



# Superficial Circumflex Iliac Perforator (SCIP) Free Flap for Lower Extremity Reconstruction in Malignancy Case

Ade Putra,<sup>1</sup> Rian Fabian Sofyan,<sup>1</sup> Rasyiqah Saratiana<sup>2</sup>

<sup>1</sup>Surgical Oncology Department, Dharmais Cancer Hospital, West Jakarta,

<sup>2</sup>General Practitioner, Firdaus Hospital, North Jakarta, Indonesia

## ABSTRACT

**Background:** Synovial sarcoma, a rare tumor primarily affecting the lower extremities, often requires surgical excision to ensure tumor removal and limb preservation. This case highlights the importance of reconstructive options in achieving optimal functional and aesthetic outcomes for patients with large surgical defects. **Case:** A 51-year-old female with left foot synovial sarcoma (T2N0M0) underwent Chopart amputation to achieve clear surgical margins. The resulting defect was extensive, involving both skin and deeper soft tissues, making primary closure impossible. Reconstruction was performed using the Superficial Circumflex Iliac Perforator (SCIP) free flap harvested from the groin region, which provided robust soft tissue coverage and minimized donor site morbidity. The patient's postoperative course was uneventful, with no complications such as flap necrosis or infection. Early rehabilitation was initiated to restore limb function, and long-term follow-up showed no evidence of recurrence or functional impairment. **Conclusion:** Chopart amputation with SCIP flap is an effective option for foot synovial sarcoma management, ensuring both tumor clearance and limb function preservation. This case demonstrates the value of microsurgical reconstruction in complex oncologic cases and underscores the importance of multidisciplinary care in achieving favorable outcomes.

**Keywords:** Case report, reconstruction, SCIP free flap, synovial sarcoma.

## ABSTRAK

**Latar Belakang:** Sarkoma sinovial, tumor langka yang terutama menyerang ekstremitas bawah, sering memerlukan eksisi bedah untuk memastikan pengangkatan tumor dan mempertahankan fungsi anggota tubuh. Kasus ini menyoroti pentingnya pilihan rekonstruksi dalam mencapai hasil fungsional dan estetika yang optimal pada pasien dengan defek bedah yang besar. **Kasus:** Wanita 51 tahun dengan sarkoma sinovial di kaki kiri (T2N0M0), menjalani amputasi Chopart untuk mendapatkan *margin* bebas tumor. Defek yang dihasilkan sangat luas, melibatkan kulit dan jaringan lunak yang lebih dalam, sehingga penutupan primer tidak memungkinkan untuk dilakukan. Rekonstruksi dilakukan dengan flap perforator superfisial iliaka sirkumfleksa (SCIP) yang diambil dari daerah lipat paha, memberikan penutupan jaringan lunak yang lebih baik dan meminimalisir morbiditas donor site. Pasien pulih tanpa adanya komplikasi seperti nekrosis flap atau infeksi. Rehabilitasi dini dilakukan untuk memulihkan fungsi anggota tubuh, dan tindak lanjut jangka panjang menunjukkan tidak adanya tanda kekambuhan atau gangguan fungsi. **Simpulan:** Amputasi Chopart dengan *flap* SCIP merupakan opsi yang efektif untuk mengelola sarkoma sinovial kaki, memastikan pengangkatan tumor dan pelestarian fungsi anggota tubuh. Kasus ini menunjukkan nilai rekonstruksi mikro bedah pada kasus onkologi kompleks dan menekankan pentingnya perawatan multidisiplin untuk mencapai hasil yang baik. Ade Putra, Rian Fabian Sofyan, Rasyiqah Saratiana. *Superficial Circumflex Iliac Perforator (SCIP) Free Flap* untuk Rekonstruksi Ekstremitas Bawah pada Kasus Keganasan.

**Kata Kunci:** Laporan kasus, rekonstruksi, *free flap* SCIP, sarkoma sinovial.



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## INTRODUCTION

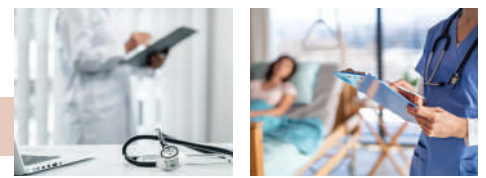
Synovial sarcoma is a rare type of malignant tumor, accounting for about 5%–10% of the total cases of soft tissue sarcomas, and is mainly seen in the lower limbs of young adult.<sup>1,2</sup> It often presents as a slow-growing mass, making early diagnosis challenging. Treatment typically involves surgical excision

to achieve clear margins, as it is crucial to uphold oncologic principles while also preserving function.<sup>3</sup> However, the proximity of the tumor to critical anatomical structures, such as joints and tendons, complicates the procedure and may limit functional outcomes.

In cases where large defects remain after

tumor excision, primary closure may not be feasible, and reconstructive surgery becomes essential to restore form and function.<sup>4</sup> Depending on the location and extent of tissue loss, various reconstructive techniques, including skin grafts, local flaps, and free flaps, may be considered. The Superficial Circumflex Iliac Perforator (SCIP) flap, a perforator-based

**Alamat Korespondensi** email: adeputra110005@gmail.com



free flap, offers a promising reconstructive option, as it provides sufficient soft tissue coverage without causing significant donor site morbidity.<sup>5</sup> Moreover, the SCIP flap presents the benefit of a less conspicuous donor site, thereby yielding superior aesthetic results in comparison to alternative flaps, including the anterolateral thigh (ALT) and radial forearm flaps.<sup>5</sup>

This case report explores the management of synovial sarcoma of the left foot through Chopart amputation and subsequent reconstruction using the SCIP free flap. The use of this reconstruction method not only avoids donor site morbidity but also provides reliable soft tissue coverage, minimizing the need for additional procedures and ensuring a functional outcome for the patient.<sup>5</sup> Moreover, the SCIP flap's versatility in adapting to various soft tissue defects makes it an increasingly preferred option

in complex oncologic reconstructions.

## CASE

A 51 year-old female presented with a left foot mass, later diagnosed as synovial sarcoma (T2N0M0). Clinical examination revealed a palpable tumor involving the midfoot, without signs of distant metastasis. The tumor's size and location warranted surgical intervention to prevent further spread and preserve limb functionality.

This surgical intervention was selected to preserve partial functionality of the limb while ensuring complete excision of the neoplasm. During the intraoperative phase, frozen section analysis on the inguinal lymph nodes did not identified involvement of lymph nodes, the tumor was restricted to the foot without evidence of regional dissemination, which subsequently enhanced the patient's

prognosis and exclude the necessity for extensive adjuvant therapy.

The surgical defect resulting from the Chopart amputation was considerable and could not be primarily closed owing to the substantial loss of tissue. This defect encompassed not only the epidermis but also the deeper soft tissues, rendering primary closure unfeasible. To rectify this issue, a SCIP (Superficial Circumflex Iliac Perforator) free flap was procured from the groin area and employed to reconstruct the defect, thereby facilitating robust soft tissue coverage.

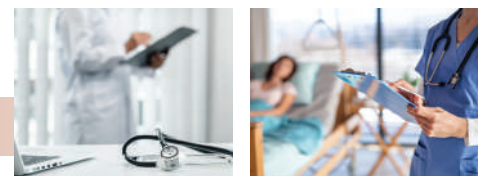
Furthermore, the donor site situated in the groin region was sutured with minimal tension, facilitating the formation of a discreet scar that would not impede the patient's mobility or daily activities. Following the surgical procedure, the patient exhibited favorable recovery, with no immediate complications such as flap necrosis or infection. A long-term follow-up regimen was established to observe any potential signs of recurrence or complications associated with the reconstruction. The integration of Chopart amputation and SCIP free flap reconstruction yielded an optimal strategy, effectively balancing oncological control with functional restoration and significantly enhancing the patient's quality of life.



**Figure 1.** Pre-operative photo (A-D). Superficial circumflex iliac perforator (SCIP) free flap (E-F). Chopart amputation was done (G-I).

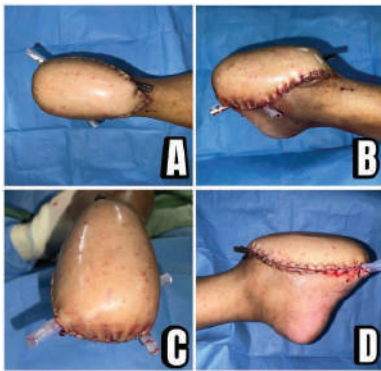
**Figure 1 A-D** shows the pre-operative condition of the patient's left foot with synovial sarcoma. Surgical markings indicate the areas of planned incision and amputation, focusing on the foot. **Figure 1 E-F** (depict the preparation of the SCIP flap. The incision is marked on the patient's lower abdomen, followed by the harvested flap with perforator vessels included. **Figure G-I** illustrate the intraoperative and post-operative stages. G shows the foot immediately after the Chopart amputation, with exposed bone and soft tissue. H shows the foot after the flap has been positioned to cover the defect. Finally, I show the fully reconstructed foot, where the flap is successfully integrated, covering the surgical site.

**Figure 2 A-D** provides multiple views of the reconstructed foot, the SCIP free flap has been successfully attached to cover the defect created by the amputation. The surgical incision is neatly sutured along the anterior and lateral aspects of the foot, with multiple drainage tubes in place to prevent

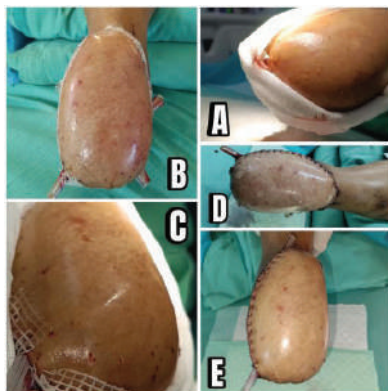


fluid accumulation and to support healing. The flap appears healthy, with a smooth, well-vascularized surface and no signs of immediate post-operative complications such as excessive swelling or infection.

The patient's postoperative course was uneventful, no signs of flap necrosis, infection, or other complications. She was discharged with a well-healed flap. **Figure 3 A-E** shows the healing process (good skin approximation, prick test (+), sign of infection (-)) over five consecutive days. Early rehabilitation focused on regaining function in the remaining portion of the limb.



**Figure 2.** Post-operative Photo (A-D)



**Figure 3.** Post-operative day 1 to 5 respectively (A-E).

## DISCUSSION

Chopart amputation is a limb-salvaging procedure that removes the forefoot while preserving the hindfoot, thus maintaining some degree of weight-bearing capacity. It offers an alternative to more radical procedures, providing patients with the opportunity to retain limb functionality and improve their mobility post-surgery. Chopart amputation involves removing tissues distal to the talonavicular and calcaneocuboid joints.<sup>6</sup>

However, the loss of substantial soft tissue poses a challenge for primary closure. In these cases, inadequate soft tissue coverage can result in wound complications, infection, or impaired healing. Therefore, reconstruction with a free flap becomes essential to cover the defect and ensure optimal functional and satisfactory outcomes.<sup>7</sup>

Given the aggressive characteristics associated with synovial sarcoma and the potential for local recurrence, a decision was made to execute a Chopart amputation to facilitate an oncologically adequate resection of the tumor with clear margins.<sup>8</sup> The SCIP (superficial circumflex iliac artery perforator) free flap was chosen due to its capacity to circumvent muscle dissection and to maintain the functionality of the donor site, employing exclusively skin and subcutaneous tissue, thereby mitigating postoperative complications.<sup>9</sup>

The SCIP free flap offers significant advantages in reconstruction. Unlike the radial forearm and anterolateral thigh (ALT) free flaps, which involve muscle harvesting, the SCIP flap only requires skin, reducing the donor site morbidity potential and to preserve function.<sup>5,10,11</sup> The minimal donor site morbidity is of particular significance in individuals with multiple comorbid conditions, such as diabetes mellitus or peripheral vascular pathology, since any supplementary trauma or tissue excision may exacerbate the recovery process. This consideration is especially pertinent for patients undergoing limb-salvaging interventions, such as Chopart amputation, wherein the preservation of each facet of limb functionality is of utmost importance.<sup>6</sup> Furthermore, the SCIP flap's capacity to furnish a substantial, well-vascularized cutaneous flap renders it exceptionally suitable for the coverage of extensive soft tissue defects, including those resultant from tumor resection.<sup>9</sup>

The SCIP flap's substantial vascular supply contributed to accelerated healing, diminishing the likelihood of wound complications and assuring the long-term integrity of the reconstruction.<sup>12</sup> Research demonstrates the efficacy of SCIP flaps in distal amputations, with a limb salvage rate of approximately 84.3% in patients with complex medical histories such as diabetes and peripheral artery disease.<sup>13</sup> The aforementioned success rate serves as an affirmation of the adaptability

and dependability of SCIP flaps in intricate oncological and reconstructive surgical procedures. Furthermore, the multifaceted nature of the SCIP flap facilitates the repair of defects in diverse anatomical regions, rendering it a progressively favored alternative in scenarios necessitating comprehensive reconstruction.

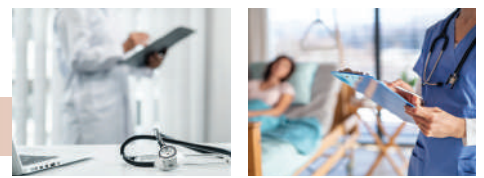
The incidence of regional lymph node metastasis (RLNM) among lower extremity sarcoma has been reported to reach 24%, necessitating intraoperative assessment through frozen section analysis.<sup>14</sup> The positive lymph node involvement markedly influences the prognostic outlook and necessitates the consideration of supplementary adjuvant treatments. This particular case was enhanced by the simultaneous assessment of lymph nodes, thereby facilitating a holistic approach to cancer management. The prompt detection and excision of metastatic lymph nodes lessen the likelihood of recurrence and enhance overall survival rates for sarcoma.<sup>15</sup>

Despite its benefits, SCIP free flap reconstruction comes with certain challenges. The procedure is technically demanding, requiring microsurgical expertise and prolonged operative time. Additionally, it may be associated with increased costs compared to simpler amputation procedures without reconstruction.<sup>16</sup> The intricate nature of microsurgical methodologies, coupled with the imperative for accurate vascular anastomosis, heightens the likelihood of flap failure, especially in individuals presenting with compromised vascular supply. Nevertheless, the enduring advantages, which encompass the preservation of limb functionality and a decrease in morbidity, surpass these obstacles, particularly for patients aspiring to uphold autonomy and mobility following surgical intervention.

Patient selection also play a crucial role for the successful SCIP free flap reconstruction, as not every person may be suitable for this complex surgical procedure.<sup>17,18</sup> The selection criteria generally include their overall health, vascular condition, and the amount of tissue loss. Individuals with systemic illnesses that may hinder wound healing or those with inadequate blood circulation to the reconstruction area may not be suitable candidates for free flap surgery.<sup>19</sup> Thorough preoperative planning and patient optimization can greatly enhance the outcomes.

In contrast, patients undergoing amputation





without reconstruction may experience complications such as poor functional outcomes, discomfort with prosthetics, or aesthetic dissatisfaction, which can significantly affect their quality of life.<sup>20</sup> Patients who undergo amputation without reconstruction often experience limited mobility, impaired balance, and increased reliance on assistive devices, which can reduce their independence. Additionally, the psychological effects of amputation without subsequent reconstruction can be significant; concerns about body image and loss of limb function potentially lead to depression or anxiety. Combining Chopart amputation with SCIP free flap reconstruction offers an ideal solution for extensive tumor removal and subsequent tissue coverage. This approach not only ensures a functional

and long-lasting result but also improves the patient's quality of life by preserving as much of the natural limb as possible.

## CONCLUSION

Chopart amputation with SCIP free flap reconstruction offers a highly effective treatment for synovial sarcoma of the foot. This approach ensures complete oncologic tumor removal while preserving limb function and achieving satisfactory results. The SCIP flap, with its muscle-sparing and minimal morbidity characteristics, is an excellent choice for reconstructing large defects in the lower extremities. As demonstrated in this case, this technique provides reliable soft tissue coverage and allows for a smooth postoperative recovery, contributing to

improved long-term outcomes for patients.

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