complications such as partial necrosis, infection, venous congestion,

stiffness, and contour irregularity should be actively prevented and managed [22].

In low-resource settings, the groin flap remains especially valuable because it provides reliable upper-limb coverage without the need for microsurgical infrastructure, specialized postoperative monitoring, or prolonged operative time. This is a major advantage in global reconstructive surgery, where access to operating microscopes, trained microsurgical teams, and postoperative flap monitoring may be limited [23].

Comparison With Alternative Reconstructive Options

A systematic approach to hand soft-tissue reconstruction should begin with the simplest option capable of achieving durable coverage and functional preservation. Skin grafts, local flaps, regional flaps, distant pedicled flaps, and free flaps should be selected according to wound bed vascularity, exposed structures, defect size, anatomical location, tissue requirements, and rehabilitation goals [24].

Soft-tissue repair of the hand and digital reconstruction require restoration of both coverage and function. For small and moderate defects, local or regional flaps may be sufficient, whereas extensive defects, crush injuries, multi-digit involvement, or exposed critical structures may require distant pedicled or free tissue transfer [25].

Alternative flap options for upper-extremity reconstruction include regional pedicled flaps, perforator flaps, muscle flaps,

The McGregor Pedicled Groin Flap for Complex Hand Soft-Tissue Defects: Anatomy, Surgical Technique, Indications, And Reconstructive Outcomes

fasciocutaneous free flaps, and abdominal or groin-based distant flaps. The McGregor flap remains most useful when its reliability, simplicity, and avoidance of microsurgery outweigh the disadvantages of staged immobilization and potential flap bulk [26].

The superficial circumflex iliac artery perforator free flap offers a thin and versatile option for extremity reconstruction when microsurgical resources are available. Its relationship to the groin donor region makes it an important modern comparator to the traditional pedicled groin flap because both derive from related vascular anatomy but differ substantially in mobility, inset flexibility, and technical requirements [27]. Osteocutaneous superficial circumflex iliac artery perforator flaps may be considered for selected extremity defects requiring composite tissue reconstruction. These techniques expand the reconstructive potential of the groin region but require advanced microsurgical planning, careful vascular dissection, and appropriate recipient vessels [28].

Microvascular gracilis muscle flaps may be appropriate for hand defects requiring pliable vascularized tissue, dead-space obliteration, or coverage of complex wounds. Compared with the McGregor flap, gracilis reconstruction offers different tissue characteristics and may be useful for contaminated or three-dimensional defects, but it requires microsurgical expertise and postoperative monitoring [29].

Free chimeric anterolateral thigh flaps provide another option for composite dorsal hand defects, particularly when large surface area, multiple tissue components, or complex three-dimensional reconstruction is required. These flaps may offer significant versatility but involve longer operative time, microsurgical complexity, and donor-site considerations that may not be suitable for every patient or institution [30].

Abdominal pedicled flaps remain useful alternatives for upper-extremity soft-tissue coverage when microsurgery is not an option. Like groin flaps, they require staged division and immobilization, but they may provide different tissue volume, reach, and positioning advantages depending on the defect, body habitus, and surgeon preference [31].

Complications and Limitations

The most important limitations of the McGregor flap are related to its staged nature and immobilization requirements. Patients must tolerate attachment of the hand to the groin before pedicle division, which can cause discomfort, hygiene difficulties, sleep disturbance, shoulder stiffness, elbow stiffness, wrist stiffness, psychological stress, and difficulty with nursing care. Flap-related complications include venous congestion, partial necrosis, infection, hematoma, seroma, delayed healing, bulky contour, marginal necrosis, and need for secondary debulking. Recipient-site complications include stiffness, tendon adhesions, sensory disturbance, contracture, and suboptimal aesthetic contour, whereas donor-site complications may include hypertrophic scarring, widened scar, contour deformity, delayed healing, and pain [32].

Proposed Practical Algorithm

For small superficial defects with a vascularized bed and no exposed tendon, bone, nerve, vessel, or joint, skin grafting may be sufficient. For small to moderate defects with exposed structures, local or regional flaps should be considered when surrounding tissue is healthy and available. For large dorsal, palmar, digital, or circumferential defects, especially after degloving or crush injury, the reconstructive decision should compare pedicled groin flap, abdominal flap, regional flap, and free flap options. The McGregor pedicled groin flap is particularly appropriate when the defect is large, exposed structures require vascularized coverage, the patient is not an ideal microsurgical candidate, recipient vessels are compromised, operative time should be minimized, or microsurgical resources are unavailable [1].

A free flap may be preferable when microsurgical expertise is available, when early mobilization is critical, when the defect requires thin pliable tissue, when the patient cannot tolerate immobilization, or when the defect is too proximal or complex for comfortable pedicled inset. Superficial circumflex iliac artery perforator, anterolateral thigh, gracilis, and chimeric free flaps may each have specific advantages depending on defect geometry and tissue requirements. The final decision should be individualized and should incorporate patient expectations, rehabilitation capacity, comorbidities, resource availability, and realistic functional goals [3].

DISCUSSION

The McGregor pedicled groin flap occupies a unique position in contemporary reconstructive surgery. It is neither a purely historical technique nor a universal solution. Its strength lies in reliability, simplicity, donor-site concealment, and ability to provide substantial vascularized tissue without microsurgery. These advantages remain meaningful in trauma centers, resource-limited settings, emergency reconstruction, and patients with complex wounds or limited microsurgical options [23].

The main argument against the groin flap is that it requires immobilization and staged division. In a modern reconstructive environment, free flaps can often provide single-stage coverage and earlier mobilization. However, this comparison is incomplete unless institutional resources, patient comorbidities, wound contamination, operative time, recipient vessel status, and postoperative monitoring capacity are considered. For a medically fragile patient, a contaminated wound, a low-resource hospital, or an emergency setting without microsurgical support, the McGregor flap may be the most appropriate reconstructive choice [24].

Recent literature suggests a renewed interest in pragmatic reconstruction. Pedicled groin flaps continue to be reported in degloving injuries, traumatic hand defects, finger defects, forearm defects, chronic wounds, and low-resource

The McGregor Pedicled Groin Flap for Complex Hand Soft-Tissue Defects: Anatomy, Surgical Technique, Indications, And Reconstructive Outcomes

environments. At the same time, SCIP and SCIA-based perforator flaps have expanded the anatomical and technical understanding of the groin donor region. This creates an opportunity to modernize the McGregor flap rather than abandon it [27].

For hand reconstruction, the endpoint should always be function. A technically successful flap that results in a stiff, bulky, poorly used hand is not an optimal result. Therefore, reconstructive planning should include the rehabilitation team from the beginning. The patient should understand that secondary procedures are common and may be necessary to improve contour, tendon glide, web spaces, scar quality, and final function [21].

LIMITATIONS

This review has several limitations. First, it was designed as a narrative review rather than a systematic review; therefore, no PRISMA-based search strategy, pooled quantitative synthesis, or formal risk-of-bias assessment was performed. Second, the available literature on the McGregor pedicled groin flap is heterogeneous and includes retrospective studies, small case series, case reports, and narrative reviews. Third, outcomes are variably reported, with differences in defect type, patient age, mechanism of injury, flap design, timing of division, follow-up duration, functional assessment, and reporting of complications. Finally, institutional resources and surgeon expertise strongly influence flap selection, making direct comparison between pedicled groin flaps and microsurgical alternatives difficult.

CONCLUSIONS

The McGregor pedicled groin flap remains a valuable reconstructive option for complex hand, digital, wrist, and distal forearm soft-tissue defects. Its durability, reliable vascularity, large skin paddle, technical accessibility, and lack of microsurgical requirement make it especially useful in traumatic degloving injuries, exposed critical structures, contaminated wounds, resource-limited settings, and patients who are not ideal candidates for free tissue transfer. Its disadvantages include staged division, temporary immobilization, flap bulk, stiffness risk, donor-site morbidity, and need for rehabilitation and possible secondary refinement. In modern reconstructive practice, the McGregor flap should not be viewed as obsolete; rather, it should be used selectively within a structured algorithm that prioritizes patient safety, durable coverage, functional recovery, and realistic resource-based decision-making.

REFERENCES

I. Devarasetty V, Vickery J, Maslow J. Outcomes of pedicled groin flaps for upper extremity injuries. *Hand* (N Y). 2025;20(7):1138-1143. doi:10.1177/15589447241265520.

II. Abualhaj S, Al-Zamer Y, Al-Shadfan L, et al. Evaluating pedicled groin flap reconstruction in hand degloving injuries: a retrospective analysis. *J Hand Surg Glob Online*. 2025;7(6):100828. doi:10.1016/j.jhsg.2025.100828.

III. Alzahrani H, Asiri M, Humedi A, et al. Free versus pedicled flaps for hand reconstruction: a systematic review and meta-analysis. *JPRAS Open*. 2025;45:278-288. doi:10.1016/j.jpra.2025.05.004.

IV. Nordback P, Hakkarainen M, Mattila S. A treatment algorithm for reconstruction of soft tissue defects in the hand: a narrative review. *Ann Transl Med*. 2023;11(11):390. doi:10.21037/atm-23-201.

V. Węgrzyn P, Jagosz M, Smorąg M, et al. Considerations in flap selection for soft tissue coverage of the hand and digits. *J Clin Med*. 2025;15(1):13. doi:10.3390/jcm15010013.

VI. Caetano E, Sabongi J, Vieira L, et al. Use of the groin flap in traumatic hand injuries. *Rev Bras Ortop*. 2025. doi:10.1055/s-0045-181412.

VII. Adhikari S, Bhattacharya D. Multifarious uses of the pedicled SCIP flap: a case series. *Acta Chir Plast*. 2022;64(3-4):148-154. doi:10.48095/ccachp2022148.

VIII. Hussain T, Khan F, Rahman O, et al. Superficial circumflex iliac artery free flap for coverage of hand injuries. *Cureus*. 2022;14(11):e31520. doi:10.7759/cureus.31520.

IX. Barnhill C, Greyson M, Iorio M. Superficial circumflex iliac artery perforator flap reconstruction of the upper extremity. *Hand Clin*. 2024;40(2):179-187. doi:10.1016/j.hcl.2023.10.001.

X. Adidharma W, Chung K. Recent advances in upper extremity microsurgery: from traditional to perforator flaps. *Hand Clin*. 2024;40(2):161-166. doi:10.1016/j.hcl.2023.08.006.

XI. Shekouhi R, Chim H. Evolution and application of ultrasound for flap planning in upper extremity reconstruction. *Hand Clin*. 2024;40(2):167-177. doi:10.1016/j.hcl.2023.08.007.

XII. Orozco J, Cordova J, Garcia J, et al. Groin flap for reconstruction of traumatic degloving hand injury: a report of 5 cases. *World J Plast Surg*. 2023;12(1):63-71. doi:10.52547/wjps.12.1.63.

XIII. Żyluk A. Outcomes of coverage of the soft tissue defects in the hand with a groin flap. *Pol Przegl Chir*. 2023;95(2):32-38. doi:10.5604/01.3001.0015.8478.

XIV. Hidajat N, Damayanthi E, Akbar H, et al. Replantation using groin flap in thirty-four years old male with traumatic total degloving of little finger: a case report. *Int J Surg Case Rep*. 2023;108:108377. doi:10.1016/j.ijscr.2023.108377.

XV. Manoukov Y, Beauthier V, Sautet A. An ultra-thinned groin flap for reconstruction of complete

- digital ring avulsion injuries. *J Hand Surg Eur Vol.* 2022;47(6):626-632. doi:10.1177/17531934221078233.
- XVI. Lodhia J, Jusabani A, Mushi L, et al. Case series of inguinal pedicle-flap to cover hand ulcers: our experience from northern Tanzania. *Int J Surg Case Rep.* 2022;96:107339. doi:10.1016/j.ijscr.2022.107339.
- XVII. Shrestha N, Batajoo S, Jaiswal S, et al. Acute thumb reconstruction with iliac crest bone graft and groin flap: a case report. *JNMA J Nepal Med Assoc.* 2023;61(265):731-734. doi:10.31729/jnma.8264.
- XVIII. Turan A. The pedicled sensate osteocutaneous groin flap for reconstruction of the forearm and hand. *Ann Plast Surg.* 2023;91(6):745-752. doi:10.1097/SAP.0000000000003702.
- XIX. Tripathi M, Saha S, Vineet K, et al. Extended use of McGregor pedicled groin flap for forearm: a case series. *Cureus.* 2023;15(7):e42375. doi:10.7759/cureus.42375.
- XX. Mohd M, Harun S, Wan W, et al. Ancient but efficient: two case reports of pedicle-tubed groin flap for soft tissue coverage in upper limb defects. *Cureus.* 2022;14(3):e23610. doi:10.7759/cureus.23610.
- XXI. Abualhaj S, Abubaker A, Al-Zu'bi B, et al. Groin flap reconstruction for finger defects: a case series and analysis of clinical outcomes. *Plast Reconstr Surg Glob Open.* 2025;13(9):e7075. doi:10.1097/GOX.00000000000007075.
- XXII. Abualhaj S, Abualhaj M, Hamouri S, et al. Multicenter retrospective analysis of success and failure patterns in groin flap reconstruction for upper extremity soft tissue defects. *Future Sci OA.* 2025:e72229. doi:10.1080/20565623.2025.2573620.
- XXIII. Wash YS, Akintayo AJ, Idrisu A, et al. Groin flap: a vital resource for upper limb reconstruction in low-resource settings. *J West Afr Coll Surg.* 2025;16(2):107-112. doi:10.4103/jwas.jwas_185_24.
- XXIV. Khan M, Hayat W, Ullah H, et al. Reconstruction of soft tissue defects of hand: a systematic approach. *Pak J Med Sci.* 2024;40(1):36-40. doi:10.12669/pjms.40.1.7484.
- XXV. Adani R, Tang JB, Elliot D. Soft tissue repair of the hand and digital reconstruction. *J Hand Surg Eur Vol.* 2022;47(1):89-97. doi:10.1177/17531934211051303.
- XXVI. Berkane Y, Bekara F, Herlin C, et al. Alternative flap options for upper extremity reconstruction. *Hand Clin.* 2024;40(2):291-299. doi:10.1016/j.hcl.2023.08.010.
- XXVII. Pereira N, Venegas J, Oñate V, et al. Extremity reconstruction with superficial circumflex iliac artery perforator free flap: refinements and innovations after 101 cases. *J Plast Reconstr Aesthet Surg.* 2023;85:1-9. doi:10.1016/j.bjps.2023.06.048.
- XXVIII. Zubler C, Kneser U, Harhaus L, et al. The osteocutaneous superficial circumflex iliac artery perforator flap in extremity reconstruction. *J Hand Microsurg.* 2025;17(6):100337. doi:10.1016/j.jham.2025.100337.
- XXIX. Pastor T, Meier RL, Haug L, et al. Mid-term clinical outcome of microvascular gracilis muscle flaps for defects of the hand. *Arch Orthop Trauma Surg.* 2024;144(4):1865-1873. doi:10.1007/s00402-024-05207-7.
- XXX. Son T, Dung P, Thúy T, et al. Using free chimeric anterolateral thigh flap for reconstruction of composite dorsal hand defect. *JPRAS Open.* 2024;39:106-113. doi:10.1016/j.jpra.2023.11.011.
- XXXI. Bakhos F, Ferri F, Andre J, et al. Delayed abdominal flap for upper extremity soft tissue coverage. *Plast Reconstr Surg Glob Open.* 2024;12(4):e5766. doi:10.1097/GOX.00000000000005766.
- XXXII. Aguilar T, Morales B, Garduño M. Abdominal pedicled flap: alternative for hand reconstruction when microsurgery is not an option. *Cureus.* 2025;17(5):e84969. doi:10.7759/cureus.84969.