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THE SCIP FLAP FOR FACIAL RECONSTRUCTION: A SYSTEMATIC REVIEW

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Summary

Introduction. The superficial circumflex iliac artery perforator (SCIP) flap has gained attention for its benefits, including a hidden donor site and a thin skin island, suitable for specific facial areas. This review analyzes the SCIP flap's use in facial reconstruction and evaluates its advantages and limitations.

Materials and methods. This review follows PRISMA guidelines and used PubMed to search for studies on SCIP flap in facial reconstruction. The search used the keywords "SCIP flap" and "head and neck reconstruction," resulting in 8 relevant studies after exclusions.

Results. The review included 8 case reports or series involving 30 patients with facial defects from oncological resections. The SCIP flap sizes averaged 14.3 x 6.3 cm, with a mean pedicle length of 9 cm. Complications reported included venous congestion, wound dehiscence, infections, thrombosis, partial necrosis, and facial nerve palsy. The average follow-up period was 17.3 months.

Discussion. The SCIP flap provides a thin, pliable skin island and can be harvested with bone tissue. Its versatility and minimal donor site morbidity are notable, though it faces challenges such as technical complexity and a short, small-caliber pedicle. The SCIP flap may not be suitable for extensive reconstructions or large defects.

Conclusions. While the SCIP flap offers significant benefits, including a thin skin island and minimal donor site morbidity, its use in facial reconstruction is limited by technical challenges and a short pedicle. With careful management, it remains a promising option for selected cases.

Key words: head and neck reconstruction, microsurgery, SCIP flap, superficial iliacal artery perforator flap, facial reconstruction

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INTRODUCTION

Restoring form and function is essential for any skin defect, but it can be particularly challenging when it involves the face [1]. This is because the face is crucial for the patient's appearance and identity, and it also affects some of the most important functions, such as breathing, speaking, seeing, and eating. Facial defects can result from burns, trauma, or surgical resections of locally cancers [1]. While simple defects can be adequately treated with primary suturing, skin grafts, or local flaps, more complex defects require

the expertise of plastic surgeons specialized in microsurgery [1-5]. This is because certain areas of the head and neck, such as the lips, eyelids, or nose, need specific characteristics like flexibility and thinness that only some free flaps can provide [1-4]. Among all free flaps, the superficial circumflex iliac artery perforator (SCIP) flap has seen increasing interest from microsurgeons due to its numerous advantages [3-5]. It features a well-hidden donor site and allows for the harvesting of a medium to large-sized skin island with a particularly thin thickness, which is well-suited for certain facial areas. If necessary, it can be harvested in a composite manner with lymphatic, muscular, or bony tissue [5]. The aim of this review is to provide a detailed analysis of the use of the SCIP flap for reconstructing various types of facial defects and to assess the real advantages and disadvantages of using this free flap in facial reconstruction.

MATERIALS AND METHODS

The current review adhered to the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [6,7]. The authors used PubMed to identify items focused on the use of the SCIP flap for facial soft tissue reconstruction. For the literature search, the keywords “SCIP flap” and “head and neck reconstruction” were combined as follows: “SCIP FLAP” AND “head and neck reconstruction”. All case reports and original articles focused on the use of SCIP flap for facial reconstruction were included in the review. 5 PubMed search results were excluded by title or abstract. Additionally, studies involving cadavers, anatomical descriptions, and review articles were also excluded. Therefore, among the 23 remaining PubMed studies, 14 were screened by carefully reading and were excluded. At the end the final number of records included in the review was 8 (Fig. 1).

RESULTS

A total of 8 items were included in the review (Tab. I). All the studies were case reports or case series published in English. The entire study population consisted of 30 cases of patients who underwent oncological resections of the face. The defects affected the ear (8/30), mouth (6/30), eyelids (3/30), facial skin (3/30), nose (1/30), chin (1/30), and cheek (1/30). The average SCIP flap size was 14.3 x 6.3 cm [9], and the mean pedicle length reported was 9 cm [8]. Reported complications included venous congestion (5 cases), wound dehiscence (5 cases), wound infections (5 cases), venous thrombosis (1 case), partial necrosis (1 case), and facial nerve palsy caused by intentional neurectomy (1 case) [13]. The mean follow-up period reported was 17.3 months [9].

DISCUSSION

Koshima et al. first described the superficial circumflex iliac artery perforator (SCIP) flap in 2004 [4]. Since then, only a few cases of facial reconstruction using the SCIP flap have been reported in the literature. This limited usage is likely due to unresolved issues, such as selecting the appropriate branch of the superficial circumflex iliac artery (SCIA). Most authors prefer to base the skin island on the superior branch [8,10,13-15]. Conversely, some favor the deep branch pedicle, arguing that it offers a larger angiosome for the soft tissue component and a longer pedicle than the superficial branch [9]. Despite these challenges, the SCIP flap provides several advantages for facial reconstruction, as detailed in Table II. It can yield a very thin and pliable skin island when harvested in a suprafascial plane, making it particularly suitable for covering complex head and neck defects [8,9,12-14]. Additionally, once the pedicle is clearly visualized, the flap can be further thinned to the desired extent [8]. The flap is also highly versatile; it can be harvested with the deep branch in a chimeric form that includes bone tissue, an often-needed component in facial reconstructions [8-10,12,15]. Another variant of the flap includes its sensitive version. By preserving and

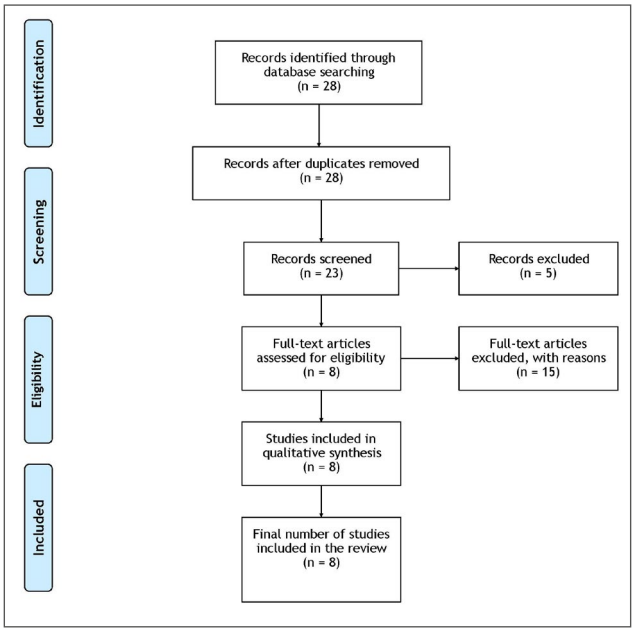

Figure 1 The PRISMA Flow Diagram (from Moher et al., 2009, mod.) [7].

Table I. Details of the Items included in the review.

Authors and year	Article	Anatomical defect	Recipient artery	Recipient vein	Main size	Mean pedicle length	Mean follow-up period
Scaglioni et al. [8], 2024	Head and neck reconstruction with the superficial circumflex iliac artery perforator (SCIP) free flap: Lessons learned after 73 cases	Mouth (5)	Superior thyroid artery	External jugular vein	46 cm^2	9 cm	11 months
		Ear (2)	Facial artery	Internal jugular			
			Superficial temporal artery	Superficial temporal vein			
Zubler et al. [9], 2022	The osteocutaneous SCIP flap: a detailed description of the surgical technique and retrospective cohort study of consecutive cases in a tertiary European centre	Cheek with orbital floor and maxilla (1)	Facial artery	Facial vein	14.3 x 6.3 cm	-	17.3 months
Lida et al. [10], 2014	Versatility of the superficial circumflex iliac artery perforator flap in head and neck reconstruction	Face (2)	Facial artery (2)	Facial vein (3)	12.8 x 6.3 cm	7.1 cm	-
		Upper eyelid (1)	Superficial temporal artery (4)	Internal jugular (1)			
		Ear (3)		Superficial temporal vein (2)			
Lida et al. [11], 2016	A pilot study demonstrating the feasibility of supermicrosurgical end-to-side anastomosis onto large recipient vessels in head and neck reconstruction	Face (1)	Facial artery (1)	Facial vein (2)	-	-	-
		Eyelid (1)	Superficial temporal artery (4)	Superficial temporal vein (3)			
		Ear (3)					
Lida et al. [12], 2019	A free vascularised iliac bone flap based on superficial circumflex iliac perforators for head and neck reconstruction	Mouth with orbital floor and maxilla (1)	Facial artery (1)	Facial vein (1)	-	-	-
Choi et al. [13], 2019	Thin superficial circumflex iliac artery perforator flap and supermicrosurgery technique for face reconstruction	Preauricular region (1)	Superficial temporal artery (2)	Superficial temporal vein	75.6 cm^2	4.6 cm	16.7 months
		Check (2)	Nasolabial artery (1)				
		Nose (1)	Angular artery (1)				
		Chin (1)	Inferior labial artery (1)				
		Postauricolar region (1)	Postauricular artery (1)				
He et al. [14], 2015	Superficial circumflex iliac artery perforator flap: identification of the perforator by computed tomography angiography and reconstruction of a complex lower lip defect	Lower lip (1)	Superior thyroid artery (1)	Superior thyroid vein (1)	9 x 6 cm	4.8 cm	-
Lida et al. [15], 2014	Superficial circumflex iliac perforator (SCIP) flap: variations of the SCIP flap and their clinical applications	Upper eyelid (1)	Superficial temporal artery (1)	Superficial temporal vein (1)	-	-	-

anastomosing the cutaneous branches of the intercostal nerves, a sensitive SCIP flap can be created [8,15]. One of its greatest advantages is the minimal donor site morbidity, with all authors reporting straightforward primary closure and no major complications [8-15]. Unlike other flaps, particularly the latissimus dorsi flap and the radial forearm flap, which remain widely used in head and neck reconstruction, the SCIP flap does not lead to functional limitations or damage major vessels [8,13,14]. However, the SCIP flap does have several limitations (see Table III) that may explain why it is not yet more widely utilized. Harvesting the SCIP flap is technically complex and requires significant microsurgical expertise [7,14]. The flap features a short pedicle and smaller vessels compared to other free flaps, with suitable recipient vessels for end-to-end anastomosis often being absent, especially in the arteries [8,10,13,15]. When small vessels are unavailable, supermicrosurgical end-to-side anastomosis may be considered as an alternative [10,15]. Additionally, for extensive reconstructions, the SCIP flap may not be appropriate [8]. Similar to the SCIP flap, the latissimus dorsi flap is also not ideal for covering large defects.

Table II. Advantages in using the SCIP flap for facial reconstruction.

Easy primary closure of the donor site [8,9,10,13,14]
Minimal donor site morbidity [8,9,12,13,14]
It is ideal for the reconstruction of specific areas of the face [8,10,13].
The flap can be harvested with bone tissue, which allows a valuable and versatile option for osteoplastic reconstructions [8,9,12].

Table III. Limitations in using the SCIP flap for facial reconstruction.

Technical complexity [8,14]
limited tissue volume [8,15]
short pedicle [9,10,12,13,14,15]
Requires experience in supermicrosurgery [10,14,15].

Table IV. Recommendations for facial reconstruction using the SCIP flap.

Vessel mapping with Doppler and computed tomography angiography of the donor site are essential to exclude any disadvantageous individual anatomical variation [8,9,14]
The SCIP flap dissection should be performed above the deep fascia, utilizing a perforator from the superficial circumflex iliac artery [8,13]. Excluding the deep fascia may enhance the skin's pliability and simultaneously reduce the flap's thickness [13]
Including the superficial vein, typically located in the medial part of the skin paddle, to enhance venous drainage [9,15]
If the small SCIP pedicle needs to be connected to larger vessels (such as the facial artery) employ the open-Y technique [8]
The use of indocyanine green perfusion imaging (ICG) appears to lower the risks of partial or complete flap failures [8, 10]

CONCLUSIONS

Currently, the literature on the use of the SCIP flap for facial reconstruction remains somewhat limited. The SCIP flap offers several advantages, including an exceptionally thin and "moderately sized" skin island, the option to include bone tissue, minimal donor site morbidity, and a scar that can be easily concealed. Although the relatively short and small-caliber pedicle poses a challenge, with careful management, the SCIP flap could be an excellent choice for selected cases of facial reconstruction. Table IV provides some recommendations to enhance the effectiveness of facial reconstruction using this flap.

Conflict of interest statement
The authors declare no conflict of interest.

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Author contributions
All authors have contributed equally to the work.

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