International Microsurgery Journal

CASE REPORT

Penopubic Junction Reconstruction Using a Pedicled Superficial Circumflex Iliac Artery Perforator Flap

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ABSTRACT

In surgical procedures involving the penopubic junction, there are significant risks associated with postoperative scar traction. Scar traction may result in a short penis and other deformities, which may cause discomfort during erections and interfere with the patient's sexual performance. The article describes the case of a 27-year-old male who had undergone a penis lengthening procedure four years earlier. After the surgery, the skin around the penopubic junction was scarred and became severely contracted. This led to a short penis and a high hanging scrotum as a consequence of the scarring. The purpose of this case report is to describe how we repaired the penopubic junction with a pedicled superficial circumflex iliac artery perforator flap. At the penopubic junction, there was a defect measuring 4 x 3 cm following the removal of the contracture scar. The affected region was repaired using a left pedicled modified superficial circumflex iliac artery perforator flap based on its medial superficial branch. Moreover, a hybrid technique was developed to harvest the superficial circumflex iliac artery perforator flap in a safe and effective manner. Using the hybrid technique, a proximal-to-distally flap elevation approach was combined with a pedicle elongation strategy to lengthen the pedicle. It is our experience that the pedicled superficial circumflex iliac artery perforator flap may provide an effective alternative method of reconstructing the postoperative scar traction at the penopubic junction.

INTRODUCTION

Postoperative scar traction is a potential complication of surgery involving the penopubic junction. An individual with scar traction at the penopubic junction may have a short penis and other deformities, which may affect his sexual performance and cause discomfort during erections. Research has shown that penopubic defects can be repaired using skin grafts, locoregional flaps, or microsurgical free tissue transfers [1-9]. However, despite the fact that each of these options has its own advantages and disadvantages, there is still considerable uncertainty regarding the most effective method of reconstructing penopubic defects. Therefore, research is underway to develop a practical and improved method of treating postoperative scar contractures of the penopubic region.

The superficial circumflex iliac artery perforator (SCIP) flap has been described by Koshima et al. as a feasible option for the reconstruction of limb deformities [10]. The SCIP flaps are thin, pliable, and versatile flaps with the advantage of minimal donor-site morbidity and well-concealed donor scarring. It should be noted, however, that the SCIP flap has a limited pedicle length, making it unsuitable for a broad range of applications. It is recommended that the maximum flap size be in the range of 10 x 30 cm, while the pedicle length may vary within the range of 20 cm. In the meantime, the SCIP flap can be constructed according to the Orochi technique [11], which includes the iliac bone for the reconstruction of the bone defect, the lateral femoral cutaneous nerve for a sensate flap, the fascia for the reconstruction of the tendons, and the sartorius muscle for the reconstruction of dynamic function.

Our main objective in this case report is to explore modifications to the SCIP flap in order to broaden its potential applications. A specific focus of this research is on the SCIP flap as an alternative reconstruction option for defects of the penopubic junction. In this case report, we illustrate how we have developed a hybrid technique to facilitate the elevation of the SCIP flap and overcome its major disadvantage, which is its short pedicle length. In this hybrid technique, the proximal-to-distally flap elevation approach [12] was combined with an elongation strategy that modifies the pedicle length [13].

CASE REPORT

We present the case of a 27-year-old male patient who underwent penis lengthening surgery four years ago. A severe postoperative complication occurred as a result of scar contracture at the penopubic junction, leading to a short penis and high hanging scrotum (Figure 1A). While the patient reported tightness during erections, there was no apparent effect on the performance of his sexual function due to the condition.

An appropriate surgical procedure was devised for resolving the scar contracture at the penopubic junction. A preliminary examination was conducted to identify the anterior superior iliac spine and pubic tubercle. A handheld doppler was used to mark the alignment of the superficial branch of the superficial circumflex iliac artery preoperatively. This branch traveled in an axial pattern beyond the anterior superior iliac spine (Figure 1B).

A contracture scar measuring 4 x 3 cm was excised at the penopubic junction (Figure 1C). A medial inferior incision was initially made as an exploratory procedure. Once the pedicle was identified, the skin paddle was redesigned laterally using a freestyle technique, and subsequent intrasubcutaneous dissections were performed under a microscope. The pedicle measured 7 cm in length (Figure 1D).

An appropriate flap was transposed through a subcutaneous tunnel and tailored to fit the defect. The defect in the penopubic junction was therefore reconstructed using a left pedicled modified SCIP flap based on

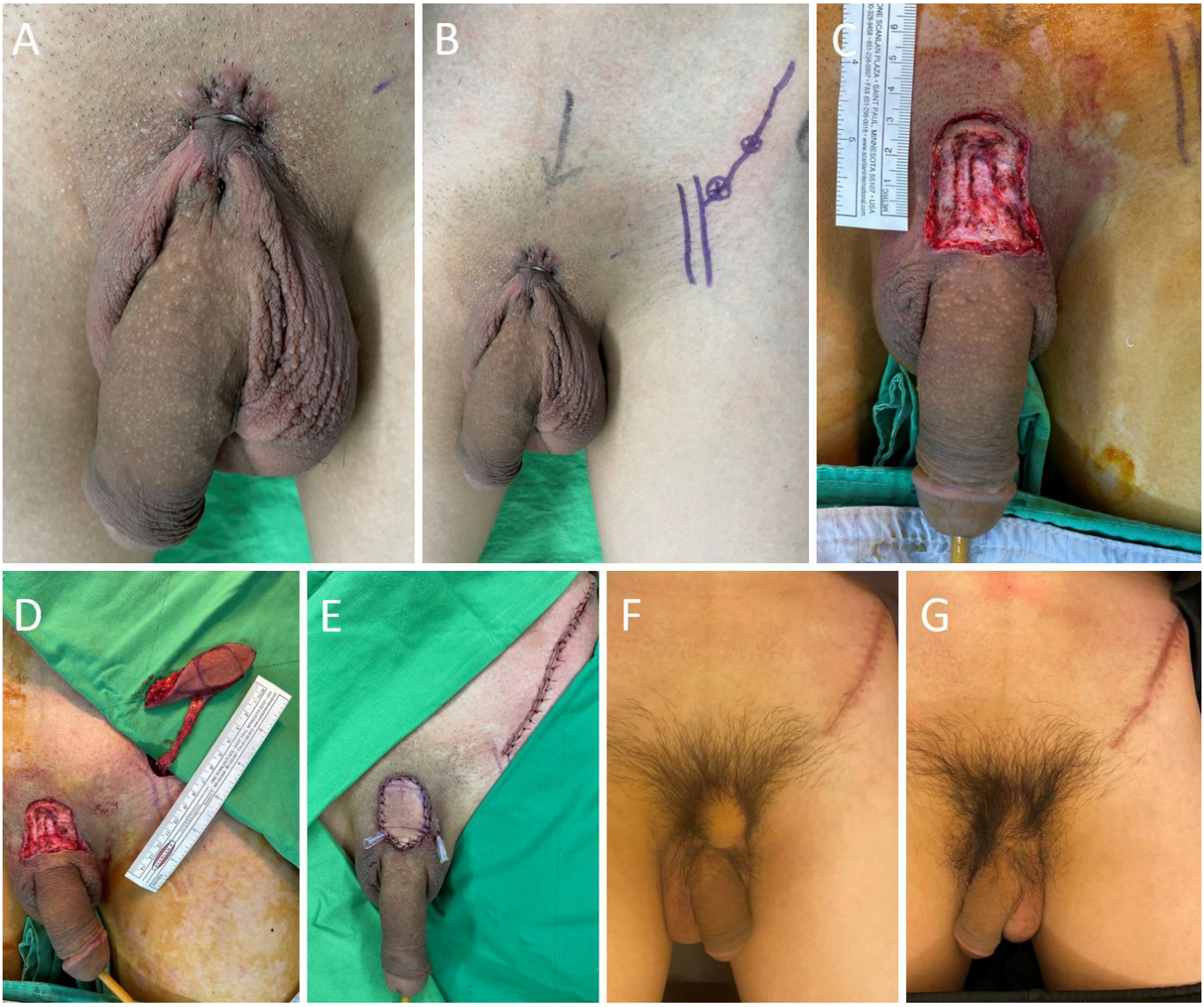

Figure 1. A 27-year-old male with a severe scar contracture at the penopubic junction. (A) Due to the scar contracture at the penopubic junction, there is a short penis and a high hanging scrotum. (B) A handheld doppler is used to determine the direction of the superficial branch of the superficial circumflex iliac artery. This branch travels beyond the anterior superior iliac spine in an axial pattern. (C) Following the excision of the contracture scar, there is a defect measuring 4 x 3 cm. (D) The length of the pedicle is 7 cm. (E) The flap is transpositioned through a subcutaneous tunnel and then tailored to fit the defect. At the donor site, a primary wound closure is performed. (F) One month after surgery, the patient recovers uneventfully. (G) The flap with hair growth is viable and durable three months after surgery.

the medial superficial branch (Figure 1E). During the surgical procedure, special care was taken to ensure the preservation of the dorsal nerve of the penis and the left iliohypogastric nerve. A primary wound closure was performed at the donor site. Overall, the duration of the surgery was 120 minutes, which included 45 minutes for flap harvesting. Postoperative recovery was uneventful for the patient after 1 month (Figure 1F) and 3 months (Figure 1G).

DISCUSSION

Using a hybrid technique, we were able to safely harvest the SCIP flap and effectively overcome its major disadvantage, which was its short pedicle length. With the SCIP flap used to restore the penopubic area, excessive tension was minimized following scar contracture release. Our study expands the potential applications of the SCIP flap by employing it to reconstruct the postoperative scar traction at the penopubic junction. Our experience indicates that the long pedicle SCIP flap can be used as an alternative single-stage operation with satisfactory outcomes.

A variety of methods are available for the reconstruction of defects in the pubic or penopubic areas, such as using skin grafts, locoregional flaps, and microsurgical free tissue transfers [1-9]. A local flap is an advantageous method of reconstructing the penopubic area since it allows color matching and hair bearing. Local flaps can be employed in various ways, including the local iliac flap, the rhomboid flap from the suprapubic region, as well as the V-Y advancement flap [1-3].

A concern associated with using skin grafts or local flaps is the possibility of scar contracture recurrence, especially if the patient previously had hypertrophic scarring or keloids. Revision surgery may then be required in order to correct the problem [3]. In the case of skin grafting, a two-stage operation with dermal substitute combined with foreskin or hair bearing skin grafts is a viable alternative to minimize the risk of scar contracture recurrence, whereas direct skin grafting limits the treatment options for scarred wound beds.

Various regional flaps are commonly used, such as the scrotal flap, the groin flap, the deep external pudendal artery perforator flap, and the pudendal artery perforator flap [3-6]. Regional flaps have several shortcomings, including hairless patches or a mismatch in color. However, the bald patch can be combed with pubic hair or secondary hair transplantation with a micrograft or follicular unit graft. In the case of penopubic junction reconstruction using a pedicle SCIP flap, there is the disadvantage of leaving behind a non-sensate area and the possibility of creating hypertrophic scarring. Nevertheless, it is possible for the sensation to gradually return, and scars can also be treated with Z-plasty.

Several studies have demonstrated that microsurgical free tissue transfers are a viable option for reconstructing defects in the pubic or penopubic regions [7-9]. Different types of free tissue transfers exist, including the hair bearing expanded free forehead flap and the hair bearing temporoparietal flap based on superficial temporal vessels with or without needle epilation [7-9]. However, microsurgical free tissue transfers are time-consuming when attempting to reconstruct pubic or penopubic defects.

The importance of this research lies in expanding the scope of application of the SCIP flap by using it to reconstruct postoperative scar traction at the penopubic junction. Additionally, our research contributes to the development of a hybrid technique to facilitate the elevation of the SCIP flap and overcome its main disadvantage, namely its short pedicle length. The hybrid technique incorporates a proximal-to-distally elevation method [12] combined with an elongation strategy that modifies the pedicle length [13].

The proximal-to-distally flap elevation technique was first described by Yoshimatsu et al. [12]. In this procedure, a SCIP flap is elevated by identifying the pedicle arteries in order to incorporate a variety of anatomical structures. A major advantage of this proximal-to-distal elevation is that when the superficial branch of the superficial circumflex iliac artery is inadequate or not present, the pedicle can be switched to the deep branch of the superficial circumflex iliac artery or even to the superficial inferior epigastric artery.

The main disadvantage of the SCIP flap is the short pedicle length. Kwon et al. detailed the modification of SCIP flap elevation to obtain long pedicles using a laterally designed flap in conjunction with an intrasubcutaneous dissection [13]. With the long pedicle of the SCIP flap, the pedicle can be prevented from being twisted by a superficial band during inguinal transposition. In addition, lymphedema in the contralateral groin area can be reconstructed by including a lymphatic channel in the flap.

Using the proximal-to-distally elevation technique [12] in combination with the elongation strategy that modifies the pedicle length [13], we contribute to the development of a hybrid technique. It is our belief that a hybrid harvesting technique would make flap harvesting both safer and more flexible.

CONCLUSION

The use of pedicled SCIP flaps may provide an alternative reconstruction method for addressing scar traction at the penopubic junction following surgery. The procedure has demonstrated effectiveness for surgeons, as well as satisfactory results for patients.

CONVERSATIONS WITH EXPERT MENTORS

Dr. Shyun-Jing Wee, the author of this article, met with the editors at SciTeMed as well as expert mentors to discuss the research in order to maximize its impact and ensure its wide dissemination. The webinar was moderated by Dr. Laura Chia-Fang Chen, a surgeon at Linkou Chang Gung Memorial Hospital who specializes in plastic and reconstructive surgery. The recording of this webinar can be accessed by clicking on the following link: https://doi.org/10.24983/scitemed.imj.2022.00164

Expert Mentors

Dr. Peter Neligan and Dr. Isao Koshima were the guests of honor for this webinar. Both of them serve as Honorary Editors-in-Chief for *International Microsurgery Journal*.

Dr. Peter Neligan

Dr. Peter Neligan is a former president of the Plastic Surgery Foundation, of the American Society for Reconstructive Microsurgery, and of the North American Skull Base Society. He is also a former board member of the American Head & Neck Society. Previously, he served as a trustee of the American Society of Plastic Surgeons. He has authored more than 12 books, 85 book chapters, and over 200 peer-reviewed publications. At present, he serves as Editor-in-Chief of Plastic Surgery, a six-volume textbook used throughout the world for plastic surgery training. He has been invited to over 300 universities and major societies as a visiting professor or honored guest. In addition to sitting on several editorial boards, he has served as Editor-in-Chief of the Journal of Reconstructive Microsurgery in the past.

Dr. Isao Koushima

Dr. Isao Koushima, a former president of the World Society for Reconstructive Microsurgery, has made an enormous impact on the field of reconstructive microsurgery due to his leadership role. He is a former chairman of the Japanese Society for Surgery of the Hand, the Japanese Society of Reconstructive Microsurgery, and the Japanese Society for Lymphoreticular Tissue. In addition, he is the supervisor of the Japanese Society of Tissue Transplantation. He is also a member of the Japan Society for Head and Neck Surgery and the Japanese Research Society of Clinical Anatomy. In addition to his position as an emeritus professor at The University of Tokyo Hospital, he is also a distinguished professor at the Hiroshima University International Lymphedema Treatment Center.

ARTICLE INFORMATION

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Received: Apr. 01, 2022; **Accepted:** May 18, 2022; **Published:** Aug. 18, 2022

DOI: 10.24983/scitemed.imj.2022.00164

Disclosure: The manuscript has not been presented at any meetings on the topic.

Ethics Approval and Consent to Participate: The study is in accordance with the ethical standards of the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The authors obtained permission from the participants in the human research prior to publishing their images or photographs.

Funding: This research has received no specific grant from any funding agency either in the public, commercial, or not-for-profit sectors.

Conflict of Interest: There are no conflicts of interest declared by either the authors or the contributors of this article, which is their intellectual property.

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