Comparison between free posterior tibial flap and free radial forearm flap for head and neck reconstruction: an anatomical study and a retrospective comparative cohort study

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Background: Both free posterior tibial flap (FPTF) and free radial forearm flap (FRFF) are commonly used for head and neck defects. They have many similarities in embryology, histology, and anatomy, but their advantages and disadvantages in head and neck repair have not been fully recognized. This study aimed to compare the cadaveric anatomy and clinical application of FPTF and FRFF for the reconstruction of head and neck defects after tumor resection.

Methods: Anatomical dissection was performed on 10 fresh adult cadavers. The general characteristics of both flaps and the sites of recipients and donors were collected. A total of 31 and 25 patients underwent FPTF and FRFF construction, respectively. The patient medical records were assessed to obtain the clinical characteristics. Characteristics of the flap such as size, pedicle length, and clinical process data were collected and compared. The appearance, sensory disturbance, and effect on quality of life and daily activity were evaluated.

Results: The posterior tibial artery was present and observed in all patients. The posterior vascular pedicle was longer than the radial artery. There was no difference between the diameters of arteries of FPTF and FRFF; however, the diameters of their veins differed. In terms of flap characteristics, FPTF was significantly larger and had a longer vascular pedicle than FRFF (40.68±11.07 *vs.* 53.77±29.02 cm^2, P=0.03; 8.48±1.66 *vs.* 11.10±2.39 cm, P=0.00). Patients in the FPTF group had a significantly shorter total hospital stay (FRFF: 26.48±8.33 d; FPTF: 18.58±6.68 d), postoperative hospital stay (FRFF: 17.60±5.53 d; FPTF: 10.94±3.62 d), and flap harvest time (FRFF: 87.00±20.92 min; FPTF: 65.00±17.56 min) than FRFF group. There were far more complications of the donor site in the FRFF group than in the FPTF group. Also, according to the patients' subjective evaluations of the donor site, FPTF was superior to FRFF (P=0.00).

Conclusions: FPTF is a reliable alternative to FRFF for head and neck reconstruction. These techniques share similar certain embryogenesis and anatomical characteristics but FPTF possesses unique aesthetic and clinical application advantages.

Keywords: Head and neck; free radial forearm flap (FRFF); posterior tibial flap (FPTF); reconstruction

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Introduction

Reconstruction of the head and neck after tumor resection often requires delicate and ductile epithelial tissue flaps for covering or separation. Although various kinds of vascularized free flaps are available for reconstructing this region, the radial forearm flap has become the first choice of most surgeons for soft tissue reconstructions since 1981 (1), especially due to its pliability, thinness, ease of harvesting, and relatively large paddles of skin with a long vascular pedicle. Meanwhile, the immediate and long-term complications caused by the donor site of radial forearm flaps still present major challenges for both patients and surgeons. There have been speculations regarding the possibility of harvesting radial artery-based forearm flaps resulting in cosmetic and functional donor-site morbidity. These include conspicuous scarring, limitations in flap size and volume, the sacrifice of major vessels, and potential hand movement dysfunction, which is reportedly caused by tendon exposure (2,3). As a consequence, various attempts have been made by surgeons around the world to minimize donor site complications (4-7).

In addition to the size, tissue type, and volume of the defect, the vascularity of the donor site and functional impairment aesthetics of the donor site are important factors of flap choice. It is well known that the forearm and lower leg are highly similar in terms of embryology, histology, and anatomy. Also, the posterior tibial artery perforator flap is most similar to the radial forearm flap (8,9). At present, however, there is a lack of study that directly compare that characteristics of free posterior tibial flap (FPTF) and free radial forearm flap (FRFF) in anatomy and clinic. Comparative study such as safety and efficacy can provide a basis for doctor and patients in clinical decision-making. The present study aimed to anatomically and clinically compare the FPTF and FRFF. The possibility of the FPTF replacing the FRFF, as well as their respective advantages and disadvantages, will also be discussed. We present the following article in accordance with the STROBE reporting checklist (available at https://atm.amegroups.com/article/view/10.21037/atm-22-5426/rc).

Highlight box

Key findings

- FPTF is a reliable alternative to FRFF for head and neck reconstruction because FPTF possesses unique aesthetic and clinical application advantages.

What is known and what is new?

- Both FPTF and FRFF are commonly used for head and neck defects. They have many similarities in embryology, histology and anatomy, however, there is a lack of study that directly compare that characteristics of FPTF and FRFF in anatomy and clinic.
- This study compared the cadaveric anatomy and clinical application of FPTF and FRFF for the reconstruction of head and neck defects after tumor resection, including characteristics of the flap and quality of life and daily activity.

What is the implication, and what should change now?

- For patients who have been severely affected by head and neck tumors, the FPTF can substantially improve their quality of life. In future clinical practice, we should popularize the use of this flap, while constantly improving it.

Methods

Anatomical study

Anatomical dissection was performed on 10 fresh adult cadavers (including eight male and two female cadavers), with no gender preference. There was no evidence of major trauma, peripheral vascular disease, or previous surgery in the head, neck, arm, and leg sites. Cadaver preparation and skin vascular measurement were carried out according to the methodology reported by Chan *et al.* (10). The body length as well as the length and external diameter of the vascular pedicle were also measured.

To illustrate the vascular characteristics of the donor and recipient sites, a dye injection study was conducted. Incisions were made in the popliteal fossa, the cubital fossa, and the root of the neck. The vascular system was identified and cannulated using an angiocatheter (20-gauge, Shangdong Weigao Group Medical Polymer Co., Ltd., China). A warm 0.9% sodium chloride solution was injected into the vascular system to flush out all of the blood clots until the venous system effluent became clear. Latex was then injected into the vascular system. A surgical incision was made, and the skin flap was reflected to expose the cervical vascular system, the radial artery, and the posterior tibial artery as well as its accompanying venae comitantes. The characteristics of the vascular system on the donor and recipient sites were recorded (*Figure 1*).

Clinical study

All patients who underwent reconstruction after head and neck tumor resection by radial forearm fasciocutaneous free flap and posterior tibial artery perforator flap between January 2015 and December 2020 from the Department of

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Figure 1 The characteristics of the vascular system on the donor sites of FPTF and FRFF. (A) Two cutaneous perforators from the posterior tibial vessels can be seen in the lower leg. The perforating vessels consist of two veins and one artery; (B) the perforators of the radial artery were too numerous and thin to be counted; (C) the external diameters of the posterior tibial artery and veins were measured at the beginning of the vascular pedicle. FPTF, free posterior tibial flap; FRFF, free radial forearm flap.

Otolaryngology Head and Neck Surgery, Beijing Tongren Hospital, Capital Medical University, were reviewed. The patient medical records from the ward medical system were assessed to obtain the following characteristics: age, gender, histopathologic diagnosis, tumor classification (TNM stage, according to the 2018 American Joint Committee on Cancer), surgical procedure (11), and area of reconstruction. The size of the flap harvested, length of vascular pedicle, recipient-site vascular system, elevation time, total operation time, intensive care unit (ICU) stay time, recipient-site complications (such as vascular crisis, flap loss, undesirable healing and hematoma, etc.), donor-site morbidity (such as donor site complications, wound dehiscence, infection and subcutaneous effusion), and hospital stay were also included in the analysis.

The patients were followed up 3, 6, 9, and 12 months after the operation. At 2–3 months postoperatively, the patients exhibited the most prominent symptoms due to surgical defects and post-repair edema, and reach a steady state at 12 months postoperatively. The outpatient evaluation consisted of both objective and subjective analyses, and all evaluations were performed by the same surgical team. To assess function and satisfaction, we referred to the evaluative methods reported in previous studies (2,12,13). All patients were asked to evaluate the donor-site appearance, sensory disturbance, psychometric property and effect on quality of life and daily activity using an integral four-point scale: "poor", "acceptable", "good", and "excellent". These included the collection of the University of Washington's quality of life questionnaire (University of Washington head and neck Quality-of-life, UW-QOL), overall quality of life assessment, as well as eye, ear, nasal cavity, oral cavity, pronunciation, and swallowing function evaluations (*Figure 2*).

Statistical analysis

Statistical analysis was conducted using SPSS for Windows, version 22.00 (SPSS Inc., Chicago, IL, USA) with a two-sided significance level of $P<0.05$. The measurements were repeated 3 times in both anatomical and clinical study for ANOVA. Counting variables were compared using the chi-squared test. Measurement variables were compared using independent and paired-sample *t*-tests or Wilcoxon's rank sum test according to the variable's distribution.

Ethical statement

The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the ethics committee of Beijing Tongren Hospital, Capital Medical University (No. TREC2022-KY017) and informed consent was taken from all the patients.

Results

Posterior tibial flap

The posterior tibial artery is a branch of the popliteal artery. In this study, it was present and observed in all of the cadavers, whose mean body length was 1.59±0.11 m (1.40–1.75). The posterior tibial arteries of all cadavers were accompanied by two venae comitantes. The mean external diameters of the posterior tibial artery and veins were 3.99±0.63, 4.45±0.71, and 4.05±0.89 mm, respectively (the measuring point was at the beginning of the vascular pedicle). The length of the posterior tibial vascular pedicle was 22.28±2.50 cm (from the malleolus medialis to the bifurcation of the posterior tibial and peroneal arteries). The number of perforators in the lower third of the lower leg ranged from 1

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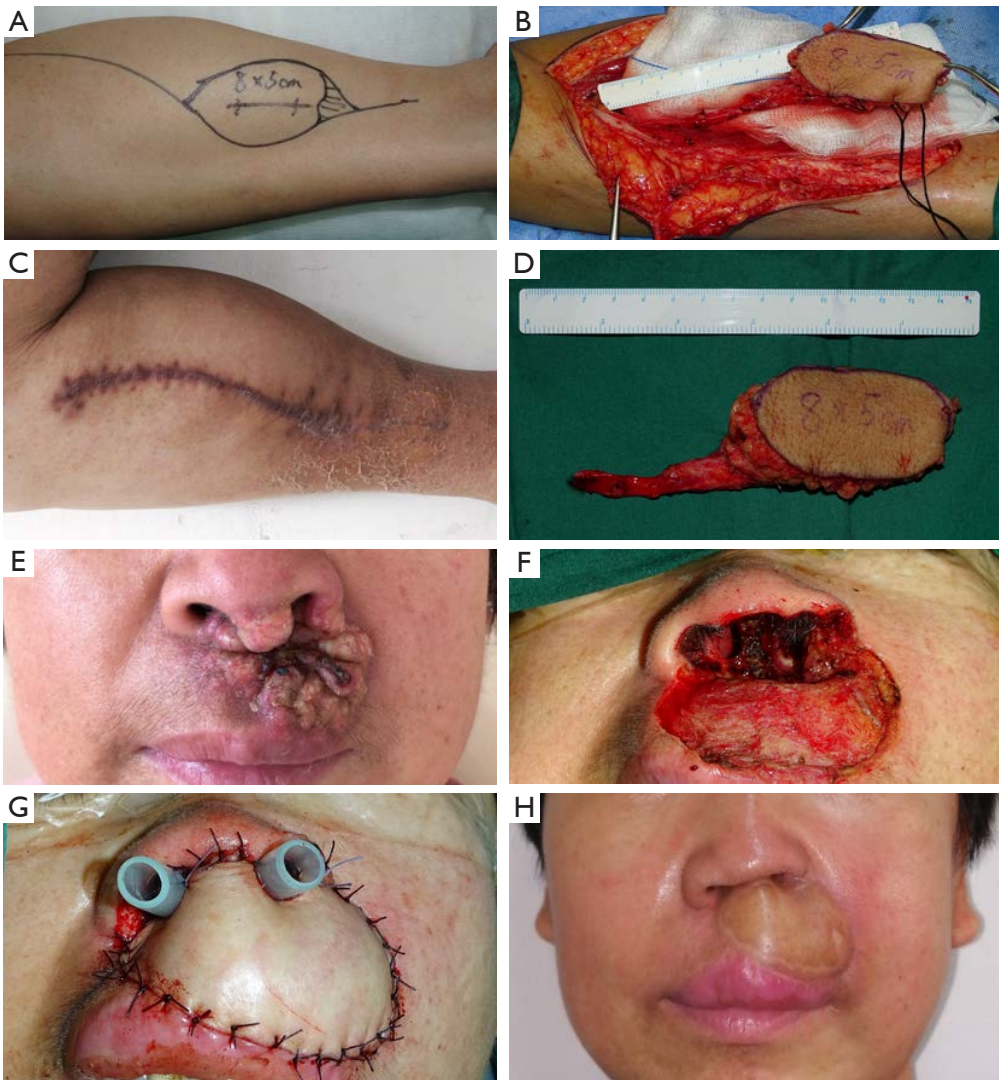

Figure 2 One case was diagnosed as squamous cell carcinoma in the left anterior naris and underwent tumor resection (nasal vestibule and upper lip). An 8.0 cm ×5.0 cm ipsilateral tibial flap was prepared. The wound healed well. (A) The design of the free posterior tibial flap according to the size of the defect; (B) harvesting of the free posterior tibial flap; (C) healing of the lower leg on the 90th day postoperatively. Favorable growth of the skin graft could be observed; (D) harvested posterior tibial flap; (E) squamous cell carcinoma in the left anterior naris; (F) postoperative defect; (G) reconstruction of defects in the nasal vestibule and upper lip region with posterior tibial flaps during the operation; (H) healing of the nasal vestibule and upper lip on the 90th day postoperatively.

to 4, with a mean of 2.5±1 (*Figure 1*). The mean thickness of the posterior tibial flap was 6.04±2.31 mm.

Free radial forearm flap

Abnormalities were not found in either the radial arteries or the cephalic veins of the 10 cadavers. The mean external diameters of the radial artery and cephalic vein were 4.04±0.90 and 5.66±1.73 mm, respectively (the measuring point was at the beginning of the vascular pedicle). The length of the radial forearm flap pedicle was 17.20±2.83 cm (from the navicular fossa to the bifurcation of the radial artery and the ulnar artery). The mean thickness of the radial forearm flap was 5.06±2.18 mm. Data were not collected because the perforators of the radial artery were too numerous and thin to be counted (*Figure 1*).

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Table 1 Variables of the FRFF and FPTF

Variables	Type of flap		P value
	FRFF	FPTF	
Diameter of artery (mm)	4.036±0.90	3.99±0.63	0.41
Diameter of vein (mm)	5.66±1.73	4.45±0.71	0.00
		4.05±0.89	0.00
Thickness (mm)	5.06±2.18	6.04±2.31	0.00
Pedicle length (cm)	17.20±2.83	22.28±2.50	0.00
Number of perforators	–	2.5±1	

Data are presented in the form of median ± standard deviation. FRFF, free radial forearm flap; FPTF, free posterior tibial flap.

Table 2 Variables of the FRFF and recipient site

Variables	FRFF	Recipient site	P value
Artery diameter (mm)	4.04±0.90	3.77±0.61	0.12
Vein artery (mm)	5.66±1.73	4.25±0.70	0.00
		5.97±1.11	0.26

Data are presented in the form of median ± standard deviation. FRFF, free radial forearm flap.

Table 3 Variables of the FPTF and recipient site

Variables	FPTF	Recipient site	P value	
Artery diameter (mm)	3.99±0.63	3.77±0.61	0.07	
Vein diameter (mm)	4.45±0.71	4.25±0.70	0.05*	0.00**
	4.05±0.89	5.97±1.11	0.00***	0.15****

Data are presented in the form of median ± standard deviation. *, thicker branch of the posterior tibial vein-posterior facial vein; **, thicker branch of the posterior tibial vein-external jugular vein; ***, finer branch of the posterior tibial vein-external jugular vein; ****, finer branch of the posterior tibial vein-posterior facial vein. FPTF, free posterior tibial flap.

Recipient site

The most commonly used vessels in the neck were measured as the recipient region, including the facial artery, the posterior facial vein, and the external jugular vein. Their external diameters were as follows: facial artery, 3.77±0.61 mm; posterior facial vein, 4.25±0.70 mm; and external jugular vein, 5.97±1.11 mm. The measuring point was within 1 cm below the mandibular margin. A paired-sample *t*-test was performed on the diameters of the recipient and donor vessels. The facial artery-radial artery, facial artery-posterior tibial artery, external jugular vein-cephalic vein, posterior facial vein-thicker branch of the posterior tibial vein, and posterior facial vein-finer branch of the posterior tibial vein exhibited no statistical differences. On the other hand, the external jugular vein-thicker branch of posterior tibial vein, external jugular vein-finer branch of the posterior tibial vein, and posterior facial vein-cephalic vein were statistically different. We also compared the pedicle length and flap thickness of the two free flaps, and a statistically significant difference was identified (*Tables 1-3*).

Clinical study

Among the 56 patients, 31 (22 males and 9 females) underwent reconstruction using the FPTF, while 25 patients (12 males and 13 females) used the FRFF. The mean age of patients was 44.97±13.56 years (range, 14–69 years) in the FPTF group and 44.76±12.21 years

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Table 4 Demographics, diagnosis, and clinical course of FRFF and FPTF

Variables	Type of flap		P value
	FRFF	FPTF	
Gender			0.09
Male	12	22	
Female	13	9	
Age (years)	44.76±12.21	44.97±13.56	0.95
Pathological diagnosis			0.11
Squamous cell carcinoma	9	23	
Adenoid cystic carcinoma	7	5	
Mucoepidermoid carcinoma	2	0	
Sarcoma	3	3	
Melanoma	1	0	
Other*	3	0	
T stage			0.35
T1	1	0	
T2	3	11	
T3	5	7	
T4	15	13	
Other*	1	0	
Site			0.05
Tongue	0	2	
Mouth floor	0	3	
Palate	4	5	
Maxilla	17	9	
Jaw	0	1	
Tonsil	4	11	
Clinical course			
Total hospital stay (d)	26.48±8.33	18.58±6.68	0.00
ICU stay (d)	2.84±1.49	2.19±1.51	0.12
Post-operative hospital stay (d)	17.60±5.54	10.94±3.62	0.00
Total operation time (h)	7.16±2.17	8.97±2.69	0.01
Harvest time (min)	87.00±20.92	65.00±17.56	0.00

Data are presented in the form of median ± standard deviation. *, one patient had a blast injury. FRFF, free radial forearm flap; FPTF, free posterior tibial flap.

(range, 22–68 years) in the FRFF group. The types of pathological diagnoses included squamous cell carcinoma, adenoid cystic carcinoma, mucoepidermoid carcinoma, sarcoma, and melanoma. No statistical difference was observed in the general characteristics, type of pathological diagnoses, T-stage and primary tumor site,

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Figure 3 Subjective and objective evaluations of functional status before and after flap harvesting. (A) Hyperplastic scar on the forearm of a female patient 3 years after harvesting of the free radial flap; (B) design of the free posterior tibial flap for a female patient before surgery; (C) the recovery of a female patient 6 months after the operation who was sutured directly without skin grafting; (D) design of the free posterior tibial flap for a male patient before operation; (E) harvesting the free posterior tibial flap of a male patient; (F,G) the motor function of a male patient 3 months postoperatively who was also sutured directly without skin grafting.

and ICU stay between the two groups. However, the total hospital stay (FRFF: 26.48±8.33 d; FPTF: 18.58±6.68 d), postoperative hospital stay (FRFF: 17.60±5.54 d; FPTF: 10.94±3.62 d), flap harvest time (FRFF: 87.00±20.92 min; FPTF: 65.00±17.56 min), and total operation time (FRFF: 7.16±2.17 h; FPTF: 8.97±2.69 h) differed markedly between the groups (*Table 4*).

Compared to the flap size and vascular pedicle of FRFF, those of FPTF were significantly larger (FRFF *vs.* FPTF: 40.68±11.07 *vs.* 53.77±29.03 cm^2, P=0.04) in size and longer (FRFF *vs.* FPTF: 8.48±1.66 *vs.* 11.10±2.39 cm, P=0.00) in vascular pedicle. All 25 patients in the FRFF group underwent donor site skin grafting, which was not performed in 6 of the 31 patients in the FPTF group, though with more conspicuous scarring (P=0.04) (*Figure 3*). There was no difference in the recipient arteries between the two groups, which were more inclined to the facial artery (P=0.06). Regarding the choice of recipient vein, the FRFF group was more inclined to the external jugular vein, while the FPTF group was more inclined to the posterior

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Table 5 Characteristics, complications, and subjective assessment of FRFF and FPTF

Variables	Type of flap		P value
	FRFF	FPTF	
Characteristic of flap			
Flap size (cm^2)	40.68±11.07	53.77±29.03	0.04
Skin grafting in donor site	25	25	0.04
Length pedicle (cm)	8.48±1.66	11.10±2.39	0.00
Number of perforators	–	2.13±0.72	
Vascular in recipient site			0.00
Artery			0.06
Facial artery	21	31	
Superior thyroid artery	4	0	
Vein*			0.00
Posterior facial vein	9	30	
External jugular vein	18	8	
Internal jugular vein	2	0	
Superficial temporal vein	0	1	
Recipient site complications			0.58
Vascular crisis	3	2	
Flap loss	0	0	
Undesirable healing	5	2	
Hematoma	1	2	
Other**	1	0	
Donor site complications			0.01
Wound dehiscence	1	0	
Infection	1	0	
Subcutaneous effusion	1	0	
Subjective assessments			0.00
Excellent	1	17	
Good	8	12	
Acceptable	9	2	
Poor	7	0	

Data are presented in the form of median ± standard deviation. *, two veins were sometimes anastomosed; **, one patient developed cervical lymph node metastases (level III) 1 year after surgery. FRFF, free radial forearm flap; FPTF, free posterior tibial flap.

facial vein (P=0.00) (*Table 5*).

Although vascular crisis, undesirable healing, and hematoma in the recipient site were more frequently observed in the FRFF group [n=9; compared with the FPTF group (n=6)], no statistical difference was observed between the two groups in terms of the type and quantity of complications (P=0.58). Yet, in terms of the donor site, there were far more complications in the FRFF group than

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in the FPTF group, including dehiscence, infection, and subcutaneous effusion (*Table 5*). There was no case lost to follow-up. A statistically significant difference was also observed in the patients' subjective evaluation of the donor site (P=0.00). In the FRFF group, the number of cases of "excellent", "good", "acceptable", and "poor" were 1, 8, 9, and 7, respectively, while the corresponding numbers in the FPTF group were 17, 12, 2, and 0 (*Figure 3*).

Discussion

The FRFF has long been the most popular fasciocutaneous flap for head and neck reconstruction due to its thinness, hairlessness, sufficient pedicle length, and ease of harvesting. However, since surgeons first acknowledged the benefits of the radial forearm flap (1), donor site complications involving sacrificing the major blood supply of the hand have become an enormous challenge (14,15). The posterior tibial artery flap, as a pedicled flap, was mainly utilized for the reconstruction of leg and ankle defects in the past (16-18). Ng *et al.*'s (19) 2008 study used the posterior tibial artery flap for the reconstruction of defects in 11 oral cancer patients. In their study, the flap survival rate reached 100%, which confirmed the safety and reliability of the FPTF for repairing defects following head and neck tumor surgery. Since then, the number of anatomical and clinical application investigations of the free posterior tibial artery flap has been steadily increasing (10,20,21).

The present study focused on the anatomy and clinical applications of the FPTF and the FRFF. In our anatomic investigation, statistically significant differences were found in both thickness (1 mm) and pedicle length (5 cm) between the FPRF and FRFF. However, no practical significance could be made of the 1 mm difference in thickness, while a 5 cm longer pedicle length could lead to a practical change in application. The number of perforators in the FPRF group was 2.5±1, which is consistent with other reports (10,22,23). The perforators of the radial artery were both numerous and thin, as shown in *Figure 1*, and thus, were neither counted nor measured. Compared to the clinical harvesting of the posterior tibial artery, perforator searching was not needed in the radial artery harvesting. A comparison of the vessel diameters showed that the radial and posterior tibial arteries were well-matched with the facial artery. However, a statistically significant difference was found between the cephalic and posterior tibial veins. A comparison of the recipient veins determined that the cephalic vein matched the external jugular vein better, while the posterior tibial vein was closely anastomosed with the posterior facial vein, regardless of thickness. According to the literature (8,9,24-26), the incidence of posterior tibial artery absence or deformity is 0.0–5%, but we did not observe anatomical deformities in our anatomical and clinical applications study. To prevent this deformation from affecting clinical applications, routine examinations of the limb blood vessels with CTA or Doppler ultrasound should be performed before surgery.

There is always a worry that sacrificing the main vascular system of a lower limb may lead to potential ischemia. The calf, foot, and ankle are supplied by the three major arteries, including the fibular, anterior, and posterior tibial arteries, in addition to the deep and superficial venous systems. In the FPTF group, we sacrificed only one major artery (posterior tibial artery) and deep vein (posterior tibial vein). In contrast, in the FRFF group, a major artery and two deep and superficial veins (radial artery, radial vein, and cephalic vein) were sacrificed. Therefore, theoretically, the blood supply risks of FPTF were lower than those of FRFF. Furthermore, no ischemic necrosis of the foot caused by flap harvesting was observed in this study and previous reports (10,11,22,27).

Theoretically, the size of the flap should depend on the size of the defect, and the sizes of two groups with the same T stage should also be equal. However, in our study, the flap size of the FPTF group was slightly larger than that of the FRFF group, which may be related to the tissue capacity of the donor site. For sites with sufficient tissue volume, surgeons may tend to harvest larger flaps to prevent local tension during the suturing process at the recipient site. Interestingly, in the FPTF group, despite the larger size of the flap area, the wounds of six patients were closed directly (*Figure 3*). According to our clinical experience, for wounds with flaps less than 5 cm in width, direct suturing could be attempted. However, close attention must be paid to the local tension during postoperative care, since this would not only affect local healing but also the foot blood reflux.

No difference was identified in the recipient site complications between the two groups, which included vascular crisis, flap loss, undesirable healing, and hematoma. One patient in the FRFF group developed cervical lymph node metastases 1 year after surgery. It is also worth noting that the donor site of the FRFF group may have exhibited higher wound dehiscence, infection, and subcutaneous effusion morbidities, none of which was observed in the FPTF group. Meanwhile, most patients in the FPTF group had better wound healing. A similar trend was also

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demonstrated by Chan *et al.* (10), who attributed it to the entirely muscular composition of the posterior tibial flap. Also, it is believed that compared to tendons, muscle makes a far superior vascularized bed for skin grafts. In general, patients are primarily concerned about defects related to the donor site healing and moving in the early postoperative period. However, over time, their concerns shift to numbness, paresthesia, itching, joint dysfunction, and certain aesthetic problems, such as hypertrophic scarring, pigmentation, and limb deformity (2,6,28,29).

In the clinical course, no statistically significant difference in ICU stay time was observed between the two groups, which revealed that there was no significant difference between FRFF and FPTF in terms of surgical difficulty, complexity, and trauma. The total and postoperative hospital stay in the FPTF group were significantly shorter than those in the FRFF group, which could be attributed to the fewer postoperative complications in the FPTF group, especially donor site complications. The average hospital stay of the FRFF group was 26 days, which is because the radial artery is the main blood supply vessel of the forearm and seriously affects the function, and thus, the preoperative ultrasound localization and vascular function assessment should be more detailed. Moreover, more complications occurred in the donor site after FRFF, including wound dehiscence, infection, subcutaneous effusion, etc., which prolonged the postoperative dressing change time and the total hospital stay. Although there was no difference in the primary lesion site or T stage between the two groups, the total operation time of the FPTF group was longer than that of the FRFF group, which might have been caused by the differences between the two groups in cervical lymph node dissection and N stage. However, the harvest time of FRFF is longer than that of FPTF, as there are two groups of surgeons during the operation to remove the tumor in the recipient area and harvest the flap in the donor area. The distance between FRFF and the head and neck is closer, which may affect each of these operations.

Objective evaluations of functional status before and after flap harvesting have been thoroughly discussed in the literature (10,30). Also, the main evaluation points of ankle joint function were stability and endurance, while the wrist function was assessed by the range of motion and accuracy (2). Only subjective evaluations between the two groups were assessed. In our study, we found that the FPTF group was significantly superior to the FRFF group in terms of the donor site, which may be related to the concealed position of the lower leg, the low requirement for tactile sense, and the relatively small displacement of muscles and tendons.

Conclusions

The FPTF is a reliable alternative to the FRFF in head and neck reconstruction. They are similar in anatomy, and FPTF is superior in terms of the length of the vascular pedicle and the flap size. Clinically, FPTF is also superior to FRFF in certain aspects, such as postoperative donor site complications, patients' subjective feelings, etc. For patients who have been severely affected by head and neck tumors, the FPTF can also substantially improve their quality of life.

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Footnote

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Data Sharing Statement: Available at https://atm.amegroups.com/article/view/10.21037/atm-22-5426/dss

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://atm.amegroups.com/article/view/10.21037/atm-22-5426/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the ethics committee of Beijing Tongren Hospital, Capital Medical University (No. TREC2022-KY017) and informed consent was taken from all the patients.

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