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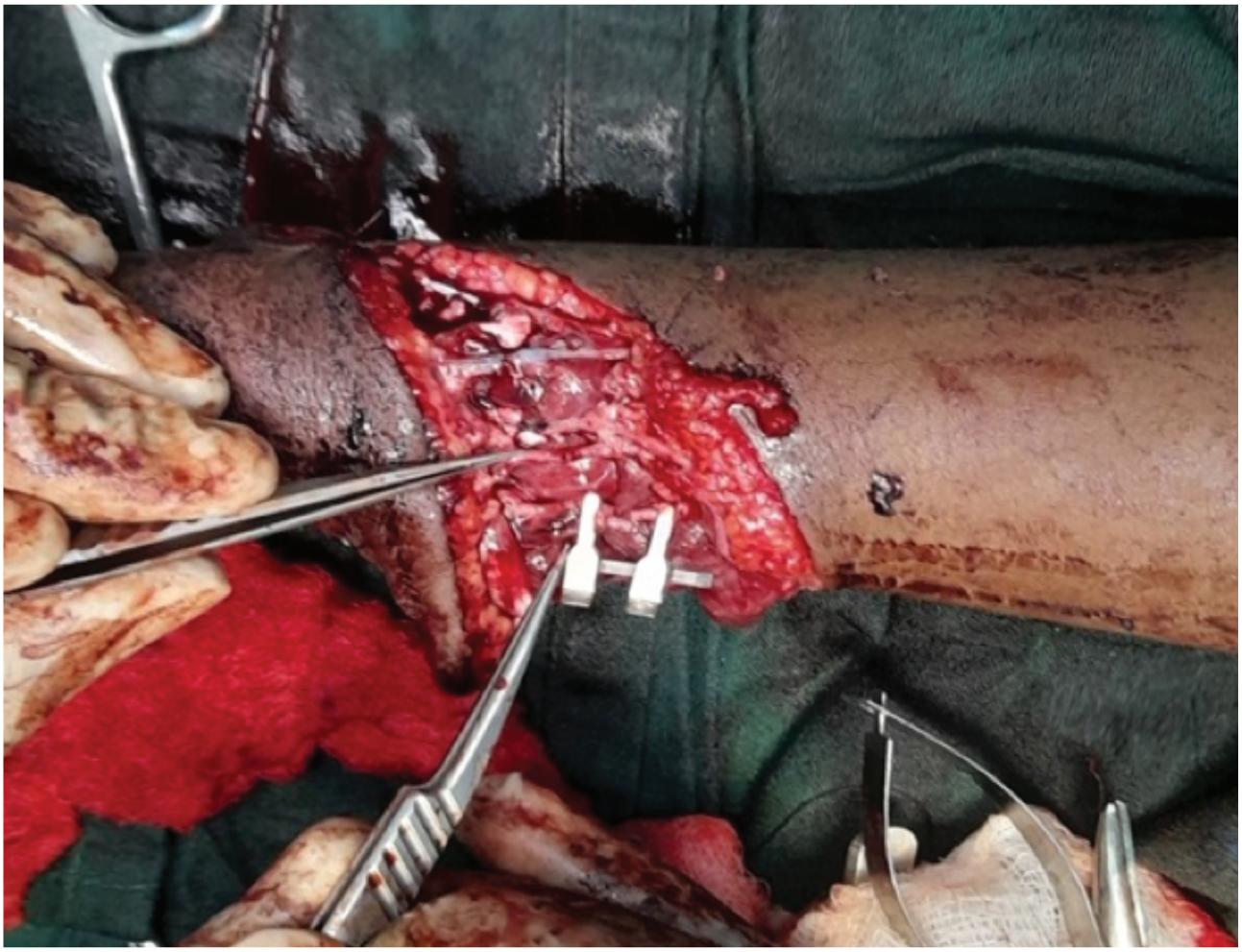

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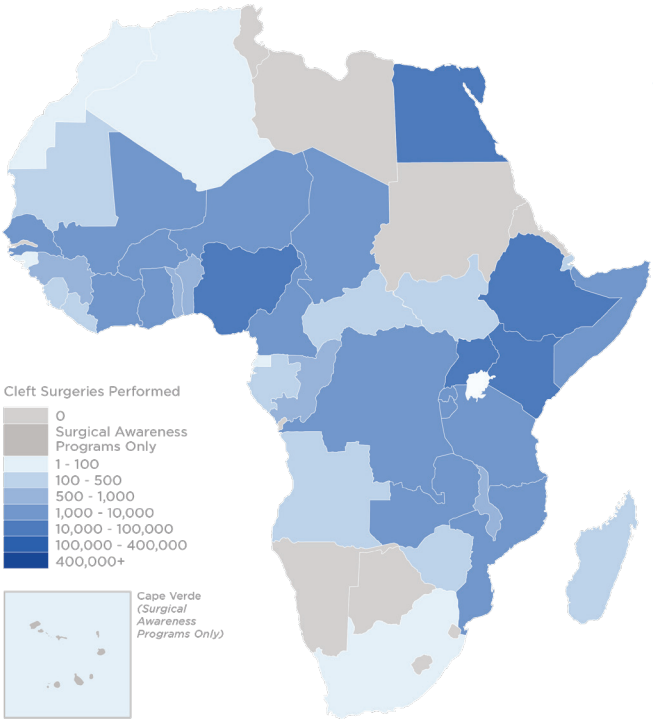

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Pan-African Journal of Plastic Reconstructive and Aesthetic Surgery Vol. 2 No. 1 March 2025
FLOW THROUGH FLAPS: A FIVE YEAR EXPERIENCE IN A LIMITED RESOURCE CENTER
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FLOW THROUGH FLAPS: A FIVE YEAR EXPERIENCE IN A LIMITED RESOURCE CENTER

F.W. NANG;OLE, V. MUTISO, J. ADEGU AND S. NYAKIOGORA,

ABSTRACT

Background: **Preservation of well vascularized extremity is one of the ultimate goals in limb reconstructions. With a paradigm shift towards limb salvage there is need to revisit flaps that could be used to ensure adequate blood flow as well reconstruction of the defects. In this series we share our experiences and outcomes of flow through flaps done in the background of limited resources.**

Objective: **To audit patients managed by flow through flaps between January 2019 and December 2024 in Nairobi, Kenya.**

Design: **A prospective study**

Study Setting: **Kenyatta N Hospital and other private institutions in Nairobi**

Study Subjects/Participants: Sixteen patients with both upper and lower limb requiring reconstruction.

Results: **A total of 16 patients with both upper and lower limb conditions were reconstructed with flow through flaps. The mean age for the patients was 38.5 years with an age range of 24 to 64 years. Twelve patients had post traumatic defects while two patients had defects secondary to skin malignancy extirpation and the rest lymph-edema. Most commonly used flap was anterior lateral thigh flap (10 patients). All defects were successfully reconstructed with flow through flaps and no case of flap or extremity loss was encountered.**

Conclusion: **Flow through flaps are reliable flaps in the reconstruction of extremities ensuring adequate blood flow as well as soft tissue coverage. The choice of the flap should be influenced by the extent of the defect as well as the anticipated length of the vascular defect.**

INTRODUCTION

Limb salvage procedures have in the recent past become the corner stone in the management of extremities allowing for good functional outcome and eventual return of patients to a productive lifestyle. Most of these procedures require reconstruction of the vasculature with the gold standard being use of vein grafts to establish vascular flow (1). Vein grafts could however, lead to more anastomosis and an increased incidence of thrombus formation (1). They could also require alternative procedures for soft tissue or bony reconstructive leading to overall increase in the operating time that could be counterproductive. Flow through flaps on the other hand could allow for one stage reconstruction with the flap being used for soft tissue or bony reconstruction as well as ensuring continuity of the blood vessels (2-4). Though these flaps have been described over the last 20 years there use has been limited to well establish microsurgical centers (3,4). We audit patients managed with flow through flaps in our unit for the last five years and share our experiences, outcomes and lessons learned in a resource constrained setting.

MATERIALS AND METHODS

Study Design: This was a prospective audit of patients treated with flow through flaps between January 2019 and December 2024. For all patients the primary etiology was noted. A thorough history and physical examination were taken to determine the vascular status of the extremity. CT angiography was done in cases where the vascularity was not clear. An appropriate flap was then chosen based on the extent and tissue deficiency to be reconstructed. During surgery both proximal and distal anastomosis of the arteries were done by end to end anastomosis while for the veins the anastomosis was only done proximally (Figure 1A-C).

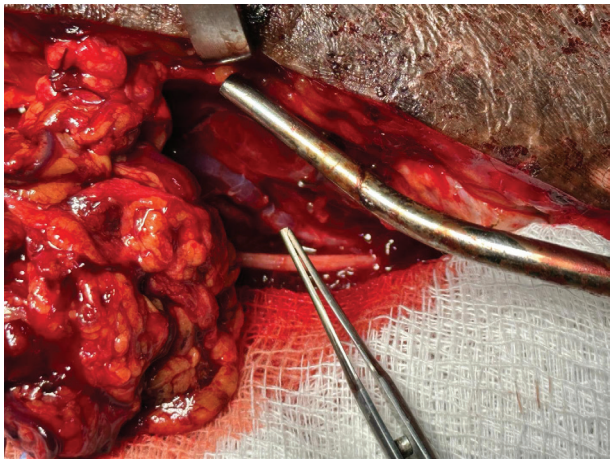

Figure 1A: Flow through omental flap with forceps showing the proximal anastomosis

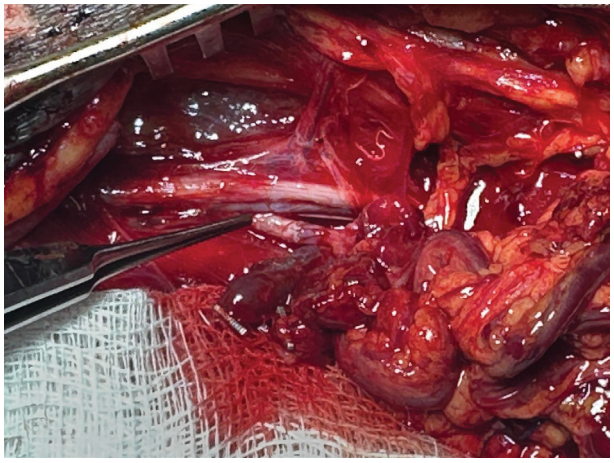

Figure 1 B: Flow through omental flap in1A above with forceps showing the distal anastomosis

Peri-operatively patients were monitored closely with four hourly monitoring of the flap for the first two days followed by once daily for the next five days. Patency of the flow through was determined by clinical examination and Doppler after the first week of surgery. Further clinical evaluations were done at 3, 6 months and at one year. Complications that arose during the surgery were noted.

RESULTS

A total of sixteen patients were followed up during the study period. The age ranges for the patients was 24 to 63 years with a mean age of 38.5 years. The male to female ratio was 3:1. Etiological causes of the defects were Motor vehicle accident (11), tumor extirpation (2), lymph edema (2) and gunshot injury (1). Fourteen patients had defects on the lower limbs with two on the upper limbs. Vessels reconstructed were anterior tibial (8), posterior tibial (4), dorsalis pedis (2) and radial arteries (2). Vascular defects varied between 5cm to 7.7 cm with a mean of 6 .3 cm. The surface area covered by the flap was between 76 to 192 cm2 with a mean of 142.3cm2. Anterior lateral thigh flap was utilized in 11 patients with radial forearm and omental flap in two patients each and free fibula flap in one patient.

Table 1: Summarizes the findings during the study.

laps used	Frequency	Percentage
Anterior lateral thigh flap	11	68
Omental flap	2	13
Radial forearm flap	2	13
Free fibula flap	1	6
Total	16	100

Table 2: Summarizes clinical diagnosis, length of vessel defect and the average size of the flap

Diagnosis	Frequency	Length of arterial defect(cm)	Flap (cm2)
Scc distal leg	1	6cm	120
Post traumatic	8	7cm	142
Wound distal leg			
Posttraumatic wound	2	7cm	145
Forearm			
Lymphedema	2	8cm	12 cm
Distal foot gunshot injury	1	5cm	50
Rt hand injury	1	8cm	192
Total	16		

Complications encountered were post-surgical wound sepsis in two patients whom were treated conservatively.

DISCUSSION

Emphasis in managing lower limb trauma and malignancy has shifted towards limb salvage, with formation of Ortho-plastic units in many centers to spearhead such efforts. However, defects with both tissue loss and vascular insufficiency pose extra challenges. Reconstruction of such conditions in majority of cases require free flaps. Ironically, free flaps could technically lead to further deprivation of

blood flow to the limb since one of the vessels has to be sacrificed as a recipient vessel. Alternatives to this could be concurrent reconstruction of the blood vessels with either venous grafts, end to side anastomosis or employing flow through flaps.

Vein grafts have remained the gold standard in reconstructing vascular defects. It however has inherent weaknesses of extra donor site morbidity, increased operating time and high incidence of thrombus formation due to high arterial pressures causing tortuosity of the veins leading to kinking and thrombus formation (5,6). End to site anastomosis on the other hand has a theoretical risk of clot formation at the anastomosis site rendering the whole limb avascular. With flow through flaps the vascular status of the extremity is however improved or preserved.

Flow through flaps has been documented in literature for the last three decades or more (2,4). There use has mainly been in the head /neck and lower extremity reconstruction (2,4, 7-9). With these flaps, complex defects that would require multiple reconstructive procedures have successfully been done in a single stage, obviating the need of prolonged surgeries or multiple procedures (7-9). In the head and neck region they have been used for covering defects as well as act as conduit that allows for a second flap after tumor extirpation surgery (2,8). Their use in the lower limbs on the other hand has primarily been in lower limb trauma ensuring soft tissue coverage of extremities while allowing for blood flow to the extremity (2,10).

Most commonly used flap in our series was anterior lateral thigh flap, followed by radial forearm flap, free fibula flap and omental flap. Anterior lateral thigh flap has been reported in many series as a workhorse flow through flap for both the head / neck and lower limb regions. (2,4,7). The flap could cover extensive defects of up to 300cm^2 making it an ideal flaps for large defects. It could also be raised as a composite flap with rectus femoris muscle allowing both functional muscle reconstruction and soft tissue coverage (Figure2A, -2C).

Figure 2A: Right arm defect with only patent radial artery, loss of nerves and flexor muscles

Figure 2B: Reconstruction of the defect in figure 2A with a composite ALT FLap and rectus femoris Muscle

Figure 2C: Successful reconstruction of the defect in 2A above at 3 months of follow up.

The long pedicle allows it to bridge long vascular defect making it ideal for such wounds. Radial forearm flap considered the gold standard flap for tongue reconstruction can also be good flow through flap as demonstrated in our series. The flap also has a long pedicle of up to 25 cm making it an ideal flap for bridging large defects and allowing for a secondary flap to be used. The disadvantage of this flap however, is the donor site that is conspicuously exposed on the forearm. Omental flaps has been reported as a flow through flap in a number of studies (11,12). The flap like a radial forearm flap has a large and long pedicle that could extent up to 30cm in length. It is an easy flap to raise with an excellent donor site. Its biggest disadvantage is the limited tissue accompanying it making it less ideal in covering extensive or complex defects. In our series, we used it extensively for patients with lymph edema.

In conclusion, flow through flaps have a wide range of application both in reconstructive and aesthetic surgery. While this flaps have been practiced in many well established centers there is need to reinvent them in upcoming centers of reconstruction especially in mid and low income countries. With these flaps there is increased possibilities to salvage more extremities as well reconstruct difficult defects especially in the head and neck region.

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A SUCCESSFUL MICROSURGICAL PENILE REIMPLANTATION 17 HOURS FOLLOWING SELF-INFLICTED MUTILATION: CASE REPORT
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A SUCCESSFUL MICROSURGICAL PENILE REIMPLANTATION 17 HOURS FOLLOWING SELF-INFLICTED MUTILATION: CASE REPORT

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ABSTRACT

Penile amputation constitutes a rare yet life threatening emergency, mostly occurring due to self-mutilation in the face of acute psychotic episode (Klingsor Syndrome), this incident, influenced by auditory commanding hallucinations, presented a considerable challenge in which multidisciplinary team approach played a vital role.

We present a case of a 22-year-old male with self-inflicted penile mutilation following an acute psychotic episode with auditory hallucination of command, the patient was referred to our facility, arriving 10 hours following a self-inflicted penile amputation. He was promptly assessed at our emergency department by multidisciplinary team and the underlying disorder was found to be controllable and after a thorough evaluation, we opted, in agreement with the family, for penile replantation, here, we provide an account to our management and the microscopic reimplantation procedure that was performed under loupe magnification, with additional anastomosis of cavernosal arteries, achieving microsurgical reperfusion by 17 hours after mutilation, following five hours of surgical time. Our patient reported his first erection before discharge. Early complications associated with the wound site were reported and was managed by wound care, surgical debridement, and subsequent skin grafting. The urethral catheter was removed at discharge, with good micturition stream observed.

Conclusively, successful microsurgical penile reimplantation in the face of self-mutilation underscores the role of a multidisciplinary team in decision making, and patient care in the background of psychiatric illness. Anastomosis of cavernosal arteries provides early return of erectile function. The promise for continued psychiatric compliance ensures avoidance of long-term complications, especially re-amputation.

Keywords: **Self-inflicted penile mutilation, Microsurgical reimplantation, Multidisciplinary, Klingsor syndrome, Case-report**

INTRODUCTION

Penile mutilation may lead to a major functional disability with significant loss of self-worth, potentially causing a vicious cycle of psychological instability, which may complicate surgical outcome. Majority of Self-inflicted penile mutilation described, follow a psychotic episode (1) (Klingsor Syndrome), accounting for 87% of reported cases (2), or with associated drug use (3). Penile Self-Mutilation (PSM), also Eshmun complex in Greek mythology (4), was first documented in the English literature by Strock, 1901(5). Reports from Kenya and Nigeria (6) associate it with deliberate self-harm as documented in a 1986 report of psychiatric practice, was categorized into two; a mild form associated with attention-seeking, and a severe form seen in psychotic states, victims of the latter may act under delusion or obeying auditory hallucinations (7). Hereunder, we present microsurgical reimplantation with additional anastomosis of cavernosal arteries for a typical case of Klingsor syndrome with resultant early return of erectile function.

CASE PRESENTATION

A 22-year-old male with a self-inflicted penile amputation using a kitchen knife, was taken to a nearby facility, arriving 3 hours after the incident. Bleeding was arrested and the amputate preserved in a cool box, then referred to our facility, arriving 7 hours later (10 hours after injury). Assessment at our emergency department revealed a hemodynamically stable patient, sedated and arousable. Urologic examination revealed a clean-cut amputation stump 2cm from the mons, blood clots, no active bleeding, the amputate was 6cm long (Figure 1).

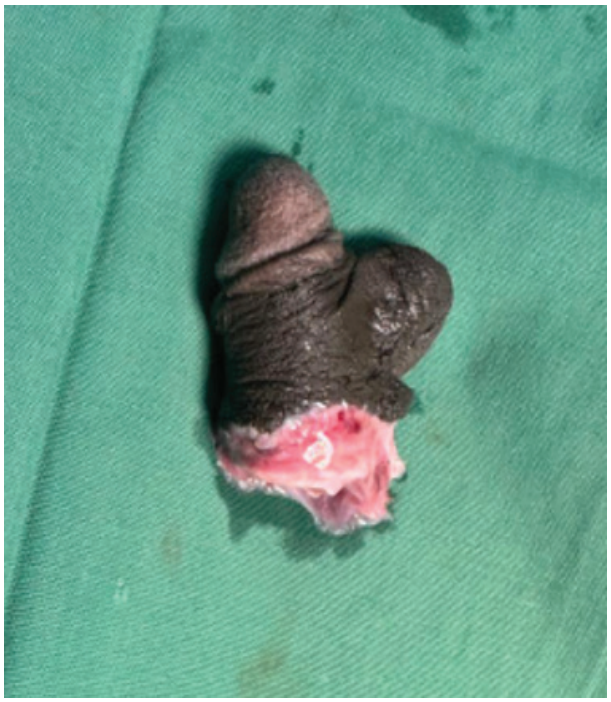

Figure 1:- Amputate after debridement and saline solution wash.

Psychiatric assessment revealed the patient had been on follow-up from a psychiatric facility with a diagnosis of acute psychosis. He was discharged on medication 10 months prior to the incident and was quite well, attending school at a technical institute. He defaulted two months after discharge, was agitated a week preceding the incident, he reported to have been instructed by God to cut off his penis, he also admitted to drug abuse. Assessment and corroboration from the father promised healthy psychological support and was thus cleared for surgery.

SURGERY

Our surgical team consisted of the Plastic microvascular surgeon and urological surgeons.

The procedure was performed under general anesthesia. The stamp and amputate, debrided and washed with saline (Figure 2). 18F silicon urethral catheterization through the tip of the amputate, then into the stump. The severed urethra ends spatulated and anastomosed end-to-end with PDS 5/0 over the catheter, the ventral portion of the tunica albuginea was repaired watertight.

Figure 2:- Amputate (a) showing the tunica enveloping the cavernosa, the stump(b) after debridement.

Figure 3:- Immediately post microsurgical repair of neurovascular structures, before skin closure.

The Plastic surgeon then dissected out the Cavernosal arteries, a 1.5mm deep dorsal vein, 1.4mm dorsal arteries and two dorsal nerves, coaptated in that order using nylon 10/0 under loupe magnification x 6 (Figure 3), cavernosal arteries anastomosis presented a challenge with placement of clamps due to limited space, we utilized the first of the four coaptation sutures to delicately approximate the vessels, aided by a slight trim off the cavernosal tissues.

The remaining dorsal portion of the tunica albuginea was then repaired with interrupted 5/0 poly-dioxanone. Skin closure was performed with 4/0 nylon and a snug dressing applied.

RESULTS

Microsurgical reperfusion was achieved 17 hours post amputation, total surgical time was 5 hours, and had received a single dose of cefuroxime 2gms, 450mls of packed red cells and 2 litters saline.

The patient was transferred to high dependence unit for observation and nursing care for a week, within which time he was started on anticoagulation with subcutaneous Clexane 40 I.U instituted on day one, for a week. The psychiatrist reviews and counselling were provided on first post operative day, and re-instituted on antipsychotics. The patient reported his first erection on the second post operative day. Surgical site dehiscence was noted second week, later debrided and thereafter skin grafted, the catheter was removed on the third week post operatively, and no micturition challenges were reported.

Other episodes of erection were reported after discharge, for which he shared the pictures with one of the contact personnel in the unit Figure (4).

Figure 4: - Second erection after experience after discharge

DISCUSSION

The gold standard treatment for penile amputation is early reimplantation which if successful, yields satisfactory functional and cosmetic outcomes (3). 13 cases of primary penile reimplantation in world literature reported by 1975(9) performed as composite grafts. Frequent complication being necrosis of distal glans and skin, stricture, fistula formation and erectile dysfunction (2). Microsurgical techniques were reported by Cohen *et al* and Tamai *et al* in 1977 (10,11). Ever since, several successfully microsurgical penile re-implantations have been documented, improving survival rates, and even return of erectile function (12). Consensus on microsurgical technique involves anastomosis of the dorsal artery, veins, and nerve (13). However, to further improve functional outcome, we opted to anastomose the cavernosal arteries as well, to this, we attribute the early erection reported by our patient.

Klingsor syndrome is often associated with severe underlying psychiatric conditions or profound gender dysphoria. The psychological state of the patient significantly impacts both surgical and long-term outcomes, as untreated mental health disorders may increase the risk of post-operative non-compliance, recurrent self-harm, or poor adjustment to reconstructive procedures. Comprehensive psychiatric evaluation and management are essential components of care, ensuring the patient receives appropriate therapy and stabilization after surgery.

CONCLUSION

Penile replantation should always be attempted, to restore function and avoid major loss of self-esteem. Timely multidisciplinary intervention is priceless and psychiatric support is crucial and should be assured. Microsurgical technique is the standard management, and cavernosal arterial anastomosis promises early return of erectile function as was seen and reported by our patient.

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Conflicts of interest: We have none to declare.

Ethical approval: N/A

Consent: Obtained from both the father and the patient.

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FAMM FLAP FOR GRADE II NASOPHARYNGEAL STENOSIS RECONSTRUCTION IN A 2-YEAR-OLD: A CASE REPORT.
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FAMM FLAP FOR GRADE II NASOPHARYNGEAL STENOSIS RECONSTRUCTION IN A 2-YEAR-OLD: A CASE REPORT

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SUMMARY

Acquired nasopharyngeal stenosis (NPS) is a rare and heterogeneous pathology with diverse causes, often a consequence of pharyngeal surgery. Disparate approaches have been used for the treatment of nasopharyngeal stenosis but there is no consensus on a unique and standardized management, however many methods have been described.

We present a case of a 2-year-old with grade II nasopharyngeal stenosis reconstructed with an inferiorly based left unilateral facial artery myomucosal flap. The Facial artery myomucosal (FAMM) Flap is a versatile yet reliable flap for reconstruction of postsurgical nasopharyngeal stenosis, a common complication of pediatric adenotonsillectomy and other pharyngeal surgeries.

In conclusion, inferiorly based facial myomucosal (FAMM) flap is an easy, yet sufficient local option in the reconstruction of nasopharyngeal stenosis post scar release.

Key words: **FAMM flap, Facial artery myomucosal flap, Nasopharyngeal stenosis, upper airway obstruction, versatile, Case Report.**

INTRODUCTION

Acquired nasopharyngeal stenosis is a rare and heterogeneous pathological condition that has different causes, generally resulting as a complication of a pharyngeal surgery, especially in patients affected by obstructive sleep apnea (OSA)(1). With an incident of about 3 in 100,000 cases occurring following tonsillectomy(2) The common causes of NPS include uvulopalatopharyngoplasty (UPPP), adenotonsillectomy, laser-assisted uvulopalatoplasty (LAUP), or radiotherapy for nasopharyngeal carcinoma(3), Thus in the pediatric population, adenotonsillar hyperplasia is a common phenomenon and adenotonsillectomy one of the commonly performed surgical procedures and that may lead to scarring causing Nasopharyngeal stenosis (NPS). However, there have not been a standardized approach to surgical management, and with growing use of electrocautery and palatal surgery techniques, incidence of NPS is on the rise.(4).

FAMM flap refers to an axial composite flap based on the facial artery in the buccal area(5,6)

Different approaches have been proposed for the treatment of nasopharyngeal stenosis but a unique and standardized management has not yet been presented. Among described techniques is the modified palatal flaps (1). However, FAMM flap provides a versatile easy alternative in the management of postsurgical severe nasopharyngeal stenosis(2). This case report represents a versatile option of the surgical techniques, the FAMM flap and we describe the steps in a simplified manner as one of the reliable options for Nasopharyngeal stenosis reconstruction. The FAMM flap was first introduced by Pribaz and colleagues in 1992, and since then, it has been utilized for repairing various types of intraoral defects(6). The facial artery myomucosal (FAMM) flap is a versatile axial intraoral flap lined by jugal mucosa and submucosa along with a portion of buccinator muscle connected to nearby blood vessels to maintain perfusion. In the bargain moreover, the FAMM flap may be pedicled inferiorly on the facial artery or superiorly on the angular artery. We report an inferiorly based pedicled FAMM flap for the reconstruction of the pharynx, in addition the flap also finds utility in vast intraoral reconstructions such as of soft palate, nasal cavity and among others nasopharyngeal defects.

Studies have shown numerous advantages supporting the use of the FAMM flap, most of which contribute to its general low morbidity rates(7,8); avoiding any external scar, provides a great axis of rotation and range of reach allowing for reconstruction of multiple sites; it is also thin & pliable; Provides a fully functional mucosal tissue; a satisfactory reconstructive option, even in irradiated tissues and finally; its strong vasculature withstands postoperative radiotherapy(8).

Guidelines: This case report has been reported in line with the SCARE Criteria 2023(9)

CASE PRESENTATION

A 2-year-old female patient who was brought to our facility by the aunty, as a referral from a peripheral facility with a diagnosis of Velopharyngeal stenosis, she had been followed up and managed at the referring facility since first presentation at the age of 3 months and had undergone adenoidectomy, followed by adenotonsillectomy by age of 17 months due to recurrence of symptoms. However, there was still persistence of symptoms including snoring, mouth breathing and bad breath at which point submucosal diathermy of the inferior turbinate was done 2 months before time of presentation, having been found to be hypertrophic but no improvement was noted.

At the time of presentation at our facility, she aunty reported persistence of symptoms of upper airway obstruction, which included mouth breathing, mucoid rhinorrhea, persistent grunting, intermittent night difficulty in breathing also dubbed Obstructive sleep apnea (OSA), she had no difficulty with feeding, and no symptoms or signs of cardiovascular compromise, no known comorbidities reported and as were the findings by our Multidisciplinary team which for this case was comprised of the plastics surgeons, and Otolaryngologist (ENT).

Examination: Good general clinical condition, with no pallor, no jaundice, no edema. Nasal examination revealed normal nares, no discharge, normal mucosal lining, Central septum, no inferior turbinates hypertrophy. Oral examination findings showed a normal lip, tongue and oral mucosa, normal dentition, healed tonsillar bed with scar tissue involving the soft palate and tonsillar pillars bilaterally (right worse than left) with narrowing of pharyngeal airway (nasopharyngeal stenosis) with about 2cm residual aperture. Ear examination did not reveal any abnormalities of the tympanic membranes.

Examination under anesthesia (EUA): Rigid nasal endoscopy using size 4mm endoscopes, 0^0 and 45^0 to further evaluate the nasopharynx was done. Nasopharyngeal stenosis was noted, with scar bands between the pillars and velum, right side affected more than left side with narrowing of nasopharyngeal airway (Figure 1). Grade II adenoid tissue bilaterally, patent choanae bilaterally.

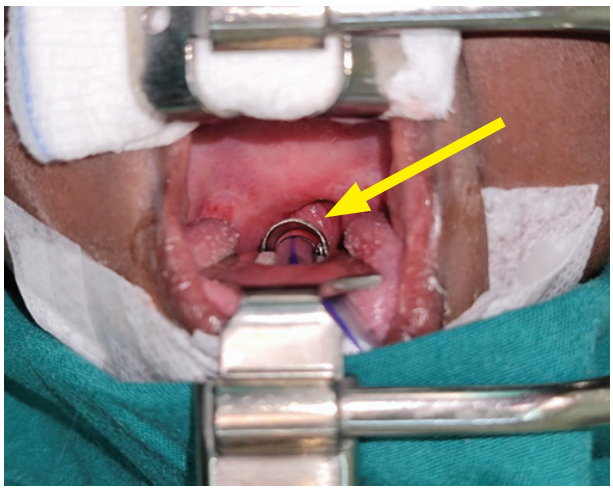

Figure 1: Showing the extent of NPS, note the severity of the right compared to the left, The remnant opening < 2cm diameter (Orange arrow)

The Plastic surgery team subsequent proceeded with release of scarred tissue (Figure 2) and reconstruction with an inferiorly based FAMM flap.

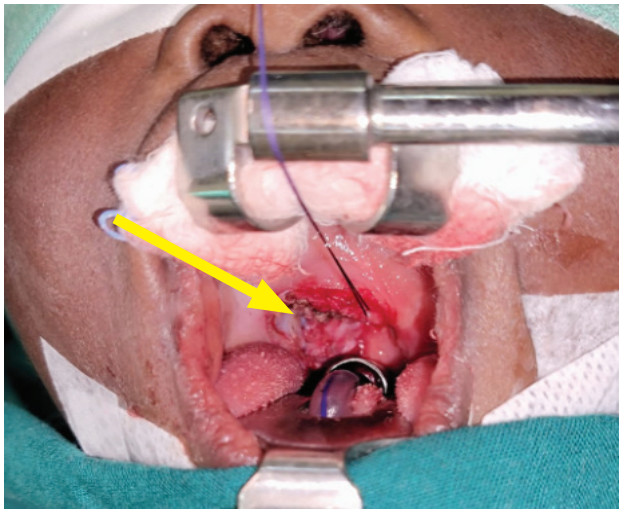

Figure 2: Extensive scarring released from the right side to free the soft palate from the pillars, (note the purple retraction stitch at the tip of the soft palate)

SURGICAL TECHNIQUE:

We started the surgery by releasing the fibrosis/ adhesion (Figure 2). To perform the procedure, we identified the position of the facial artery (Figure 3a) (10) by palpation of pulse and a hand-held Doppler and mapped its position in the myomucosal pedicle flap, we also identify the os of the Stensen duct and marked(Figure 3b).

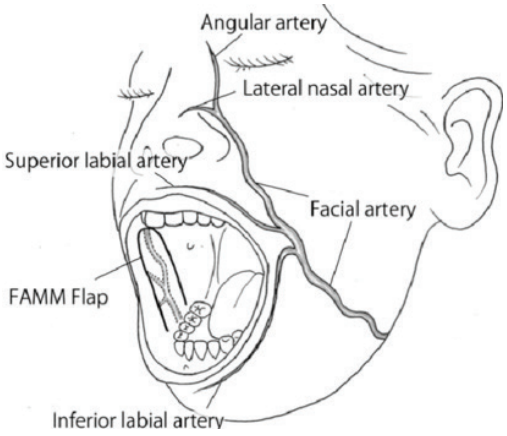

Figure 3-a: Schematic representation of the right inferiorly based FAMM flap

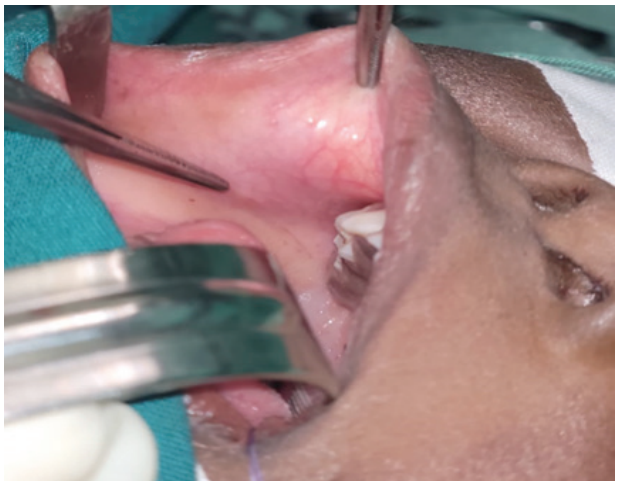

Figure 3-b: Buccal mucosa, Note the forceps pointing at the Ostium of the Stensen's duct at tip of forceps/ Orange arrow

Figure 3-C: Flap Marked using methylene blue dye; posterior border 1-2mm anterior to the Os of Stensen duct and the anterior boundary 1. - 1.5cm from oral commissure, the flap tip was 1.7cm from the superior labial frenulum

Figure 3-D: Right side inferiorly based FAMM Flap completely dissected out and freed ready for inset.

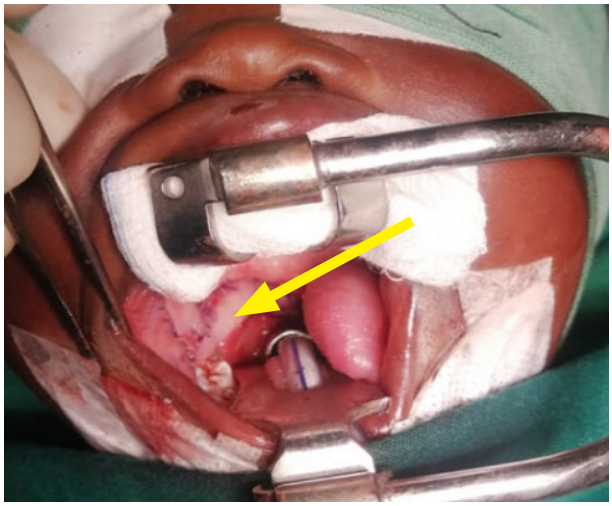

Figure 4: FAMM Flap inset (Orange arrow) onto the raw area over the site of released fibrosis and the donor site closed primarily.

We then marked the flap with pedicle inferiorly based (Figure 3c) using methylene blue, the anterior border at 0.8cm from the oral commissure, and the posterior border 2mm anterior to the os of Stensen duct. The distal reach of the flap was 17mm shy of the ipsilateral superior labial frenulum, the flap was then raised with part of the buccinator muscle in the plane of the buccal fat pad until inferiorly as far as the mandibular vestibule opposite second mandibular premolar and first molar and advanced to the defect, via the retromolar trigone without needing a bite protector, the flap had good reach crossing the midline. The narrow tip (excess) was amputated after inset (Figure 4), we did not use stents or obturators, since the epithelial surface of the flap already established the lining.

RESULTS

After flap inset to establish the mucosal lining of the resultant raw area from release of fibrosis, there was a significant immediate flexibility of the velum, and patency of the nasopharynx. The patient was admitted to the ward after recovery and on first post operative day, reported pain at the operative site with refusal to take fluid diet, and there was also drooling of saliva.

With good pain management however, the symptoms subsided and was able to feed.

Upon review at the clinic after one week, the aunty reported the child still had symptoms but was much better,

At three weeks review, the symptoms were reported to have resolved, save for the intermittent snoring that was reported by the aunty.

The flap was divided four weeks later and the child was discharged stable.

DISCUSSION

Nasopharyngeal stenosis (NPS) is a rare condition characterized by obstruction of the communication between the oropharynx and nasopharynx owing to scar contracture of the soft palate, tonsillar pillars, and posterior pharyngeal wall. NPS can be primary (attributed to disease process such as rhinoscleroma) or secondary, if caused by prior surgery (postoperative NPS), it usually manifests with nasal obstruction, dysphagia, snoring, and obstructive sleep apnea (OSA) It represents one of the challenging problems that can complicate surgeries in the pharyngeal region. Being a rare condition, it has not been described in literature. At the same time, not much has been written about this severe complication(3).

NPS is classically classified based on severity as follows:

Type I (Mild): The lateral aspects of the soft palate adhere to the posterior pharyngeal wall without velar lengthening.

Type II (Moderate): Circumferential scarring with a small central opening (1–2 cm in diameter) of soft palate.

Type III (Severe) Complete fusion of the soft palate with the posterior and lateral pharyngeal walls, leaving a remaining opening < 1 cm(4).

Considering our findings, we grade our case to have had Type II NPS

Considering absence of standardized definitive treatment for NPS, most suggested methods that require reestablishment of epithelium may lead to more scarring and restenosis.

CONCLUSIONS

Nasopharyngeal stenosis is a rare, yet a potentially severe complication of pharyngeal surgeries, especially in the pediatric population. The increasing number of cases attributed to increase in the utility of electrocautery(4) presents a challenge in the management, convoluted by the absence of standardized protocolized management of nasopharyngeal stenosis, The facial artery myomucosal flap represents a versatile yet reliable technique for reconstruction of nasopharyngeal stenosis that provides stable mucosal lining, limiting recurrence of fibrosis.

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HARNESSING THE POWER OF A CONTRALATERAL PARAUMBILICAL FLAP IN COVERING A RIGHT VOLAR DISTAL FOREARM WOUND: A CASE REPORT
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HARNESSING THE POWER OF A CONTRALATERAL PARAUMBILICAL FLAP IN COVERING A RIGHT VOLAR DISTAL FOREARM WOUND: A CASE REPORT

K. CHESONI, L.MUNGE, W. ADEGU, AND F.W.NANG'OLE,

SUMMARY

The ipsilateral paraumbilical flap is frequently employed in upper extremity reconstruction. However, the contralateral paraumbilical flap offers a robust alternative for addressing complex volar distal forearm wounds, particularly when local tissue options are inadequate. This case report presents our experience utilizing a contralateral paraumbilical flap in the reconstruction of a right volar distal forearm defect following an electrical burn injury in an 8-year-old male patient.

The patient, who sustained a high-voltage electrical burn injury, underwent staged reconstruction from November 2023 to January 2024. A contralateral paraumbilical fasciocutaneous flap measuring 6 x 10 cm was raised and used for wound coverage. The patient reported satisfaction with the reconstructive outcome, expressing contentment with the overall functionality, despite the loss of the thumb and little finger. The flap provided stable coverage of vital structures with minimal donor site morbidity.

In conclusion, the contralateral paraumbilical flap is an effective reconstructive option for distal volar forearm defects, particularly in cases involving severe electrical injuries. This approach is characterized by ease of harvest, reliable vascularity, and a favorable profile of donor site complications.

Keywords: **contralateral paraumbilical flap, upper extremity reconstruction, forearm volar defect.**

INTRODUCTION

Electrical injuries to the upper extremities are often associated with significant morbidity, ranging from skin and soft tissue damage to deeper injuries involving muscles, nerves, and bones. High-voltage injuries, in particular, can cause severe tissue necrosis, posing a challenge in terms of wound coverage and reconstruction(1). In Kenya, such injuries are prevalent in informal settlements and frequently affect young males working near power lines(2). Reconstruction often necessitates tissue transfer from distant sites due to a lack of viable local tissue options(3)which can be a significant challenge for burn and plastic surgeons to reconstruct. This intensive and multistage reconstructive process is especially difficult in the growing child. Maximizing upper extremity function is a top priority, as it can have a significant impact on a patient's quality of life. This report aims to highlight the versatility and applicability of the contralateral paraumbilical flap in managing complex upper limb injuries.

CASE PRESENTATION

An 8-year-old male patient presented with a severe right forearm wound resulting from a high-voltage electrical injury. After initial management and wound stabilization, a contralateral paraumbilical fasciocutaneous flap was utilized for reconstruction. The defect measured 6 x 10 cm and encompassed the distal volar forearm. The flap was harvested under general anesthesia, and the donor site was primarily closed. Short-term follow-up showed stable wound coverage with no significant complications at the donor site.

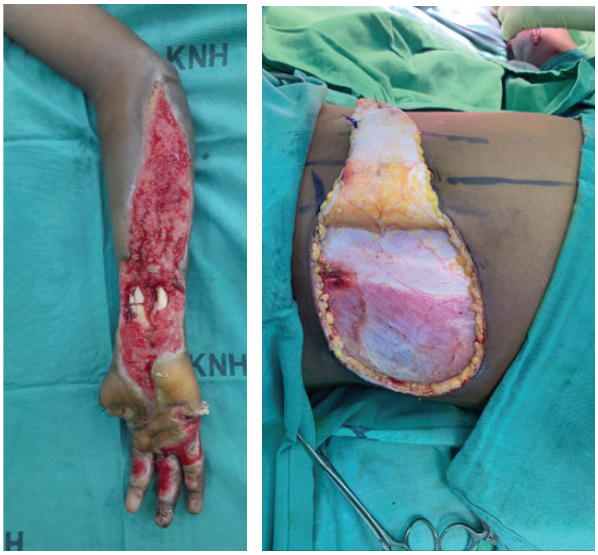

Figure 1: Initial defect on the left forearm and raised contralateral paraumbilical flap.

Figure 2: Flap in situ before division.

Figure 3: Final results post flap division.

OUTCOME ASSESSMENT

Assessment of outcomes following reconstruction with a contralateral paraumbilical flap revealed promising results in both functional and aesthetic aspects. The patient exhibited an improved range of motion, facilitating an early return to activities of daily living. Furthermore, the contralateral paraumbilical flap covered all the vital structures at the distal forearm, with minimal donor site morbidity observed. Short-term follow-up indicated durable outcomes, underscoring the reliability and efficacy of this technique in upper limb reconstruction.

DISCUSSION

The contralateral paraumbilical flap offers a valuable option for covering volar distal forearm defects, especially in cases where local tissue is insufficient or unsuitable due to prior surgeries, infection, or trauma(1). Its rich vascular supply ensures reliable tissue perfusion, facilitating wound healing and minimizing the risk of flap failure. Additionally, this flap provides adequate tissue volume with minimal donor site morbidity.

In comparison to traditional methods, such as the radial forearm flap or free flap techniques, the contralateral paraumbilical flap circumvents the need for complex microvascular anastomoses, reducing operative time and associated risks(4). While free flaps like the anterolateral thigh (ALT) flap require advanced microsurgical skills and longer operative times, the contralateral paraumbilical flap offers a straightforward and effective solution with fewer complications(5)

However, patient selection is crucial. Factors such as overall health, body habitus, and specific wound characteristics must be considered to optimize outcomes. Despite the advantages, potential complications include donor site infection, seroma, and aesthetically concerning scarring.

CONCLUSION

The contralateral paraumbilical flap is a reliable and versatile option for distal forearm reconstruction, especially in cases of severe electrical injury. Its application minimizes the need for microsurgery while providing stable wound coverage with a low incidence of complications. Further research with larger patient samples is warranted to validate these findings and establish guidelines for its use.

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SCIENTIFIC COMMUNICATION:

PLASTIC SURGEONS' UNDERSTANDING ON NANOTECHNOLOGY APPLICATIONS IN WOUND DRESSINGS AND SKIN REGENERATION

ABSTRACT

The development of sophisticated wound dressings that can both actively aid in wound healing and provide protection is made possible by nanotechnology. With its innovative approaches to increased healing, decreased infection rates, and better cosmetic results, nanotechnology is revolutionizing the fields of wound care and skin regeneration. Advanced wound dressings that stimulate tissue regeneration, offer antimicrobial activity, and alter the wound microenvironment can be made on account of the special qualities of nanomaterials. With an emphasis on their mechanisms of action, advantages over traditional treatments, and potential future directions, we examine the current uses of nanotechnology in wound dressings and skin regeneration. The current review addresses the implications of these advancements for bettering patient outcomes, with a focus on the field of plastic surgery.

INTRODUCTION

Hemostasis, inflammation, proliferation, and remodeling are some of the overlapping phases that make up the intricate and dynamic process of wound healing. Infection, chronic wounds, and impaired healing are significant obstacles to wound care, especially in plastic surgery, where functional results and aesthetics are crucial. More advanced solutions are required because conventional wound dressings, like gauze and hydrocolloids, frequently fall short in addressing these complexities.

The development of sophisticated wound dressings that can both actively aid in wound healing and provide protection is made possible by nanotechnology. Nanomaterials have special physical, chemical, and biological characteristics that make them perfect for promoting tissue regeneration and wound healing because of their small size and high surface area-to-volume ratio. This study examines how nanotechnology can be used to create wound dressings and promote skin regeneration, especially for plastic surgeons who treat complicated burns, wounds, and cosmetic procedures.

NANOTECHNOLOGY IN WOUND CARE: MECHANISMS OF ACTION

The term "nanotechnology" describes the manipulation of materials at the atomic and molecular level, usually between 1 and 100 nanometers. Unique behaviors that are not seen in their bulk counterparts are displayed by materials at this scale. Wound dressings with enhanced protection, antimicrobial activity, and regenerative potential can be made by utilizing these behaviors.

To speed up the healing process, nanoparticles (NPs) can be engineered to deliver medications, growth factors, or antimicrobial agents straight to the wound site. Additionally, they can imitate the extracellular matrix (ECM), which offers structural support for tissue regeneration and cell migration. Furthermore, it has been demonstrated that electrospun nanofibrous scaffolds encourage angiogenesis and cell proliferation, both of which are essential for wound healing (Gupta *et al*., 2017).

The main mechanisms by which nanomaterials enhance wound healing include:

Antimicrobial Activity: Because of their strong antimicrobial qualities, silver nanoparticles (AgNPs), zinc oxide nanoparticles (ZnO NPs), and other nanomaterials are effective against a variety of pathogens, including bacteria that are resistant to antibiotics. This is essential for avoiding wound infections, which can impede the healing process and result in subpar plastic surgery results. (Chaloupka *et al.*, 2010).

Controlled Drug Delivery: It is possible to engineer nanoparticles to release therapeutic agents—like growth factors, anti-inflammatory medications, or antibiotics—in a regulated way. According to Dhivya *et al.* (2015), this prolonged release promotes healing and lessens the need for frequent dressing changes by preserving therapeutic levels at the wound site.

Promotion of Tissue Regeneration: The natural extracellular matrix's structure and function can be mimicked by nanofibers and nanoscaffolds, creating

an environment that is favorable for cell attachment, migration, and proliferation. Because they encourage the formation of new tissue, these scaffolds are perfect for skin regeneration after trauma, burns, or reconstructive surgery (Yang *et al*., 2019).

APPLICATIONS OF NANOTECHNOLOGY IN WOUND DRESSINGS

Antimicrobial Nanomaterials: Among the most imperative developments in wound care is the creation of antimicrobial nanomaterials. Infection can lead to grave complications and is a major cause of delayed wound healing, especially in patients with diabetes or compromised immune systems. Since they have broad-spectrum antimicrobial activity, nanoparticles such as AgNPs have attracted a lot of attention. According to Rai *et al*. (2009), silver ions have the ability to damage bacterial cell membranes, obstruct metabolic processes, and prevent DNA replication, all of which can result in bacterial death.

Silver nanoparticles successfully suppressed the growth of methicillin-resistant Staphylococcus aureus (MRSA) and other Gram-positive and Gram-negative bacteria in vitro, according to a study by Franci *et al***.** (2015). This discovery is pivotal to plastic surgeons who treat surgical site infections or wounds that are vulnerable to colonization by resistant organisms.

In addition to silver, other nanoparticles such as zinc oxide (ZnO NPs) and copper oxide (CuO NPs) also exhibit antimicrobial properties. These nanoparticles not only kill bacteria but also promote wound healing by stimulating the proliferation of keratinocytes and fibroblasts, essential cells in skin regeneration (Chandran *et al*., 2020).

Nanofibrous Scaffolds for Skin Regeneration: Because electrospun nanofibers can replicate the natural extracellular matrix, they are being utilized more and more in skin regeneration and wound dressings. The extracellular matrix (ECM) is essential for wound healing because it gives cells structural support and biochemical signals. According to Jiang *et al*. (2015), nanofibers' high surface area and porosity provide the perfect conditions for angiogenesis and cell migration, accelerating and improving healing.

By encouraging organized collagen deposition and lowering inflammation, nanofibrous dressings can dramatically lessen scarring in plastic surgery, where the best possible aesthetic results are crucial. Collagen-coated polycaprolactone (PCL) nanofibers increased wound closure rates and decreased scar formation in animal models (Zeng *et al*. 2018)). This implies that patients undergoing skin grafting or reconstructive procedures may benefit greatly from the use of nanofibrous scaffolds.

Drug-Loaded Nanoparticles for Enhanced Healing: Controlled release of therapeutic agents is another major application of nanotechnology in wound care. Traditional wound dressings often require frequent changes, which can disrupt the healing process and increase the risk of infection. Nanoparticles can be loaded with drugs and incorporated into wound dressings, allowing for sustained release of active agents over time.

Dhivya *et al*. (2015), for instance, created a dressing made of chitosan-based nanoparticles that contained curcumin, a naturally occurring antioxidant and anti-inflammatory substance. By lowering oxidative stress and inflammation at the wound site, the study demonstrated that curcumin-loaded nanoparticles greatly improved wound healing in diabetic rats. Curcumin is continuously supplied by this controlled release system, maintaining a wound environment that promotes healing.

Drug delivery methods based on nanoparticles are especially helpful for chronic wounds, which frequently show high levels of inflammation and poor healing. These systems can speed up wound closure and enhance results for patients with non-healing wounds, including those undergoing reconstructive surgery, by offering long-lasting therapeutic effects.

SKIN REGENERATION USING NANOTECHNOLOGY

Stem Cell-Based Nanotechnology: Stem cells are a promising tool for skin regeneration, and nanotechnology can enhance their therapeutic potential. Mesenchymal stem cells (MSCs) are known for their ability to differentiate into various cell types, including keratinocytes and fibroblasts, which are essential for skin regeneration. Nanomaterials can be used to deliver stem cells to the wound site, protect them from the harsh wound environment, and enhance their differentiation and proliferation.

Combining stem cells with nanofibrous scaffolds has been demonstrated to increase the cells' engraftment and survival in the wound bed. In a murine model, for example, Yang *et al*. (2019) showed that MSCs encapsulated in a nanofibrous scaffold improved wound healing by encouraging angiogenesis and lowering inflammation. Large, complicated wounds that are challenging to heal with traditional techniques may benefit greatly from the combination of stem cell therapy and nanotechnology.

Growth Factor Delivery via Nanoparticles: Growth factors that promote angiogenesis and cell proliferation, like vascular endothelial growth factor (VEGF) and epidermal growth factor (EGF), are essential for wound healing. However, their

therapeutic potential is limited by their short half-life and quick degradation in the wound environment. Growth factors can be sustainedly delivered to the wound site by nanoparticles, which can also shield them from deterioration.

In a study by Liu *et al.* (2016), full-thickness wounds in a diabetic mouse model were treated with VEGF-loaded nanoparticles mixed into a hydrogel dressing. The findings demonstrated that by encouraging neovascularization and lowering inflammation, the prolonged release of VEGF markedly enhanced wound healing. These growth factor-loaded nanomaterials may be especially helpful for plastic surgery procedures where minimal scarring and quick tissue regeneration are crucial.

Challenges and Future Directions: Although there are still a number of obstacles to overcome, nanotechnology has demonstrated tremendous promise in wound care and skin regeneration. The possible toxicity of nanoparticles is a significant worry. According to studies, some nanoparticles, like zinc oxide and silver, can cause cytotoxicity at high concentrations, which may postpone the healing of wounds (Rai *et al.*, 2009). To reduce negative effects, it is crucial to carefully regulate the dosage and duration of nanoparticle exposure.

Furthermore, before nanomaterials are widely used in plastic surgery, their long-term safety and biocompatibility must be thoroughly assessed in clinical trials. Nanotechnology-based wound dressings have not yet received widespread regulatory approval, and further study is required to fully comprehend their long-term impacts on human health.

Notwithstanding these obstacles, nanotechnology has a promising future in wound care. It is anticipated that developments in materials science and bioengineering will result in the creation of more intelligent wound dressings that can detect changes in the wound environment and release therapeutic agents in response to particular stimuli. These "smart" dressings have the potential to completely transform plastic surgery wound care by offering individualized, focused treatment for every patient.

CONCLUSION

As regards plastic surgery as a discipline, nanotechnology provides creative ways to enhance skin regeneration and wound healing. It is feasible to develop materials that actively aid in wound healing through antimicrobial activity, regulated drug release, and improved tissue regeneration by adding nanoparticles, nanofibers, and nanoscaffolds to wound dressings. Although there are still obstacles to overcome, there is no denying nanotechnology's potential advantages in wound care. To guarantee these materials' successful integration into clinical practice, future research should concentrate on maximizing their safety and effectiveness. The application of wound dressings based on nanotechnology is a major advancement for plastic surgeons in terms of bettering patient outcomes, especially when it comes to complex wounds, burns, and reconstructive procedures.

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SCIENTIFIC COMMUNICATION:

CHALLENGES IN POST-BARIATRIC BODY CONTOURING SURGERY: A PLASTIC SURGEON'S NIGHTMARE

ABSTRACT

A common treatment for obesity is bariatric surgery, which results in substantial weight loss and better health outcomes. For patients who have had bariatric surgery, post-bariatric body contouring surgery is an essential part of their treatment plan. Although this surgical procedure can greatly improve self-esteem and quality of life, it comes with a special set of difficulties. Anatomical changes, loose skin, malnutrition, and psychological issues that affect patient outcomes are some of these difficulties. In addition to providing insights into improving surgical outcomes, this paper examines the literature on the difficulties encountered following bariatric body contouring surgery. In order to effectively address these issues and guarantee comprehensive patient care, a multidisciplinary approach is recommended.

INTRODUCTION

A common treatment for obesity is bariatric surgery, which results in substantial weight loss and better health outcomes. However, significant weight loss frequently causes soft tissue laxity and excess skin, which calls for body contouring procedures to improve appearance and restore body shape (Moraes *et al*., 2017). A variety of surgical procedures, such as abdomino-plasty, breast lifts, arm lifts, thigh lifts, and lower body lifts, are included in post-bariatric body contouring. Even though body contouring has many benefits, anatomical changes, nutritional deficiencies, and psychological issues can all compromise surgical results (MacNicol *et al*., 2018). We examine these difficulties and how they affect patients and plastic surgeons.

Anatomical Changes Following Bariatric Surgery

SKIN LAXITY

Due to the loss of underlying fat support and the skin's incapacity to fully retract, significant weight loss following bariatric surgery causes noticeable skin laxity (Huang *et al*., 2020). Skin laxity is frequently correlated with weight loss; patients who lose a significant amount of weight tend to have more severe laxity. Functional problems like poor hygiene and a higher risk of skin infections can result from this excess skin (Ding *et al*., 2018).

ALTERATIONS IN BODY CONTOUR

The body's contour is changed by the drastic reduction of subcutaneous fat, making it more difficult to achieve symmetry and aesthetic balance during body contouring procedures. Particularly concerning are the arms, thighs, breasts, and abdomen, where extra skin may mask the underlying bone and muscle structure (Morales *et al*., 2018). In order to address individual anatomical variations and achieve the best possible aesthetic results, this disparity calls for meticulous preoperative planning.

NUTRITIONAL DEFICIENCIES

Impact of Bariatric Surgery on Nutritional Status: Due to dietary restrictions and changes in gastrointestinal physiology, bariatric surgery can result in severe nutritional deficiencies (Tice *et al*., 2020). Protein, vitamin, and mineral deficiencies are common and can affect wound healing and recovery after surgery. The type of bariatric procedure performed frequently affects the prevalence of deficiencies; patients who have a gastric bypass are generally at higher risk than those who have a sleeve gastrectomy (MacNicol *et al*., 2018).

ROLE OF PREOPERATIVE NUTRITIONAL ASSESSMENT

In order to reduce complications during body contouring surgery, preoperative nutritional assessment and optimization are essential. To improve wound healing and postoperative results, deficiencies must be found and fixed prior to surgery (Moraes *et al*., 2017). Identification of at-risk patients and the implementation of nutritional interventions, such as dietary changes and supplements, can be facilitated by a multidisciplinary team approach involving plastic surgeons and nutritionists.

PSYCHOLOGICAL FACTORS

Body Image Concerns: Following significant weight loss, the presence of excess skin exacerbates body image issues that patients who have bariatric surgery frequently experience (Huang *et al.*, 2020). Their psychological health and level of satisfaction with the results of surgery may be impacted by these worries. Underscoring the significance of addressing psychological factors in the preoperative phase, the discrepancy between expected and actual results can result in dissatisfaction, elevated anxiety, and depression (Ding *et al.*, 2018).

Role of Psychological Support: Counseling and psychological support can assist patients in controlling their expectations and enhancing their satisfaction with the outcomes of surgery. By addressing both the psychological and physical aspects of recovery, integrating mental health specialists into the surgical team can promote comprehensive care (Morales *et al.*, 2018). Preoperative psychological assessments can also help identify people who are more likely to be unhappy, enabling them to receive specialized support and counseling.

SURGICAL CHALLENGES

Technical Challenges in Body Contouring: The technical challenges of body contouring surgery after bariatric procedures are distinct. Changes in anatomy and the presence of extra skin can make surgery more difficult and raise the risk of complications like seroma, hematoma, and poor wound healing (MacNicol *et al*., 2018). Furthermore, surgeons must weigh functional and cosmetic factors because the necessity of extensive tissue resection may affect the results.

Complications and Risk Management: Following bariatric body contouring surgery, complications may include hematoma formation, infection, and delayed wound healing. Patients' overall satisfaction with surgical outcomes and their ability to recover can be greatly impacted by these complications. Surgeons must follow best practices in patient selection, surgical technique, and postoperative care in order to reduce these risks (Huang *et al.*, 2020). Complications may also be avoided with the help of preventative measures like compression garments and drains.

OPTIMIZING SURGICAL OUTCOMES

Comprehensive Preoperative Assessment: Optimizing surgical outcomes for patients who have undergone bariatric body contouring requires a comprehensive preoperative evaluation. A review of the patient's medical history, nutritional status, and psychological health should all be part of this evaluation. Surgeons can customize surgical techniques and improve patient care by determining possible risk factors (Ding *et al.*, 2018).

MULTIDISCIPLINARY APPROACH

Addressing the complex needs of post-bariatric patients requires a multidisciplinary approach involving psychologists, neuroscientists, nutritionists, and plastic surgeons. Teamwork can enhance surgical results and guarantee comprehensive care (Morales *et al*., 2018). Giving patients psychological support and education about the significance of following dietary guidelines can also improve their general happiness and quality of life.

CONCLUSION

Plastic surgeons must overcome a number of obstacles following bariatric body contouring surgery in order to get the best results possible. The outcomes of surgery and patient satisfaction can be greatly impacted by anatomical changes, nutritional deficiencies, and psychological factors. A multidisciplinary strategy that includes thorough preoperative evaluations and customized treatment plans is essential for successfully tackling these issues. In order to improve surgical results and patients' overall quality of life, plastic surgeons must identify and address the particular problems that post-bariatric patients face.

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