Comparative Study of the Free Microvascular Groin Flap: Optimizing the Donor Site After Free Radial Forearm Flap Phalloplasty

Ulrich M. Rieger, Pawel Majenka, Anna Wirthmann, Michael Sohn, Ahmet Bozkurt, and Gabriel Djedovic

OBJECTIVE To improve the donor-site morbidity of the radial forearm flap through coverage with a free vascularized groin flap and comparing this flap coverage to the current standard, a full-thickness skin graft (FTSG).

MATERIALS AND METHODS A retrospective analysis of all free radial forearm flap phalloplasties for transgender surgery at our institution was performed. We examined patient characteristics, donor site defects, surgical procedure, and clinical courses.

RESULTS Between October 2013 and February 2016, 27 consecutive patients underwent phalloplasty for female-to-male reassignment surgery with free radial forearm flaps. A total of 7 free groin flaps (group A) and 20 full-thickness skin graft from the groin region (group B) for donor-site defect coverage of the forearm were performed. The mean age in group A was 28.4 years with a mean body mass index of 21.6 kg/m^2 and a mean follow-up time of 10.6 months. The mean surgery time was 724 minutes. The mean patients' functional rating was 3.6 accompanied by the mean patients' aesthetical rating of 3.7. The mean age in group B was 30.5 years with a mean body mass index of 23.7 kg/m^2 and a mean follow-up time of 13.4 months. The mean surgery time was 563 minutes. The mean patients' functional rating was 3.1 accompanied by the mean patients' aesthetical rating of 2.9.

CONCLUSION We suggest that the free microvascular groin flap should be considered for immediate defect closure after phalloplasty with a radial forearm flap due to its beneficial functional and aesthetic results and the low rate of complications. UROLOGY 95: 192–196, 2016. © 2016 Elsevier Inc.

Since the first report of penile reconstruction with a pedicled abdominal flap in 1936, several other pedicled flaps, such as the groin flap or the myocutaneous gracilis flap, have been proposed and were subsequently modified for phalloplasty.[1-3] Penile reconstruction after trauma, tumor, or for female-to-male transsexual surgery is still very challenging as the requirements for the neophallus are comprehensive and demanding. The ideal flap for phalloplasty should be sensate, hairless, aesthetically pleasant, and should provide sufficient tissue for potential tubularization and enable sexual intercourse.[4] All these requirements were rarely accomplished with the use of pedicled flaps, hence leading to a poor aesthetical and functional outcome. The development of microsurgery with innovative procedures over the last decades opened new possibilities in the reconstruction of a neophallus. In 1982 the free radial forearm flap was used for penile reconstruction for the first time.[5] Harvesting the free radial forearm flap is not only relatively easy, fast, and safe, but also fulfills the aforementioned requirements for an "ideal" phalloplasty. Due to these advantages, the radial forearm flap nowadays represents the gold standard for penile reconstruction.[6]

Despite all the aforementioned advantages, the donor-site-morbidity of the radial forearm flap ranges from impaired range of motion to decreased pinch and grip strength, graft loss, delayed wound healing, sensory changes, and unpleasant scarring.[6] Especially the typical scar can lead to a stigmatization of the transgendered patient. To attenuate the disadvantages of the donor site, which is usually

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From the Department of Plastic & Aesthetic, Reconstructive & Hand Surgery, St. Markus Hospital, Johann Wolfgang von Goethe University, Frankfurt, Germany; the Department of Urology, St. Markus Hospital, Johann Wolfgang von Goethe University, Frankfurt, Germany; and the Department of Plastic, Reconstructive and Aesthetic Surgery, Innsbruck Medical University, Innsbruck, Austria

Address correspondence to: Gabriel Djedovic, M.D., Department of Plastic, Reconstructive and Aesthetic Surgery, Innsbruck Medical University, Anichstr. 35, 6020 Innsbruck, Austria. E-mail: gabriel.djedovic@me.com

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covered with split-thickness skin grafts, defect coverage was performed with full-thickness skin grafts (FTSGs) (eg, from the groin region) with or without acellular dermal matrices and locally placed expansion devices.[7-11] The free anterolateral thigh (ALT-) flap was utilized as a flow-through flap to overcome the disadvantage of sacrificing the radial artery. Because of its own vascularization, it was also able to solve all the addressed donor-site problems except the abnormal sensation.[12] Besides the mentioned donor-site coverage with ALT-flaps, there are no further reports on the coverage of the radial forearm donor-site defect coverage with vascularized free flaps in literature.

The aim of the present study was to evaluate our new technique and improve the donor-site morbidity of the radial forearm flap after coverage with a free vascularized groin flap.

MATERIALS AND METHODS

A retrospective analysis of all free microvascular groin flaps for donor-site defect closure after free radial forearm flap phalloplasties for transgender surgery performed between October 2013 and February 2016 at our department was conducted.

Surgical Procedure

Under general anesthesia, patients were placed in a lithotomy position. Stockinettes were placed on the feet so the legs could be moved. The operation started with two teams: the plastic surgeons harvested the radial flap from the nondominant forearm, whereas the urologists performed a vaginectomy and colpocleisis. Prior to surgery, an Allen test was obligatory and was done in all patients. Under exsanguination, a free radial forearm flap was formed by means of a tube-in-tube technique as described by Gottlieb and Levine.[13] In group A, a third team started to harvest the free microvascular groin flap from the contralateral side of the free radial forearm flap after the urologist has finished. Finally, after both free flaps have been harvested, the donor site on the forearm was covered with the free microvascular groin flap with end-to-end anastomosis between the superficial circumflex iliac vessels and the proximal stumps of the radial vessels. If necessary, additional FTSGs from the other groin region were performed for full defect coverage at the forearm and fixed with a vacuum-assisted wound closure device at 125 mmHg for 7 days. Fatty gauze between the foam and the skin served as adhesion barrier. Stab incisions in the FTSG were done to decrease risk of graft loss due to hematoma or seroma formation. In group B, the donor site was covered with a FTSG from the contralateral groin region. Fixation and further treatment of the FTSG were similar to that in group A. In all patients, the donor site at the groin region was closed directly. The neo-urethra of the free forearm flap was anastomosed to the urethra and an end-to-side anastomosis of cutaneous nervous branches was conducted to the dorsal nerve of the clitoris. Vascular supply of the neophallus was provided by end-to-end-anastomosis to the inferior epigastric vessels. Postoperatively, all patients received antibiotic treatment with amoxicillin and clavulanic acid 625 mg p.o. 3 times daily for a total of 7 days. Patients were immobilized for 24 hours and thromboembolic prophylaxis with low molecular weight heparin was administered until full mobilization was achieved. Suction drains were removed when fluid quantity was less than 30 mL. Compressive stockings were applied for 4 weeks minimum.

Analyzed Parameters

Data recorded were age, body mass index (BMI), complications after surgery at the groin region and the forearm, size of the free groin flap, time of follow-up, and duration of the surgical procedure.

All patients were asked to fill out a questionnaire at the time of follow-up. They were asked to assess their postoperative aesthetical and functional outcome on a scale of "1 = poor," "2 = satisfactory," "3 = good," and "4 = excellent." Additionally, patients were asked if they underwent the procedure again when considering their postoperative result.[14]

RESULTS

Between October 2013 and February 2016, 27 consecutive patients underwent a phalloplasty for female-to-male reassignment surgery with free radial forearm flaps at our department. A total of 7 free groin flaps (group A) and 20 FTSGs from the groin region (group B) for donor-site coverage of the forearm were performed.

In group A, the mean age of the patients was 28.4 years (range: 21.5-38.7 years) with a mean BMI of 21.6 kg/m^2 and a mean follow-up time of 10.6 months. The average size of the forearm defect was 22.6 × 9.3 cm (length × width; 210.2 cm^2) and the mean surgery time was 724 minutes (range: 603-808 minutes). In 6 out of 7 patients, additional FTSGs (average size: 9.2 × 4.1 cm; length × width; 37.7 cm^2) from the groin region was required for complete defect coverage of the forearm. One patient underwent pre-expansion of the groin flap with an inflatable tissue expander prior to penoid formation and therefore did not need any additional skin graft. One patient required a revision due to hematoma formation in the forearm region. The further postoperative healing was uneventful and showed an aesthetical pleasing result (Figs. 1,2). No patient developed major complications in the groin region. The mean patients' functional rating was 3.6 accompanied by the mean patients' aesthetical rating of 3.7. All patients stated that they would undergo the same procedure considering the postoperative result.

In group B, the mean age of the patients was 30.5 years (range: 18.2-54.9 years) with a mean BMI of 23.7 kg/m^2 and a mean surgery time of 563 minutes (range: 459-825 minutes). The mean follow-up time was 13.4 months and the mean size of the donor site at the forearm was 23.1 × 11 cm (length × width; 254.1 cm^2). No patient needed additional skin except from the groin region for defect coverage of the forearm. Two patients required revision at the forearm because of tendon adherence to the skin graft or wound dehiscence. One of these patients also showed wound dehiscence at the donor site at the groin region treated by secondary suture. The majority of patients showed only very minor delayed wound healing located at the edges of the FTSG, which was treated conservatively. The mean patients' functional rating was 3.1 and the mean patients' aesthetical rating was 2.9.

All patients were satisfied and stated that they would have undergone the same procedure considering the postoperative functional and aesthetical results.