ORIGINAL ARTICLE

Early Experiences with Microvascular Free Tissue Transfer in Lagos, Nigeria

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ABSTRACT

Objectives: Microvascular free tissue transfer within our subregion is fraught with considerable challenges. We aim to highlight our experiences gained with our first fifteen cases of microvascular free tissue transfer at the Lagos University Teaching Hospital. We believe our report will be useful to colleagues embarking on such reconstructions in similar settings. **Materials and Methods:** The clinical records of the first 15 cases of free flaps done at our center were reviewed. The indications for surgery, choice of flap, recipient vessels, duration of surgery and complications were noted. **Results:** Fifteen cases were done, 10 flaps survived, ten defects occurred following trauma while remaining five followed cancer resections. Anterolateral thigh and radial forearm flaps were the most common flap used. The mean duration of surgeries was 7.1 hours SD ± 1.10 hours. Our take back rate was 13.3%, with a salvage rate of 50%. Three flaps failed on account venous congestion while remaining two failed due to arterial occlusion. **Conclusion:** 66.67% free flap success rate recorded reflect our early experiences in our institution. We believe meticulous planning, careful vessel selection, close flap monitoring as well as improved infrastructural support can lead to much better success rates in microvascular reconstruction in our country.

KEYWORDS: Experiences, free, tissue, transfer

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Access this article online	
Quick Response Code:	Website: www.nigerianjsurg.com
	DOI: 10.4103/1117-6806.127108

INTRODUCTION

Microsurgical reconstruction with free tissue transfer has become an established method of reconstruction for the contemporary plastic surgeon. Virtually every specialty has benefited from this technique.[1] It circumvents the limitations of pedicle flaps where the arc of rotation may be restrained, as well as local flaps where local tissues may be have been compromised by previous surgery or irradiation. Free tissue transfer allows the provision of customized, well-vascularized, healthy tissues from distant sites.

The traditional concept of using the reconstructive ladder to repair defects has been challenged and microsurgical reconstruction has been proposed has the method of choice in the cover of complex defects in various parts of the body.[2] Reconstructive microsurgery is however a rather demanding procedure requiring a high level of technical competence. It requires specialized equipments, entails long operating hours, and significant commitment on the part of the surgeon. Free flap failure can be costly to the institution and the patient. This method of reconstruction also requires significant institutional support in terms of resources, time, as well as personnel costs.

While the technique is well established in virtually all developed countries, it is still in the early stages in many developing countries. In this report we highlight our early experiences with this technique at the Lagos University Teaching Hospital.

MATERIALS AND METHODS

The clinical records of all patients who had microvascular reconstruction done between January 2008 and December 2012 were reviewed. All patients seen had detailed clinical evaluation carried out. The option of free tissue transfer was discussed with the patients and consent was taken. Detailed clinical evaluation was carried out to ensure adequacy of the recipient vessels with the aid of a pencil Doppler when appropriate. Angiogram was not used for vessel identification in any of the patients. The selected flaps were based on the nature of the defects and surgeon's expertise.

All procedures were carried out under general anesthesia and followed the standard steps of tumor resection/recipient vessel preparation, flap dissection, and microvascular anastomosis. During the early stages of our series all procedures by same surgeon. However, the later cases were done by two teams.

All microvacsular work was done with Carl Zeiss binocular operating microscope (OPMI) 1. All patients were nursed in a high dependency unit within the theater complex for the first 48 h after surgery to facilitate easy transfer to theater in case of flap compromise. Here, flap was monitored hourly with an infrared thermometer, clinical appearance, tugor, and occasionally pinprick. No other special monitoring device was used. All patients had continuous Dextran 40 500 ml per day for 48 h after surgery. The operating surgeon reviewed the flaps 4 hourly for the first 48 h.

Following discharge from hospital all the patients were reviewed and followed-up over a 12 month period.

Results

Fifteen free tissue transfers were done over a 5 year period. There were seven males and eight females. The youngest patient was 7-year-old, while the oldest was 72 years. The mean age was 35.5 years standard deviation (SD) ± 15.5. The sites involved mainly in the extremities, the leg and foot in five patients, the hand in four, while the rest were in the head and neck region. Two-thirds of the defects reconstructed followed trauma, while the remaining followed oncologic resections [Table 1].

The anterolateral thigh flap was used in seven patients see [Figure 1], the radial forearm flap in six, while a single free groin flap and latissimus dorsi muscle flaps were transferred in one patient each.

All anastomoses were carried out in an end-to-end fashion except in two patients with single vessel limbs which necessitated end to side anastomosis. The 'single vessel limbs' were those in which one of the major arterial supply to the limb (radial or ulnar arteries in hand, the anterior or posterior tibial arteries in the lower leg and foot) was visibly completely disrupted.

Two flaps were reexplored on account of flap compromise. In one patient tight skin closure was found to be the cause of compromise and was salvaged following pedicle irrigation with 2% xylocaine. In the other patient, venous thrombosis was found; however, salvage was not successful in spite of thrombectomy and anastomotic revision.

Ten flaps survived of which two suffered partial necrosis that necessitated skin grafting of about quarter of the flap surface area. Five flaps failed and the defects needed to be reconstructed by other methods. Three flaps failed on account of venous thrombosis, while two late arterial failures occurred.

Only four of the donor sites were amenable to primary closure. The remaining required skin grafts. One patient who had a free groin flap developed a donor site dehiscence two had delayed donor site healing. One patient complained of excessive flap bulk over the scalp. There was one mortality in the series, a 72-year-old

Figure 1: (a) A 17-year-old with sarcoma eroding the cranial vault. (b) Following initial excision and local flap cover. (c) Intraoperative appearance of tumor recurrence. (d) Three months following re-excision and anterolateral flap cover

Table 1: Free tissue transfers 2008-2012

Year	Indication	Age	Sex	Type of flap	Outcome	Complications
2008	Right hand avulsion injury	27	M	ALT	Failed	Venous thrombosis
2008	Right hand avulsion injury	41	M	RFF	Failed	Venous thrombosis
2008	Right hand crush injury	22	F	Free groin flap	< 25% flap loss (SSG needed)	Donor site dehiscence, partial flap loss
2009	Post excision of sarcoma of foot	25	F	RFF	Successful	Nil
2009	Squamous cell ca supraorbital region	30	M	RFF	25% flap loss (SSG needed)	Partial flap loss
2009	Gunshot injury to the heel	57	M	LD	Successful	Nil
2010	Open tibial fracture	45	F	RFF	Failed	Arterial occlusion
2010	Gunshot injury to left wrist	30	F	RFF	Successful	Nil
2011	Gunshot injury to the hand	43	M	ALT	Failed	Persistent venous thrombosis
2011	Open tibial fracture	7	M	ALT	Successful	Nil
2011	Open tibial fracture	41	F	ALT	Failed	Arterial occlusion
2012	RTA with scalp avulsion	33	F	ALT	Successful	Nil
2012	Excision of recurrent sarcoma	22	F	ALT	Successful	Nil
2012	Extended maxillectomy defect for ca	71	M	ALT	Successful	Died of heart failure after 10 days
2012	Squamous cell ca temporal region	39	F	RFF	Successful	Nil

RFF: Radial forearm flap, LD: Latissimus dorsi flap, ALT: Anterolateral thigh flap, RTA: Road traffic accident, ca: Carcinoma, SSG: Split skin grafting

man who had free anterolateral thigh flap with vastus lateralis flap for reconstruction of an extended maxillectomy defect who died of heart failure 10 days post-surgery.

Discussion

Microvascular reconstruction was developed as an application of the successful ability to repair vessels in the range of a millimeter achieved in the laboratories. The first clinical application was thumb replantation reported in 1968 by Komatsu and Tamai.[3] Subsequently, this ushered in an era of microsurgical reconstruction of soft tissue defects.[4,5] The first free flap was reported in 1972[5] and virtually all vascularized tissue have been transferred or replanted since then. The first documented free flap in Africa was done in Capetown, South Africa.[6]

While it has become well-established in developed and many western nations, it is still infrequent in many developing nations as reflected in our 15 cases seen over a 5 year period. This may probably be due the fact that this technique is a demanding procedure requiring significant surgeon commitment as well as extensive infrastructural support which is lacking in the healthcare facilities of many developing countries.

Our case mix is also similar to some developing countries with similar experiences, where trauma related defects constituted the majority.[7] However, this is in contrast to other centers who report microreconstruction for predominantly post-oncologic resections in their series.[8] Usually the type of defect and surgeon's experience determine the choice of flaps, we favored the use of anterolateral thigh flap for large defects and the radial forearm flap for smaller ones. Other workers have traditionally used latissimus dorsi and radial forearm, respectively.[8] We observed like other workers[9,10] that our operating times reduced with increasing experience (mean 7.10 h, SD ± 3.81 hrs). Expectedly we noticed the success rate was better for post-oncologic resection defects and lower for trauma related defects on account of narrower zones of injury for post-oncologic resections.

Our overall success rate of 66.7% appears low and represents our early experiences. Eighty percent of our failures occurred within the first 2 years of introducing this technique where it was particularly challenging to convince operating team staff to commit so much resources and operating time to these cases. Our success rate for the last seven cases was 75% as the team and operating room personnel had overcome the initial learning curve.

In the context of our environment, there is still the challenge of procuring and maintaining microsurgical consumables, allocation of adequate operating times, need for close monitoring of flaps within first few days, operating space, and resources to reexplore a failing flap. Our experiences seem in line with various other workers in settings similar to ours.[7,8,11]

In spite of all these challenges we are of the opinion that microvascular free tissue transfer can become established in our environment. With strong commitment and better institutional support, success rates can be better.

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How to cite this article: Mofikoya BO, Ugburo AO. Early experiences with microvascular free tissue transfer in Lagos, Nigeria. Niger J Surg 2014;20:35-7.

Source of Support: Nil. **Conflict of Interest:** None declared.