PJPS
PAKISTAN JOURNAL OF PLASTIC SURGERY
ISSN #: 2307-213X
Volume 13, Issue 01, March 2025

CONTENTS

Editorial

Reflections Beyond the Mirror Navigating Body Dysmorphic Disorders After Rhinoplasty

Prof. M. Mustehsan, Dr. Salman Bajwa

Mental turmoil, exacerbated by post-operative stress, can complicate follow-up visits. Patients may suffer disproportionate distress, fail to acknowledge objective evidence and have unrealistic expectations and illogical concerns. Unconscious compensatory behaviors become more apparent.

These patients may exhibit features of multiple disorders. Abundant literature has primed us to diagnose these patients with body dysmorphic disorder ('I *cannot see because of my bumped* nose). Differentials to consider include somatic symptom disorder *('it feels weird breathing through my new nose'),* anxiety disorder *('I avoid gatherings out of concern for my weak nose'),* and adjustment disorder *('I cannot break the news to my family').* Such patients may acquire a variety of maladaptive defense mechanisms (unconscious processes used by the ego to decrease internal stress). Neurotic maladaptive defenses provide short-term relief, but harm long-term relations. These include controlling ('I just *need you to look deeper with a probe.')* and intellectualization *('I know that a perfectly natural result is impossible.').*Immature defenses include blocking *('I cannot concentrate on my work')* and somatization. Projection, a pathologic defense, can present as paranoid delusions *('Everyone keeps looking inside my nose').*[1]

Reflecting on these patients led us to develop a concise interview framework (acronym PULVERISE). It is appropriate for a spectrum of disorders and applies elements of various psychotherapies (supportive, cognitive behavioral and motivational):

1. Prerequisite- time. Openly acknowledge that the patient's concerns deserve and demand time and attention. Progress may be incremental, and require multiple consultations.[2]

2. Patiently Probe, and take Pauses. Resist the 'righting reflex'. Pauses help patients feel unhurried, even if visits are kept short, and gives surgeons time to consider.

3. Understand and List concerns. Having a list helps organize what may be runaway conversations.

4. Validate concerns and respond to them, *e.g., 'It is not easy to adjust to (specific changes).It is human to be concerned about one's appearance. A few other patients have had similar concerns, but I am concerned how it is affecting your (function).'*

5. Empower patients by conveying hope and supporting autonomy, e.g., Moving *forward,* I am *confident we can overcome these concerns.'*

6. Reflect on the concerns, their influence on behaviors, and how to address them. This takes time.

7. Individual reflection conserves time and allows ideas to incubate. Provide patients with a written task, e.g., to reflect on their concerns, and how they would like to see them resolved. This helps organize their thoughts, and produces a tool valuable in future visits.

8. Summarize the meeting and encourage Strategies. Summaries help bring order. Promote anticipation/preparation, humor, and suppression-these mature defense mechanisms help control mental stress. Mindfulness and peer-support have important roles.[3]

9. Establish Expectations and deliver accurate Empathy. Expectations inform goals which can define progress. The surgeon's own expectations are important. At the very least, one's expectations should be that the seriously afflicted patient will eventually agree to seek expert psychotherapy.

An early referral decision is advisable for controlling patients or those showing transference. This approach remains valid in our current experience.

Reference

1. Veale D, De Haro L, Lambrou C. Cosmetic rhinoplasty in body dysmorphic disorder. Br J Plast Surg. 2003 Sep;56(6):546-51. doi10.1016/s0007-1226(03)00209-1. PMID: 12946372.

2. Lekakis G, Picavet VA, Gabriëls L, Grietens J, Hellings PW. Body Dysmorphic Disorder in aesthetic rhinoplasty: Validating a new screening tool. Laryngoscope. 2016 Aug;126(8):1739-45. doi: 10.1002/lary.25963. Epub 2016 May25. PMID: 27223322.

3. Sahraian A, Janipour M, Tarjan A, Zareizadeh Z, Habibi P, Babaei A. Body Dysmorphic and Narcissistic Personality Disorder in Cosmetic Rhinoplasty Candidates. Aesthetic Plast Surg. 2022 Feb;46(1):332-337. doi: 10.1007/s00266-021-02603-x. Epub 2021 Nov 24. Erratum in: Aesthetic Plast Surg. 2022 Feb;46(1):593. doi: 10.1007/s00266-021-02711-8. PMID: 34820690.

Guest Editorial

A "Y" Chromosome is Not the Only Indicator of Gender Assignment: Unpacking Gender and Biology

Obaid Ullah Obaid,[1] Zaara Zahid[2]

[1-2]*Northwest General Hospital and Research Centre, Peshawar*

The conviction that the "Y "chromosome alone ascertains male gender is trivial. It is not the sole determinant of male identity. This writing aims to rethink sex, gender, and the complexity of male identity, drawing on insights from various disciplines, including paediatricians, gynaecologists, psychologists, and plastic surgeons. The following observations have been found in our gender Multi-Disciplinary Team (MDT) meetings.

(1) A child with ambiguous genitalia should not be declared any gender, based on karyotyping alone.

(2) MDT is essential as the decision should be shared by the whole team including plastic surgeons.

(3) Extreme ambiguity makes gender affirmation challenging and often leads to unsuccessful conversion of genitalia into male organs, particularly in micturition and sexual activity.

(4) Before embarking on gender re-assignment, adolescents and adults should change their attire for an agreed period as surgery is irreversible

(5) A male DSD can successfully convert to a female phenotype for appearance, and sexual relations except fertility.

(6) It must be remembered that nearly 20% of normal couples show infertility.

The Y chromosome and the complexity of male identity is an overlooked topic that needs a collaborative effort in managing sexual development disorders. Doctors are often misled by karyotyping, disregarding future progress. West encourages raising gender-neutral children, but our society lacks the freedom to do so. Therefore, educating family physicians, paediatricians, paediatric surgeons, and general surgeons along with discussing with the parents and adolescents regarding consequences in detail is indispensable.

Severe Disorders of Sexual Development (DSD) analyses show that sex determination is influenced by more than just chromosomes. Androgen insensitivity syndrome (AIS) is a condition where individuals with XY chromosomes produce testosterone but are unresponsive to androgens (1). This leads to the female phenotype affecting 1 in 64,000 births. Swyer Syndrome is another condition where individuals with XY genotype have female genitalia, but lack ovaries, leading to infertility due to underdeveloped gonads (2). Patients with 5-alpha reductase enzyme deficiency may have ambiguous genitalia due to their inability to produce active testosterone, dihydrotestosterone (DHT), crucial for male external genitalia development (3). The SRY gene on one of the XX chromosomes is found in 1/20000 males with 10% being fertile due to SRY gene translocation during mioses (4). Another group of sex-reversed patients have XY chromosomes and 20% have a loss-of-function mutation in the SRYgene (5).

Gender identity is not solely determined by karyotype, but also by a combination of biological, psychological, and social factors. Hormones regulate external genitalia and secondary sexual characteristics. The binary idea of male and female, based on genomic makeup and phenotype, has shaped society's conception of sex and gender, but does not fully consider human diversity.

The body and psyche manifestations of gender reassignment can differ from expectations, requiring the involvement of relevant specialists to ensure the

best interest of the child's future. Exclusion of plastic surgeons from section-making can lead to false hopes. From social acceptance and integration, which is crucial in our tight-knit communities to psychosocial well-being, it is important to avoid stigmatization and isolation promoting a sense of normalcy and security. Therefore, all children with the slightest ambiguity of genitalia should be discussed in an MDT and a plastic surgeon is one of the crucial members of the team.

Reference

1. Boudreau S. Beyond Just XX or XY: The Complexities of Biological Sex [Internet]. www.visiblebody.com. 2022 [cited 2024 Oct 31]. Available from: https://www.visiblebody.com/blog/beyond-just-xx-or-xy-the-complexities-of-biological-sex
2. Claire Ainsworth. Sex Redefined: The Idea of 2 Sexes Is Overly Simplistic [Internet]. Scientific American. 2018 [cited 2024 Nov 2]. Available from: https://www.scientificamerican.com/article/sex-redefined-the-idea-of-2-sexes-is-overly-simplistic1/
3. Montañez A. Beyond XX and XY. Scientific American [Internet]. 2017 Aug 15 [cited 2024 Nov 1];317(3):50–1. Available from: https://www.scientificamerican.com/article/beyond-xx-and-xy-the-extraordinary-complexity-of-sex-determination/
4. Carlson BM. Urogenital System. Elsevier eBooks [Internet]. 2014 Jan 1 [cited 2024 Nov 9];376–407. Available from: https://www.sciencedirect.com/topics/immunology-and-microbiology/sry-gene#chapters-articles
5. Maloy SR, Brenner S. Brenner's Encyclopedia of Genetics. 2nd ed. San Diego: Academic Press; 2013.

https://doi.org/10.5455/pjps.1702062656

Research Article

Facial Artery Musculomucosal Flap for Closure of Fistula After Cleft Palate Surgery

Hassan Saeed Khan,[1] Farhan Gohar,[2] Muhammad Aslam Khan,[3] Shiza Naeem,[4] Umar Iqbal,[5] Javeria Khan[6]

[1-4]Department of Paediatric Plastic Surgery, The Children's Hospital, Lahore; [5]Rashid Latif Medical College, Lahore; [6]Royal Preston Hospital, Lancashire, United Kingdom

Abstract

Background: Palatal fistula is the most common complication of palatal repair. Most anterior palatal fistulas need tongue flap for closure, which is a two-stage procedure. In this article, we have used facial artery musculomucosal (FAMM) flap technique, for closure of anterior palatal fistula as a single stage procedure.

Methodology: Twenty-four patients with an oronasal fistula size range between 0.5-2cm² underwent the FAMM flap procedure. Follow-up was up to 2 years, assessing flap viability, recurrent fistulas, and speech changes.

Results: The flap showed promising outcomes, with one case of partial necrosis and no recurrent fistulas. The procedure achieved reduction in the velopharyngeal insufficiency.

Conclusion: FAMM flap offers a reliable one-stage option for oronasal fistula repair, demonstrating minimal complications and improved speech and oral hygiene. Further studies should assess velopharyngeal function in patients undergoing FAMM flap.

Received | 08-12-2023 **1st Revision** | 25-05-2024 **2nd Revision** | 22-08-2024 **Accepted** | 28-08-2024

Corresponding Author | Dr. Muhammad Aslam Khan, Associate Professor, The Children's Hospital & The University of Child Health Sciences , Lahore.

Email: muhammad.raoaslam@gmail.com

Keywords | : Facial artery musculomucosal flap, oronasal fistula, palate reconstruction, velopharyngeal function, palate surgery.

Introduction

Fistula formation is the most frequent complication after surgery of a cleft palate. The reported incidence of this complication ranges between 8% and 40%[1], particularly in cases of bilateral complete cleft palate. Several factors can contribute to this with most important being the class and extent of cleft, procedure used for repair and the expertise of operating consultant[2,3]. The majority of fistulas occur at the midpoint where hard palate and soft palate meet, but in cases where the cleft is bilateral they occur mostly in the anterior most area close to alveolar arch. Repairing wide clefts or recurrent fistulas can be challenging due to severe scarring and tissue deficiency. Various local flap options have been employed for fistula repair, utilizing local mucoperiosteal flaps. Nasolabial flaps and buccal mucosal flaps, have been historically used.[2] While the tongue flap[3,4] is an effective option for difficult palatal fistulas, it necessitates a two-stage procedure, limiting its acceptance, especially among children.

Addressing the need for a one-step procedure with vascularized mucosal tissue, Pribaz et al. introduced the FAMM flap in 1992.[1] Combining principles from buccal mucosal and nasolabial flaps, the FAMM flap, based on the facial artery, proves reliable and versatile. It has been successfully utilized in various reconstructive scenarios, including oronasal mucosal lip, vermilion, nasal, and palate reconstruction. Notably, it has demonstrated efficacy in anterior cleft fistula repair, making it a valuable choice.[4]

Methodology

Our study analysed the retrospective data of all the patients who were treated with facial artery myomucosal flap for the repair of fistula in anterior palate secondary to previous palate repair procedure. All patients presented with complaints of regurgitation of food or water from nose during eating or drinking along with variable degree of hypernasality during speech. All the surgical outcomes and characteristics of patients were reviewed. The results were labelled as successful if there was no recurrence of oronasal fistula and no subsequent surgeries were required for the fistula.

Operative technique

FAMM flap is based on facial artery and corresponding vein and since it is an axial pattern flap it is designed along the course of the artery and must incorporate the artery in its entire length. Facial artery arises from external carotid artery. After its origin the artery courses upwards over the mandible close to the medial border of masseter muscle, it then travels upwards on the cheek in close proximity to the oral commissure finally coursing towards the lateral wall of nose across the ala dividing into various branches mainly angular artery. Facial vein always courses posterior to the artery[5]. There is a gradual increase in the distance between facial artery and vein as they course much closer to each other at the upper border of mandible with average distance of 4 mm between each other, which becomes almost 15 mm by the time the artery and vein reach at nasal ala. These anatomical observations are very important while planning a surgery as they play a key role when the operating surgeon plans to raise a flap, which is based superiorly. Along with facial artery, the flap also contains deeper fibres of orbicularis oris muscle, some part of buccinators muscle, submucosa and buccal mucosa[6]. Because of the axial nature of the flap it is highly reliable and versatile in its design and can be planned based on either the superior flow or inferior flow with equal reliability. However, when the flap is designed based on superior flow it has the added advantage of a longer arc of rotation than the inferiorly based flap and can reach the far distant areas up to lower orbit, nasal floor and upper lip in addition to alveolar and hard palatal defects[7].

The procedure was conducted with the patient under general anaesthesia, with endotracheal tube placed through mouth. The patient head was place in a position for palatal surgery with neck extension. A handheld Doppler was used to mark the whole course of facial artery from the border of mandible to ala of nose. A Dingman mouth gag was employed to maintain mouth opening.

Before the dissection, a solution of lignocaine and adrenaline was used to infiltrate all the margins of fistula. Dissection was carried out circumferentially making sure that the continuity between fistula margins and alveolar cleft is maintained. Nasal mucosal layer was aimed to be closed primarily by turned down flaps. The flap was usually raised from the side when there was open alveolar cleft in unilateral clefts, on the contrary, it was preferred to be raised from the side of a large fistula or left or right side depending on the handedness of the operator when there is no disparity of size in cases of bilateral clefts.

The flap was designed using reverse planning, creating a paper template covering the defect and indicating the pedicle's length. Flap was infiltrated with a mixture of adrenaline and lignocaine for postoperative analgesia and hydro dissection during flap raising. The flap, up to 30 mm long and 15 mm wide, was designed below the level of parotid duct to prevent inadvertent injury.

Incision was made through buccal mucosa, submucosa, underlying muscle into the buccal fat layer along the outline of the marked flap. After identifying facial artery was divided at the inferior border of flap. As the flap was raised retrograde, the blood supply was maintained through angular artery. A bridge of mucosa was maintained over the pedicle. Sub-periosteal dissection over the maxilla allowed tension free transfer of the flap. After advancing the flap through alveolar cleft, it was sutured into the defect using 5/0 polygalactin suture, and primary closure of donor site was done with 5/0 Polygalactin suture which absorb over four weeks time.

Postoperatively patients were managed with an intravenous cannula for the administration of pain medication and fluids. Subsequently, they were advised to consume soft food. No specific measures were required for the care of the surgical site except for ensuring its protection from harm until it heals. The stitches on the palate advised naturally dissolved in 6 weeks.

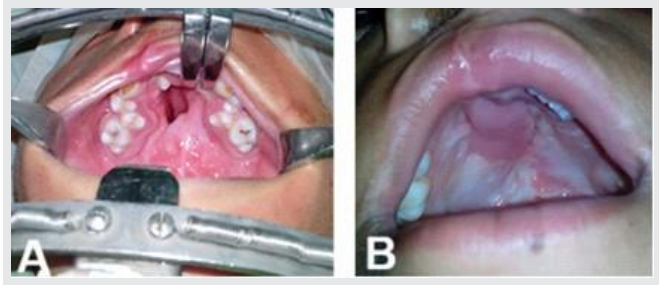

Figure1. *7-year old child with right sided cleft lip and palate with anterior palatal fistula (A) after Famm Flap*

Figure 2. *12-year-old patient underwent surgery for complete unilateral left cleft palate (Veau type III). Pre- and post-surgery appearance of a large (>5mm) Pittsburgh types IV and V hard palate fistula, undergoing two layered closure of fistula in a single stage.(A-E)*

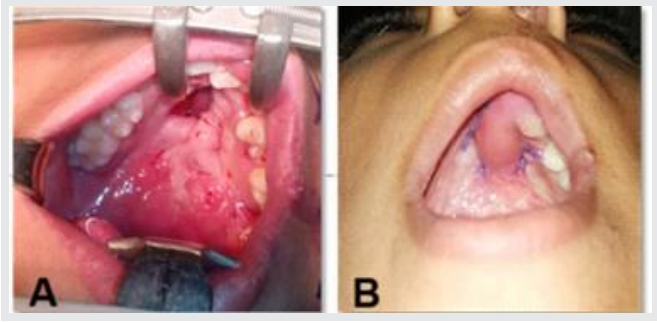

Figure 3: *8-Year-Old Girl with Left Unilateral Cleft and Palate with Anterior Nasoalveolar Fistula(A) Covered With Superior Based Facial Artery Musculomucosal Flap(B)*

Results

Twenty-four patients were included in this series. The average age was 4 years (range, 2 to 9 years). Ten patients had an oronasal fistula in the setting of bilateral cleft lip–cleft palate, two had unilateral cleft lip–cleft palate, one had an isolated cleft palate, and one had a palatal soft-tissue injury. Average oronasal fistula size was 1.5 cm^2 (range, 0.5 to 2 cm^2). Three patients required bilateral facial artery Musculomucosal flaps. The average follow-up was 2 years. There were no complete flap loss or donor-site complications. All patients were free of recurrent oronasal fistula. One patient had necrosis of the distal end (< 1 cm^2) requiring a revision.{Figure 1-4}, [Table 1]

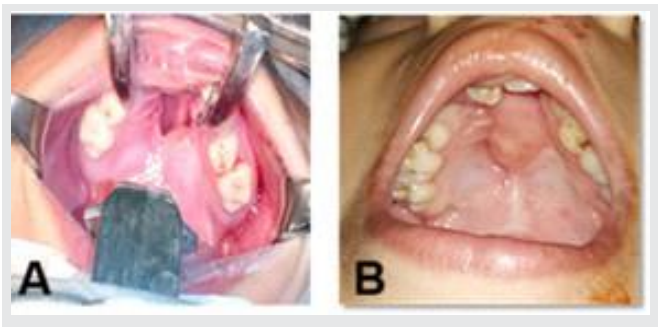

Figure 4: *A 7-year-old patient with a complete bilateral cleft lip and palate (Veau type IV) undergone surgery to address hard palate fistula (>5 mm), causing regurgitation and contributing to hypernasality and halitosis (A). Closure by left sided Facial Artery Musculomucosal (FAMM) flap(B).*

Table 1: *Patients Criteria and FAMM Flap Results*

Patient Criteria	No.	%
Age (2–9 Years; Mean 4 ± 2 Years)		
Gender		
Male	10	41.66
Female	14	58.33
Fistula Site		
Anterior Palate	14	58.33
Junction	10	41.66
Fistula Size		
Small (<0.5 Cm)	9	37.5
Medium (0.5-2 Cm)	15	62.5
Fistula Closure		
Satisfactory	23	95.84
Unsatisfactory	1	4.16
Complication		
Venous Congestion	3	12.5
Dehiscence	1	4.16
Flap Revision	1	4.16
2 Years Follow Up	24	100

Discussion

Different authors have reported many variations of the facial artery musculomucosal (FAMM) flap in the literature. Massarelli et al[6,7]. described an islanded flap involving the dissection of flap island and its

vascular pedicle all the way upto the external carotid artery, requiring the creation of a tunnel in the perimandibular space through floor of the mouth. Similarly Jackson et al[8]. in their respective studies used a different technique to repair oronasal fistula using a buccinator based random pattern buccal myomucosal flap and an incision in the palate would be required for the insetting of flap. In order to maintain the unobstructed motion of palate or without altering its length Matros et al[9]. reported creation of space for FAMM flap across retro molar trigone using medially based mucoperiosteal flap.

The FAMM flap technique, used for oronasal fistula types II-IV [10,11], involves flap insetting in the retro molar trigone and the velum to push back palate, resulting in an 18% average lengthening. Revision intravelar veloplasty further improves levator musculature repair[12,13]. While perceptual speech improved patients, further studies using video Naso-endoscopy and video fluoroscopyis required to assess the impact on velopharyngeal insufficiency.

The FAMM flap proves advantageous for anterior hard palate fistula closure due to its axial pattern, single-stage requirement, and minimal donor site morbidity[14]. Mouth opening reduction is temporary, and patient compliance is crucial for success.[15] Careful patient selection, particularly regarding behavioural issues, is essential. In complex cases which have recurrent fistulas after failed attempts to close them by local tissue or cases where anterior hard palate has wide fistula, the FAMM flap is considered the optimal surgical choice, providing highly vascular tissue closely matching the replaced tissue's characteristics with minimal donor site morbidity[16,17].

Conclusions

FAMM flap emerges as a fitting choice for the reconstruction of small to medium-sized palatal fistulas due to its dependable nature and versatile characteristics. This flap demonstrates minimal complications and guarantees satisfactory functional outcomes following palatal fistula repair, primarily owing to its remarkable similarity to palatal tissue. Positioned as an excellent option, FAMM flap excels in reconstructing fistulas located at the junction of hard and soft palate and also anterior part of hard palate as both of these sites are most prevalent for fistula formation following cleft palate surgery.

Conflict of interest: *None*

Source of funding: *None*

Author's Contribution

Hassan Saeed Khan: Study design, drafting of work, Data Collection and final approval of the version.

Farhan Gohar: Conception and design of the study, critical revision of the article and final approval of the article to be published.

Muhammad Aslam Khan: Conception and design of the study, data collection, analysis and interpretation, Drafting the work Final approval of the version to be published and 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.

Shiza Naeem: Data collection, Manuscript Revision, analysis and interpretation of data and final approval of the version.

Umar Iqbal: Data collection, Manuscript Revision, analysis and interpretation of data and final approval of the version.

Javeria Khan: Contribution to conception and design of study, Data Interpretation and Analysis and final approval of the version.

References

1. Pribaz J, Stephens W, Crespo L, Gifford G. A new intraoral flap: facial artery musculomucosal (FAMM) flap. Plast Reconstr Surg. 1992 Sep;90(3):421-9. doi: 10.1097/00006534-199209000-00009. PMID: 1513887.
2. Coghlan K, O'Regan B, Carter J. Tongue flap repair of oro-nasal fistulae in cleft palate patients. A review of 20 patients. J Craniomaxillofac Surg. 1989 Aug;17(6):255-9. doi: 10.1016/s1010-5182(89)80093-9. PMID: 2768480.
3. Mukherji MM. Cheek flap for short palates. Cleft Palate J. 1969 Oct;6:415-20. PMID: 5260747.
4. Posnick JC, Getz SB Jr. Surgical closure of end-stage palatal fistulas using anteriorly-based dorsal tongue flaps. J Oral Maxillofac Surg. 1987 Nov;45(11):907-12. doi: 10.1016/0278-2391(87)90438-1. PMID: 3478437.
5. Kobayashi S, Fukawa T, Hirakawa T, Maegawa J. The folded buccal musculomucosal flap for large palatal fistulae in cleft palate. Plast Reconstr Surg Glob Open. 2014 Mar 6;2(2):e112. doi: 10.1097/GOX.0000000000000058. PMID: 25289306; PMCID: PMC4174597.

6. Massarelli O, Baj A, Gobbi R, Soma D, Marelli S, De Riu G, Tullio A, Giannì AB. Cheek mucosa: a versatile donor site of myomucosal flaps. Technical and functional considerations. Head Neck. 2013 Jan;35(1):109-17. doi: 10.1002/hed.22933. Epub 2012 Jan 31. PMID: 22290874.
7. Massarelli O, Gobbi R, Soma D, Tullio A. The folded tunnelized-facial artery myomucosal island flap: a new technique for total soft palate reconstruction. J Oral Maxillofac Surg. 2013 Jan;71(1):192-8. doi: 10.1016/j.joms.2012.03.030. Epub 2012 Jun 15. PMID: 22705225.
8. Jackson IT, Moreira-Gonzalez AA, Rogers A, Beal BJ. The buccal flap--a useful technique in cleft palate repair? Cleft Palate Craniofac J . 2004 Mar;41(2):144-51. doi: 10.1597/02-124. PMID: 14989691.
9. Matros E, Swanson EW, Pribaz JJ. A modification of the facial artery musculomucosal flap for palatal reconstruction in patients with intact dentition. Plast Reconstr Surg. 2010 Feb;125(2):645-647. doi: 10.1097/PRS.0b013e3181c87b25. PMID: 20124849.
10. Jodeh DS, Nguyen ATH, Rottgers SA. Outcomes of Primary Palatoplasty: An Analysis Using the Pediatric Health Information System Database. Plast Reconstr Surg. 2019 Feb;143(2):533-539. doi: 10.1097/PRS.0000000000005210. PMID: 30688897.
11. Stein MJ, Zhang Z, Fell M, Mercer N, Malic C. Determining postoperative outcomes after cleft palate repair: A systematic review and meta-analysis. J Plast Reconstr Aesthet Surg. 2019 Jan;72(1):85-91. doi: 10.1016/j.bjps.2018.08.019. Epub 2018 Sep 5. PMID: 30253932.
12. Landheer JA, Breugem CC, van der Molen AB. Fistula incidence and predictors of fistula occurrence after cleft palate repair: two-stage closure versus one-stage closure. Cleft Palate Craniofac J. 2010 Nov;47(6):623-30. doi: 10.1597/09-069. PMID: 21039279.
13. Bykowski MR, Naran S, Winger DG, Losee JE. The Rate of Oronasal Fistula Following Primary Cleft Palate Surgery: A Meta-Analysis. Cleft Palate Craniofac J. 2015 Jul;52(4):e81-7. doi: 10.1597/14-127. Epub 2014 Oct 16. PMID: 25322441.
14. Diah E, Lo LJ, Yun C, Wang R, Wahyuni LK, Chen YR. Cleft oronasal fistula: a review of treatment results and a surgical management algorithm proposal. Chang Gung Med J. 2007 Nov-Dec;30(6):529-37. PMID: 18350736.
15. Lakhera KK, Singhal PM, Patel P, Babu A, Daima M, Chatterjee A, Singh S, Gora BS, Agarwal NK. Reconstructing Small-Medium Sized Oral Cavity Defects- Our Experience with the Versatile Famm Flap. Indian J Otolaryngol Head Neck Surg. 2023 Dec;75(4):3432-3438. doi: 10.1007/s12070-023-03946-4. Epub 2023 Jun 27. PMID: 37974893; PMCID: PMC10645677.
16. Saralaya S, Desai AK, Kumar N. Difficulty Index-Based Management of Palatal Fistula After Primary Cleft Palate Repair: An Institutional Experience. J Oral Maxillofac Surg. 2019 Apr;77(4):851.e1-851.e7. doi: 10.1016/j.joms.2018.12.005. Epub 2018 Dec 18. PMID: 30641033.
17. Rothermel AT, Lundberg JN, Samson TD, Tse RW, Allori AC, Bezuhly M, Beals SP, Sitzman TJ. A Toolbox of Surgical Techniques for Palatal Fistula Repair. Cleft Palate Craniofac J. 2021 Feb;58(2):170-180. doi: 10.1177/1055665620949321. Epub 2020 Aug 18. PMID: 32806926; PMCID: PMC8150164.

https://doi.org/10.5455/pjps.1706000831

Research Article

Functional Outcome of Upper Limb Reconstruction After Resection of Soft Tissue Sarcoma

Shah Zaib Aslam,[1] Rashmeen Khan Afridi,[2] Adeela Hussain Khan,[3] Farwa Shabbir,[4] Maimoona Goher[5]

[1-5]*Department of Plastic Surgery Shifa International Hospital, Islamabad*

Abstract

Background: About 20% all soft tissue sarcoma involve the upper limb. Extensive surgical resections often require reconstruction. The aim of reconstruction is an aesthetic and functional upper limb.

Objective: To determine the functional outcome of upper limb reconstruction after resection of soft tissue sarcoma. This is a retrospective Cohort Study was done at Plastic and Reconstructive Surgery Shifa International Hospital Islamabad Pakistan, from January 2013 to December 2022.

Methodology: Patient of either gender, between the age of 18 to 70 years, requiring upper limb reconstruction after resection of soft tissue sarcoma were included in this study. The WHO Sample Size calculator calculated the sample size 50%. Patients were clinically evaluated up to a six-month follow-up period using the Musculoskeletal Tumor Society (MSTS) Score to evaluate functional outcomes. Functional outcomes were labelled as excellent (>25 score), Good (20-25 Score), Satisfactory (10-19 Score) and Poor (< 10 score).

Results: The Mean Baseline MSTS Score was 7.78±2.105 while the six-month Mean follow-up MSTS Score was 23.53±3.829. There was a statistically significant difference between the MSTS Scores pre and post-operatively with a p-value < 0.001. Free flaps had 51.4% of Excellent functional outcomes while the Pedicled flaps had 30.0% of Excellent functional outcomes. Fifty-one (92.7%) patients had no complications while only 01 (1.8%) patient had partial flap loss and 03 (5.5%) patients had complications of wound infection and delayed wound healing.

Conclusion: Excellent functional outcome was achieved in the appropriate immediate reconstruction of the soft tissue defect following sarcoma resection in the upper limb.

Received | 29-01-2024 **1st Revision** | 15-02-2024 **2nd Revision** | 10-06-2024 **Accepted** | 24-06-2024

Keywords | Functional Outcome, hand, limb-sparing surgery, Upper Limb Reconstruction, Resection, Soft Tissue Sarcoma.

Introduction

Primary Soft Tissue Sarcomas (STS) are uncommon and make up only 1% of all adult malignancies however they are highly varied tumors that can originate almost anywhere in the body, affect people of all ages and share a mesenchymal origin.[1] About 20 % of all STS are found in the upper extremities and diagnosed at a median age of 38 years.[2] Higher incidence of Malignant Fibrous Histiocytoma/Undifferentiated Pleomorphic Sarcoma (UPS), Synovial Sarcoma (SS), Epithelioid Sarcoma (ES) and Clear Cell Sarcoma (CCS) are reported on the upper extremities, out of 50 different histological and molecular subtypes.[3]

Over the past few decades, the 5-year survival rate of STS patients has improved to 80% with the recent treatment guidelines.[4] Gold standard treatment for STS patients is limb preservation surgery and only a small proportion of about 5% will require amputation. A multidisciplinary team approach is always needed, choosing surgery with a combination of neoadjuvant or adjuvant chemotherapy and/or radiotherapy, which probably minimizes local spread

in more than 90% of cases and has an excellent effect on disease-free survival.[5] In the past, patients with larger or higher-grade tumors often had amputation as a treatment option.[6] Due to the advent of adjuvant therapy and sophisticated reconstructive techniques, the survival rate has improved and a fall in recurrence rate has also been noticed.[7] Studies have reported almost 90% of excellent functional outcomes in patients who underwent upper limb reconstruction after resection of STS.[8-10]

For patients with STS of the extremities, a resection strategy comprises free-margin excision, reconstructive surgery that is both aesthetically and functionally acceptable, and application of supportive therapy protocols.[11] At the expense of disease-free margins large soft tissue defects are formed with the involvement of tendons, vessels, and nerves. That will require reconstruction of the involved structures with pedicled or free tissue transplantation to achieve a functional limb.

Large complex soft tissue defects are formed after STS resection in the upper extremities. Pedicled or free flap reconstruction is often required for coverage of defect. Additional procedures such as nerve & tendon reconstruction are also required to restore the functionality of the involved limb.

The research aims to find out the functional outcome of upper limb reconstruction after resection of STS and offer significant perspectives into the effectiveness of treatment, quality of life of the patient, and informed clinical decision-making. The findings from this study will benefit both healthcare providers and patients, ultimately leading to better outcomes for patients with STS requiring upper limb reconstruction in our local population.

Methodology

This retrospective study was conducted at Plastic and Reconstructive Surgery Shifa International Hospital Islamabad Pakistan, from January 2013 to December 2022. Ethical approval Ref No: (IRB # 0325-23) was obtained from the Ethical Committee and Institutional Review Board. The WHO Sample Size calculator calculated the sample size with 90% proportion of excellent functional outcome of upper limb reconstruction surgery for extremity sarcoma and 5% significance level. Data were collected using a nonprobability consecutive sampling approach.

Patients of either gender between the ages 18 to 19 years with upper limb Soft Tissue Sarcoma requiring reconstruction after resection were included in this study.

All selected patients provided written informed consent, and all underwent a preoperative evaluation of function using the Musculoskeletal Tumor Society (MSTS) score. All patients had a wide local resection, immediate reconstruction with pedicled or free flap including adjunctive procedures like nerve reconstruction, tendon transfer, vascular reconstruction and adjuvant chemotherapy or radiotherapy was done when indicated. After the reconstruction, patients were clinically evaluated by the Consultant Plastic Surgeon twice weekly for the first month and then once weekly for the next six months. To assess functional outcomes during follow-up visits, MSTS Score was used. This Scoring system was 6 categories pain, function, emotional acceptance, hand positioning, manual dexterity and lifting ability. Each category has a scale of 0 to 5, with 5 showing the maximum and 0 showing no function and on aggregate. They will be labeled as excellent (>25 score), Good (20-25 Score), Satisfactory (10-19 Score) and Poor (< 10 score).

Statistical Package for Social Sciences (SPSS) version 23.0 was used to conduct the statistical analysis. Concerning quantitative data, mean+SD was computed. Qualitative variables were recorded as frequencies and percentages. Cross-tabulation analysis was performed for comparison of functional outcome and type of reconstruction. The quantitative and qualitative variables were analyzed using the independent samples t-test and chi-square test, with p-values < 0.05 indicating significance.

Results

This study comprised of a total fifty-five patients. The patient's mean age was 53.38 ± 8.601 years. Total number of male patients was 31 (56.4%) and female were 24 (43.6%). The mean baseline MSTS Score was 7.78 ± 2.105 while the Mean follow-up MSTS Score was 23.53 ± 3.829. Fifty-one (92.7%) patients had no complications while only 01 (1.8%) patient had partial flap loss and 03 (5.5%) patients had minor complications including delayed wound healing and wound infection, which were managed non-invasively in an OPD setup. Between the pre-and

post-operative MSTS Scores, there was a statistically significant difference (p-value < 0.001). (Table-I)

Table 1: *Demographic and Clinical characteristics of patients (n=55)*

• Age (Years)	53.38 ±8.601	<0.001
• Baseline MSTS Score	7.78 ±2.10	
• Follow up MSTS Score	23.53 ±3.829	
Qualitative Variables		
Gender,	**n (%)**	
• Male	31 (56.4%)	
• Female	24 (43.6%)	
Anatomical Region,	**n (%)**	
• Shoulder	18 (32.7%)	
• Elbow and Arm	13 (23.6%)	
• Forearm and Wrist	15 (27.3%)	
• Hand	09 (16.4%)	
Complications,	**n (%)**	
• Partial flap loss	01 (1.8%)	
• Wound infection	03 (5.5%)	
• Non	51 (92.7%)	

Twenty-four (43.62%) had excellent functional outcomes followed by 21 (38.2%) patients with good and 09 (16.4%) patients with satisfactory functional outcomes. However, only 01 (1.8%) patient with poor functional outcome was recorded due to complication of partial pedicled flap loss. (Table-II)

Thirty-one (56%) patients had neoadjuvant radio/chemotherapy. No significant difference in total functional outcome was observed but Patients who received preop radiotherapy had post-op delayed wound healing. Table III shows the type of reconstruction done and also compares their MSTS scores.

Table 2: *Functional Outcome of Patients (n=55)*

Functional outcome	n (%)
Excellent	24 (43.6%)
Good	21 (38.2%)
Satisfactory	9 (16.4%)
Poor	1 (1.8%)
Total	**55 (100.0%)**

The pre-op MSTS Score and post-op MSTS Score of STS of upper extremity reconstruction with free flaps were compared with a pedicled flap and are tabulated in Table III. There was no significant difference in pre- and post-op MSTS scores in the free flap and pedicled flap groups.

Table 3: *Type of soft tissue reconstruction done (n=55)*

Free Flap	35 (63.6%)	8.29+2.094	24.31+2.898
Pedicled Flap	20 (36.4%)	6.90+1.861	22.15+4.848
Total	55 (100%)	7.78+2.105	23.53+3.829

This study further investigated the relationship between the type of reconstruction and the functional outcome. Free flaps had 51.4% of Excellent functional outcomes, 40.0% of Good functional outcomes, 8.6% of satisfactory and 0.0% of poor functional outcome. While the pedicled flaps had 30.0% of Excellent, 35% of Good, 30% of Satisfactory and 5% of Poor functional outcome. (Table-IV)

However, the p-value 0f 0.081 indicates that these observed differences in functional outcomes between free flap and pedicled flaps are not statistically significant.

Table 4: *Association of Functional Outcome with Type of Reconstruction (n=55)*

			Functional Outcome				Total	p-value
			Excellent	Good	Satisfatory	Poor		
Type Of Reconstruction	Free flap	Count	18	14	3	0	35	0.081
		% within Type Of Reconstruction	51.40%	40.00%	8.60%	0.00%	100.00%	
	Pedicled Flap	Count	6	7	6	1	20	
		% within Type Of Reconstruction	30.00%	35.00%	30.00%	5.00%	100.00%	
Total		Count	24	21	9	1	55	
		% within Type Of Reconstruction	43.60%	38.20%	16.40%	1.80%	100.00%	

Discussion

According to the reconstructive ladder, primary closure is considered first in the complex management of wounds. After achieving clear margins, definitive and immediate reconstruction should be followed.[12,13] Our study investigated the functional outcomes of upper limb reconstruction after resection of STS in 55 patients. The type of reconstruction was dependent on the defect size after the excision, its type, depth, proximity of a local flap and also the patient factors like age, history of radiation and comorbidities. Tumors at the wrist and hand required free flap because of anatomic position, structures involved and extensive resection to obtain clear margins[14]. Free flaps are more desirable when the available local flaps are of a radiated nature which makes it difficult for flap designing and elevation.[15,16]

On the other hand, primary amputation should be considered for irresectable tumors where clear margins cannot be achieved based on pre-op imaging. A primary amputation should be considered for those cases where tumor resection will result in severe soft tissue loss and severe functional deficit that cannot be restored with available surgical procedures or the anticipated high complication rate.[17]

The mainstay of the best functional outcome is the achievement of disease-free margins of STS, selection of the best available reconstructive option and following post-op rehabilitation regime.

The patients in our study had a low baseline Musculoskeletal Tumor Society (MSTS) Score (7.78), indicating poor functional outcomes before surgery. After upper limb reconstruction, there was a significant improvement in functional outcomes, with a mean follow-up MSTS Score of 23.53 (p-value < 0.001). This suggests that the surgical intervention led to substantial enhancements in functional status. The majority of patients (43.6%) achieved excellent functional outcomes, followed by 38.2% with good outcomes, and 16.4% with satisfactory outcomes. Only 1 had poor outcomes and this was the patient that had partial flap loss. Gender did not significantly influence functional outcomes. These findings provide valuable insights into the effectiveness of surgery procedure in improving the standard of living for those suffering from soft tissue sarcoma.

High-grade tumors involving the wrist and hand required free flap reconstruction because of the anatomic positions and structures involved. Delayed wound healing and infections were noted in the majority of those patients who had received radiation preoperatively. A previous study[18] assessed the functional outcome of upper extremity following wide local excision of STS in 72 patients over a period of 9 years with reconstruction and adjuvant therapy as required. The Toronto Extremity Salvage Score (TESS) was scored for the functional outcome and achieved good to excellent function (TESS mean of 87 out of 100).[18]

Our study revealed that there was no discernible difference in the functional outcome between the groups with pedicled and free flaps. Caroline et al compared the pre-and post-operative upper extremity function after STS excision with pedicled and free flap reconstruction in 113 patients,.[19] showed similar results. The Toronto Extremity Salvage Score (TESS) and the Musculoskeletal Tumor Society (MSTS) score were used to evaluate the functional results.[19]

Another study by kim et al.[20] assessed the functional outcome of upper extremity reconstruction after resection of STS in 83 reconstructions in 81 patients, including 16 microvascular and 67 non-microvascular reconstructions. The mean total functional score was 23.1 (Good) and indicating that limb-sparing surgery is effective in producing favorable functional results.

When performing limb salvage procedures for upper extremity sarcomas, free and pedicled flaps are an essential component of the reconstructive toolbox. The complex and intricate anatomy of the upper extremity should not discourage us from aiming for limb salvage. A reasonable treatment option for individuals with primary STS of the upper extremities is limb reconstruction surgery as in our study excellent functional outcomes with both free and pedicled flap reconstructions were noted. Free flaps create well-vascularized tissue that promotes wound healing and tolerates radiation well.

STSs are relatively rare, and the small sample size of this study can affect the generalizability of the findings to a broader population. Therefore, it's essential to acknowledge that these results may not apply to all STS patients.

Conclusion

Excellent functional outcome was achieved with appropriate immediate reconstruction of the soft tissue defect following sarcoma resection in the upper limb.

Conflict of interest: None

Source of funding: None

Author's Contribution

Shah Zaib Aslam: Conception and design of the study, data analysis and interpretation, agreement to be accountable for all aspects of the work and final approval of the version to be published

Rashmeen Khan Afridi: substantial contribution to acquisition of data, concept and design and final approval of the version to be published

Adeela Hussain Khan: Interpretation of data, Critical revision of the article and final approval of the study.

Farwa Shabbir: Interpretation of data Critical, revision of the article and final approval of the study

Maimoona Goher: Concept and design, substantial contribution to acquisition of data, critical review and final approval of the study.

References

1. Wiffen J, Mah E. Determining functional outcomes after resection and reconstruction of primary soft tissue sarcoma in the lower extremity: A review of current subjective and objective measurement systems. J Surg Oncol. 2023 Apr;127(5):862-870. doi: 10.1002/jso.27202. Epub 2023 Jan 22. PMID: 36683344.
2. Stiller CA, Trama A, Serraino D, Rossi S, Navarro C, Chirlaque MD, Casali PG; RARECARE Working Group. Descriptive epidemiology of sarcomas in Europe: report from the RARECARE project. Eur J Cancer. 2013 Feb;49(3):684-95. doi: 10.1016/j.ejca.2012.09.011. Epub 2012 Oct 15. PMID: 23079473.
3. Lazerges C. Soft tissue sarcomas of the forearm, wrist and hand. Hand Surg Rehabil. 2017 Sep;36(4):233-243. doi: 10.1016/j.hansur.2016.12.010. Epub 2017 Jun 16. PMID: 28624293.
4. Abarca T, Gao Y, Monga V, Tanas MR, Milhem MM, Miller BJ. Improved survival for extremity soft tissue sarcoma treated in high-volume facilities. J Surg Oncol. 2018 Jun;117(7):1479-1486. doi: 10.1002/jso.25052. Epub 2018 Apr 6. PMID: 29633281; PMCID: PMC6322682.
5. Martin E, Dullaart MJ, van de Sande MAJ, van Houdt WJ, Schellekens PPA, Coert JH. Resuscitating extremities after soft tissue sarcoma resections: Are functional reconstructions an overlooked option in limb salvage? A systematic review. Eur J Surg Oncol. 2019 Oct;45(10):1762-1769. doi: 10.1016/j.ejso.2019.05.024. Epub 2019 May 31. PMID: 31178300.
6. Erstad DJ, Ready J, Abraham J, Ferrone ML, Bertagnolli MM, Baldini EH, Raut CP. Amputation for Extremity Sarcoma: Contemporary Indications and Outcomes. Ann Surg Oncol. 2018 Feb;25(2):394-403. doi: 10.1245/s10434-017-6240-5. Epub 2017 Nov 22. PMID: 29168103.
7. Casali PG, Abecassis N, Aro HT, Bauer S, Biagini R, Bielack S, Bonvalot S, et al ESMO Guidelines Committee and EURACAN. Soft tissue and visceral sarcomas: ESMO-EURACAN Clinical Practice Guidelines for diagnosis, treatment and follow-up. Ann Oncol. 2018 Oct 1;29(Suppl 4):iv51-iv67. doi: 10.1093/annonc/mdy096. Erratum in: Ann Oncol. 2018 Oct 1;29(Suppl 4):iv268-iv269. doi: 10.1093/annonc/mdy321. PMID: 29846498.
8. Yang X, Zhang L, Yang X, Yu W, Fu J. Oncologic outcomes of pre- versus post-operative radiation in Resectable soft tissue sarcoma: a systematic review and meta-analysis. Radiat Oncol. 2020 Jun 23;15(1):158. doi: 10.1186/s13014-020-01600-9. PMID: 32576267; PMCID: PMC7310344.
9. Roland CL, van Houdt W, Gronchi A. The Landmark Series: Multimodality Treatment of Extremity Sarcoma. Ann Surg Oncol. 2020 Oct;27(10):3672-3682. doi: 10.1245/s10434-020-08872-1. Epub 2020 Jul 27. PMID: 32720044; PMCID: PMC7603653.
10. Evans DR, Lazarides AL, Visgauss JD, Somarelli JA, Blazer DG 3rd, Brigman BE, Eward WC. Limb salvage versus amputation in patients with osteosarcoma of the extremities: an update in the modern era using the National Cancer Database. BMC Cancer. 2020 Oct 14;20(1):995. doi: 10.1186/s12885-020-07502-z. PMID: 33054722; PMCID: PMC7557006.
11. Collin C, Hajdu SI, Godbold J, Friedrich C, Brennan MF. Localized operable soft tissue sarcoma of the upper extremity. Presentation, management, and factors affecting local recurrence in 108 patients. Ann Surg. 1987 Apr;205(4):331-9. doi: 10.1097/00000658-198704000-00001. PMID: 3566371; PMCID: PMC1492734.
12. Lawrenz JM, Mesko NW, Marshall DC, Featherall J, George J, Gordon J, Vijayasekaran A, Nystrom LM, Schwarz GS. Immediate Versus Staged Soft Tissue Reconstruction After Soft Tissue Sarcoma Resection Has Similar Wound and Oncologic Outcomes. Ann Plast Surg. 2020 Aug;85(2):163-170. doi: 10.1097/SAP.0000000000002192. PMID: 31913884.

13. Perrault DP, Lee GK, Yu RP, Carre AL, Chattha A, Johnson MB, Gardner DJ, Carey JN, Tseng WW, Menendez LR, Wong AK. Risk Factors for Wound Complications After Soft Tissue Sarcoma Resection. Ann Plast Surg. 2021 Mar 1;86(3S Suppl 2):S336-S341. doi: 10.1097/SAP.0000000000002592. PMID: 33234885.
14. Payne CE, Hofer SO, Zhong T, Griffin AC, Ferguson PC, Wunder JS. Functional outcome following upper limb soft tissue sarcoma resection with flap reconstruction. J Plast Reconstr Aesthet Surg. 2013 May;66(5):601-7. doi: 10.1016/j.bjps.2013.01.034. Epub 2013 Feb 21. PMID: 23434111.
15. Townley WA, Mah E, O'Neill AC, Wunder JS, Ferguson PC, Zhong T, Hofer SO. Reconstruction of sarcoma defects following pre-operative radiation: free tissue transfer is safe and reliable. J Plast Reconstr Aesthet Surg. 2013 Nov;66(11):1575-9. doi: 10.1016/j.bjps.2013.06.029. Epub 2013 Jul 4. PMID: 23831122.
16. Chao AH, Chang DW, Shuaib SW, Hanasono MM. The effect of neoadjuvant versus adjuvant irradiation on microvascular free flap reconstruction in sarcoma patients. Plast Reconstr Surg. 2012 Mar;129(3):675-682. doi: 10.1097/PRS.0b013e3182412a39. PMID: 22373973.
17. Duran-Moreno J, Kontogeorgakos V, Koumarianou A. Soft tissue sarcomas of the upper extremities: Maximizing treatment opportunities and outcomes. Oncol Lett. 2019 Sep;18(3):2179-2191. doi: 10.3892/ol.2019.10575. Epub 2019 Jul 5. PMID: 31404317; PMCID: PMC6676724.
18. Wright EH, Gwilym S, Gibbons CL, Critchley P, Giele HP. Functional and oncological outcomes after limb-salvage surgery for primary sarcomas of the upper limb. J Plast Reconstr Aesthet Surg. 2008;61(4):382-7. doi: 10.1016/j.bjps.2007.01.080. Epub 2007 Sep 21. PMID: 17889633.
19. Payne CE, Hofer SO, Zhong T, Griffin AC, Ferguson PC, Wunder JS. Functional outcome following upper limb soft tissue sarcoma resection with flap reconstruction. J Plast Reconstr Aesthet Surg. 2013 May;66(5):601-7. doi: 10.1016/j.bjps.2013.01.034. Epub 2013 Feb 21. PMID: 23434111.
20. Kim JY, Youssef A, Subramanian V, Rogers BA, Pollock RE, Robb GL, Chang DW. Upper extremity reconstruction following resection of soft tissue sarcomas: a functional outcomes analysis. Ann Surg Oncol. 2004 Oct;11(10):921-7. doi: 10.1245/ASO.2004.06.026. PMID: 15466352.

https://doi.org/10.5455/pjps.1713351214

Research Article

Assessing Outcome in Aesthetic Rhinoplasty Surgeon Assessor Patient's Perspective

Hafiz Khalil Ahmad,[1] Bilal Umar,[2] Kamran Khalid,[3] Muhammad Amin Yousaf,[4] Usman Ishaque,[5] Ammara Rabbani[6]

[1-4]Department of Plastic Surgery, Jinnah Hospital Lahore; [5]Mayo Hospital, Lahore; [6]Khawaja Safdar Teaching Hospital, Sialkot

Abstract

Background: Throughout the years, a plethora of aesthetic rhinoplasty scales and instruments have surfaced, each tailored to capture distinct dimensions of nasal features, patient contentment, and overall quality of life. The importance of standardized outcome assessment tools in the context of aesthetic rhinoplasty is paramount.

Objective: To propose a standardized outcome measuring tool in form of JRAS (Jinnah Burn and Reconstructive Surgery Centre, Rhinoplasty Assessment Score) that unites patient's aesthetic preferences with the surgeon's clinical objectivity.

Methodology: The study was conducted from March 2023 to August 2023 and 50 participants were enrolled**.** All surgeries were performed by different well-known surgeons having experience of more than 10 years in the field. An independent rhinoplasty surgeon not performing the surgery, assessed the preoperative and postoperative photographs taken at six months after rhinoplasty and marked the scores according to the proforma given. ALikert item was generated to link satisfaction scores to a scale.

Results: While mean pre-operative JRAS was 41 ±3.2 while postoperative JRAS score was 46.1 ±1.8. This showed an overall substantial improvement from the preoperative scores. Spearman's correlation with satisfaction scores showed a significant positive correlation.

Conclusion: JRAS is a good addition to the already existing repertoire of rhinoplasty assessment scores especially because it provides unique perspective in linking the plastic surgeon's assessment in a single numerical score with the patient's satisfaction. This allows all data points to be presented in a concise manner.

Received | 20-05-2024 **Revision** | 29-07-2024 **Accepted** | 12-08-2024

Corresponding Author | Hafiz Khalil Ahmad, Department of Plastic Surgery, Jinnah Hospital Lahore.

Email: khalilah007@gmail.com

Keywords | Aesthetic rhinoplasty, Outcome assessment scale, Surgeon: assessor: patient's perspective, saddle deformity, hump deformity.

Introduction

Rhinoplasty represents a prevalent cosmetic surgical intervention globally, providing individuals with the opportunity to attain facial harmony and bolster self-perception. While the main objective of rhinoplasty is refining aesthetic features of nose,[1] the evaluation of surgical outcomes poses a multifaceted undertaking, necessitating the formulation and implementation of standardized measurement tools. Among these instruments, aesthetic rhinoplasty scales assume a pivotal role in the objective assessment of postoperative results, facilitating effective communication between clinicians and patients, and guiding treatment decision-making processes.[2,3]

Throughout the years, a plethora of aesthetic

rhinoplasty scales and instruments have surfaced, each tailored to capture distinct dimensions of nasal features, patient contentment, and overall quality of life. These scales encompass a diverse array of domains, spanning from assessments of nasal appearance and symmetry to evaluations of psychosocial well-being and functional outcomes.[4,5] Nevertheless, despite their widespread utilization, the landscape of aesthetic rhinoplasty scales remains heterogeneous,[6] characterized by variances in scale design, validation methodologies, and clinical applicability.

Sharp and Rowe designed RASP, rhinoplasty assessment score(photographic), consisting of 28 elements giving 0 to best form of that specific feature and 3 to the worst one. So best score of normal nose is 0 and worst score is 84.[8] However,the authors find it unattractive for use in routine practices of rhinoplasty. That is because it is important for a scale to be simple enough to be used in routine practices yet important enough to be used as a tool to guide surgeon about the success of the procedure and categorize a patient's satisfaction level. Furthermore, the level of deformities mentioned in the scale should be according to standard classification systems and values mentioned in literature. That is what we aim to do with the new JRAS, a modification of RASP.

The importance of standardized outcome assessment tools in the context of aesthetic rhinoplasty is paramount. [7] Ensuring the accuracy and comprehensiveness of surgical outcome evaluations is imperative for clinicians to ascertain the efficacy of interventions, to customize treatment modalities according to individual patient requirements, and optimizing postoperative contentment and well-being.

Methodology

A prospective cohort study was conducted at Jinnah Burn and Reconstructive Surgery Centre. Ethical approval was obtained from the institutional review board.

After the comprehensive review of literature pertaining to outcome scales in rhinoplasty, a list of eligible features that could complement the RASP in its modification to an even more comprehensive scale was made. This list was further expanded by expert consultations regarding new unique items eligible to be added. Items that could be comprehensively addressed under one combined key item were merged. The team of experts at Burn and Reconstructive Surgery center, Jinnah hospital then went over this list, deeming each feature very important, important and not important (as a modification to RASP). These ratings compiled after expert validation were used to filter the expansive list of eligible features and only the features successively getting highly important ratings were added to the modified scale. A series of cognitive interviews were conducted with five plastic surgeons each with more than ten years of experience and strict attention was paid to their responses to each of the proposed items all the while encouraging them to think out loud and concurrent probing. All such interviews were recorded so that the team of authors could debate on inclusion or exclusion of said items.

J-RAS(Jinnah burn and reconstructive surgery centre-Rhinoplasty Assessment Score) is a modified, more inclusive version of RASP rhinoplasty assessment score(photographic)(4) with the addition of the eligible modified items deigned appropriate through the above review process. J-RAS was designed to include features of nose which mostly affect tip-dorsum relationship and those that are related to nose itself, while excluding all the external features of face e,g, maxillary hypoplasia which affects nasal aesthetics. The features of Ala and columella which were present as separate entities in RASP were combined together in one single item after our extensive review process. We classified alar-columellar relationship deformities into mild, moderate and severe deformities with respect to either isolated or combined deformities. A similar approach was the case for the tip-lobule ratio, two independent features of RASP were combined into one item in order to streamline their synergistic relationship. On basal view, normally nostril/tip lobule should be approximately 2:1 . An imbalance can produce either an illusionary or true nostril-tip disproportion, with tip over-projection if the nostril is short and an insufficient nasal tip if the nostril is long.[9]

In addition to these, two new features were added to JRAS as a modification of RASP, these being the feature of Saddle and Hump. We followed the Jang-Moon classification for hump deformities i.e isolated, generalized and relative hump(10).For saddle nose, we followed Rollin's classification which

classification saddle nose deformity into 5 categories[7] It is noted that class 5 saddling is catastrophic destruction requiring free tissue transfer and is not included in our parameters.[11] Scaling of dorsum deviation was done in accordance with the Yong ju Jang classification.[11] It classifies dorsal deformities into 5 types depending upon the deviation of bony or cartilaginous dorsum. Brow-tip aesthetic lines(BTALs) are two lines on the lateral edges of dorsum forming normal hour-glass appearance. An ideal dorsum is straight with well-defined BTALs.[11] Nasal width approximately should be equal to inter-canthal distance (normally 31 to 33 mm). Inter-alar distance is the distance between the lateral-most point on each ala. Flare is present when the alar rim projects farther laterally than does the alar base such that the inter-alar distance is greater than the base width. Limited flare (e.g., 2 mm in the Caucasian woman) is normal and often desirable. Rohrich mentioned three patterns of alar flaring.[12] Radix is an important landmark in the surgical field of rhinoplasty, The radix is defined by its height and vertical position. At the nasion, the height of the radix is ideally between 9 mm and 14 mm as measured from the anterior corneal plane. When projection of the radix is less than this

Table 1: J-RAS (Jinnah Burn and Reconstructive Surgery Centre Rhinoplasty Assessment Score, Photographic)

VIEW	SR#	FEATURE	DEFORMITY			
			NORMAL Score =4	MILD Score=3	MODERATE Score=2	SEVERE Score=1
Frontal	1	DORSUM (figure 1, A-D)	Straight dorsum with well-defined BTALs	c-shape/ reverse C-shape deviation with visible BTALs	s-shaped dorsum with visible BTALs	Severe deviation/crooked dorsum with Washed out BTALs/flat nose
	2	WIDTH OF DORSUM (figure 2, A-D)	**70-80% of inter-canthal distance**	**less than 70% of ICD**	**more than 80% of ICD**	**Width of dorsum deformity associated with radix deformity**
Lateral	3	TIP SHAPE AND SYMMETRY (figure 3, A-D)	Pointed, central tip with well-defined tip defining pints	Bulbous or boxy tip	Asymmetry in tip lobule, Deviated tip	Bulbous or boxy tip , also asymmetric or deviated
	4	SADDLE (figure 4, A-C)	Normal straight dorsum	Grade 1 saddle deformity	Grade 2 saddle deformity	Grade 3 or 4 saddle deformity
	5	**HUMP (figure 5, A-D)**	**No hump**	**Isolated Hump**	**Generalized hump**	**Relative Hump**
	6	**NASAL LENGTH** (figure 6, H-K)	**Nasal length (stomion to menton distance)**	**Short length**	**Long length**	**Long nose with high radix**
	7	RADIX (Figure 7, A-C)	Normal position and height	Change in height **<9mm or > 14mm**	Change in position **(Cephalic to upper eyelid crease or caudal to upper eyelash line)**	Combination of change in height and position
	8	ALAR-COLUMELLAR RELATIONSHIP (Figure 8, A-C)	Normal	Isolated columellar deformity (retraction or columellar show>2mm)	Isolated alar deformity (notching or overhanging)	Combined alar and Columellar deformity
	9	TIP PROJECTION (Figure 9, A-D)	Normal (0.67 times dorsal length)	Over projection	Under-projection	Under-projection with loss of tip lobule
	10	TIP ROTATION (figure 10, A-D)	Normal Male=90-100 Female =95-110	Droopy/undue rotation		loss of tip lobule
Basal View	11	**ALAR FLARING (figure 11, A-C)**	**No alar flaring**	**Type 1**	**Type 2**	**Type 3**
	12	TIP LOBULE/NOSTRIL RATIO (figure 12, A-D)	Normal Nostril/tip lobule 2:01	Increased tip lobule	Decreased nostril height	Combination

range, the authors refer to this condition as a low radix. The vertical position of the radix should lie between the level of the supra-tarsal crease and the superior eyelid lash line. When the vertical position of the radix is inferior to the superior lash line, the authors refer to this as a caudally positioned radix.[13] The deformity of radix can be defined in cephalo-caudal (position) and anteroposterior(height) axes. Authors classified radix deformities according to change of height, position or combination.[14]

Jinnah Burn and Reconstructive Surgery Centre Rhinoplasty Assessment Score, Photographic(J-RAS) was designed to include all characteristics of nose. Table 1 consists of ten characters formulated to include all aesthetic features of the nose while excluding all external features affecting the aesthetics of nose. An assessor, an independent rhinoplasty surgeon who is performing atleast 50 independent rhinoplasties a year but not performing the surgery under evaluation was made to assess the preoperative and postoperative photographs taken immediately postoperative, one month and six months after rhinoplasty and marked the scores according to the performa given below . Satisfaction level of the surgeon was simply defined as extremely satisfied, satisfied, dissatisfied or extremely dissatisfied by the results and was correlated to a Likert scale from 1 to 4. The same was done for the satisfaction level of the patient.

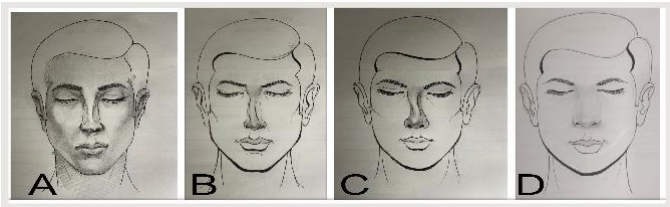

Figure 1: *Normal straight dorsum with visible BTALs(A), B,C and D showing mild, moderate and severe deformity, C-shape dorsum with visible BTALs, S-shape dorsum with visible BTALs, and Flat Nose with washed out BTALs respectively.*

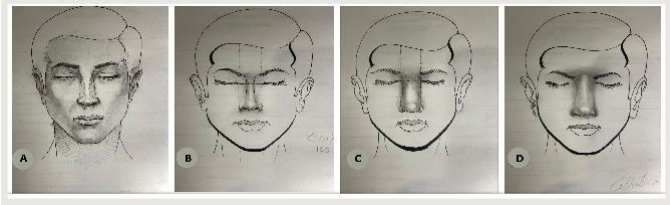

Figure 2: *Normal dorsum width(A), mild deformity with width <70% of ICD(B), moderate deformity with of dorsum >80% of ICD(C), severe deformity with wide dorsum and high Radix(D)*

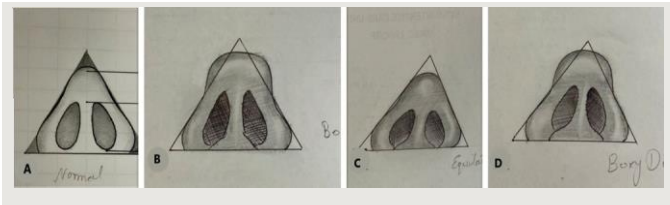

Figure 3: *Normal Tip shape with two equal triangles(A),mild tip deformity with boxy tip shape(B), moderate tip deformity with deviated tip(C), severe tip deformity with deviated as well as boxy tip(D)*

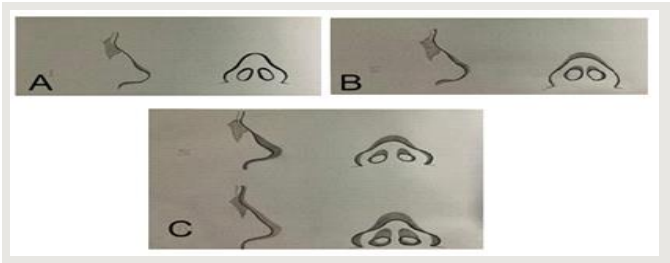

Figure 4: *Saddle nose deformity according to Rollin's Classification.(A)Type I as mild deformity,(B) type II as moderate deformity. (C) type III and IVas severe deformity.*

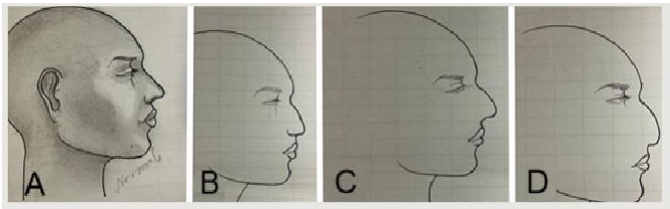

Figure 5: *Nasal Hump Deformity (A) Normal straight nose without hump. (B) mild deformity with isolated hump deformity, (C) generalized Hump as moderate hump deformity, (D) severe deformity with generalized hump as well as under-projected tip.*

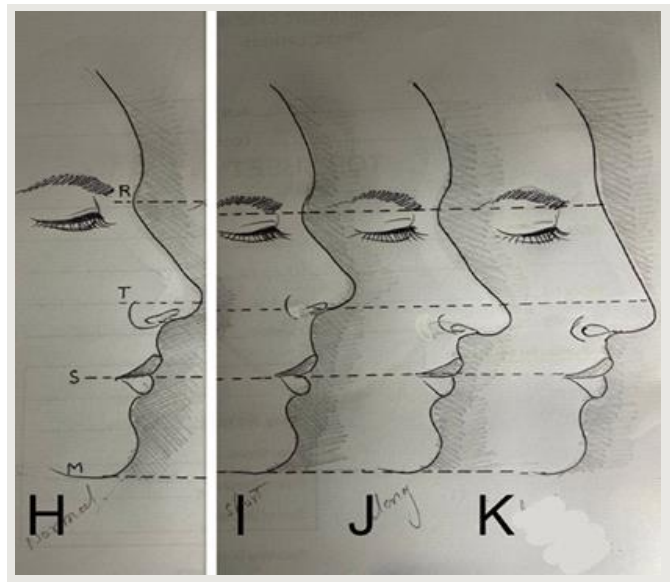

Figure 6: *(H) normal nasal length with Radix® to Tip(T) distance is equal to Stomion(S) to Menton(M)*

distance, (J) mild deformity, long nose with R-T>S-M distance (I) showing moderate deformity with R-T<S-M distance, (K) is severe deformity with long nose as well as high Radix.

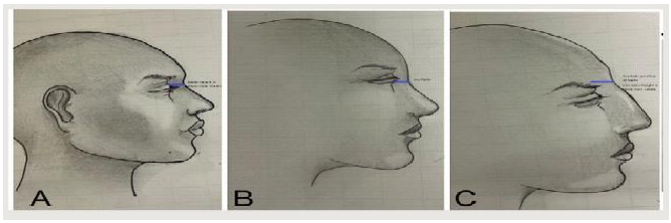

Figure 7: *mild deformity of where radix height is >14mm(A), moderate deformity where radix is caudally placed(B), severe deformity, where radix is placed in cephalic position as well as height is more than 14mm(C).*

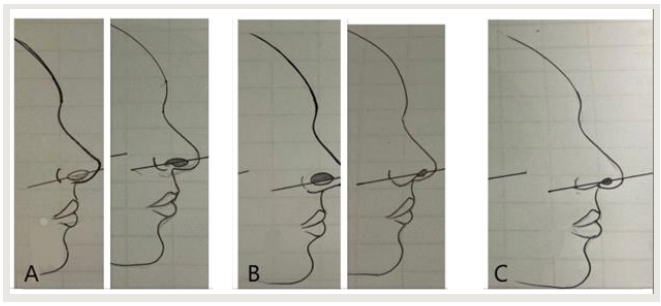

Figure (8). *Mild deformity, isolated collumelar deformity either collumelar retraction or collumelar show>2mm(A), moderate deformity, isolated alar deformity, wither alar notching or overhanging(B), severe deformity, combined collumelar and alar deformity(C).*

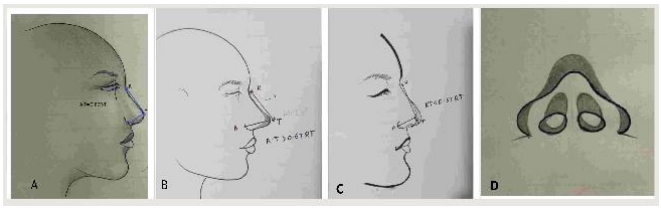

Figure 9: *(A) normal tip projection(alar crease to tip distance) , 0.67 times nasal length(radix to tip distance),(B) and (C) showing over-projected and under-projected tip as mild and moderate deformities respectively. (D) severe deformity. Under-projected tip and loss of tip lobule.*

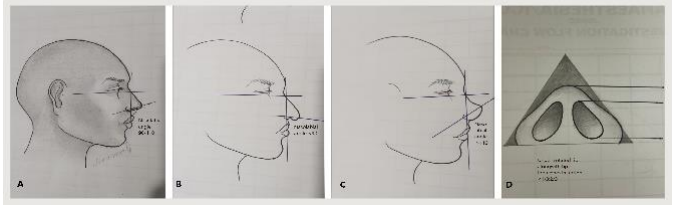

Figure 10: *(A) normal tip rotation with nasolabial angle 90-110 degrees. (B) is mild deformity with nasolabial angle less than 90 degrees. (C) moderate deformity with nasolabial angle more than 110 degrees. (D) severe nasal tip projection deformity with under-rotated tip along with loss of tip lobule.*

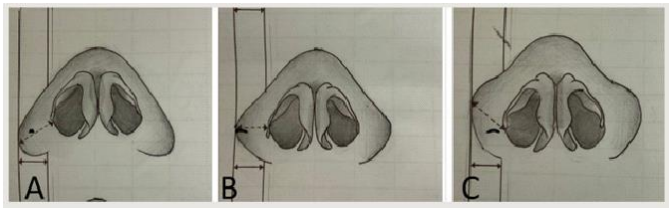

Figure 11: *A,B and C showing mild, moderate and severe deformity of alar flaring, where lateral most point of ala is below, at the level of, and above the nasal sill-base junction,accordingly.*

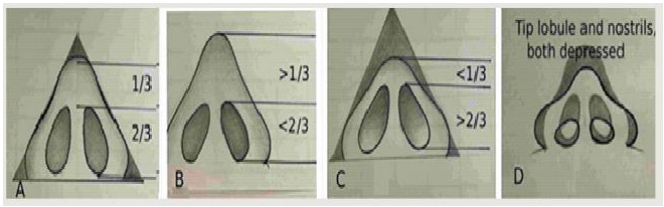

Figure 12: *Tip lobule/nostril ratio. (A) normal with tip lobule/nostrils ratio 1/3:2/3*
(B), (C) and (D) showing mild, moderate and severe deformities.

For each feature, the best possible score 4, while the worst score is 1. So, for an ideal nose, maximum score is 48 and minimum score for aesthetically worst nose is 12.

Asmall scale pilot study for feasibility for JRAS was conducted from March 2023 to August 2023 and 50 participants were enrolled. This was to ensure that the there is no problems in research design and to maximize efficiency for future studies. This was a pilot study so the formal statistical considerations for a sample size calculation for a main trial were not used instead the stepped up rules of thumb using NCT approach for a sufficiently powered future main trial were used. For the specific domains of our study, that came out to be 50 patients. For any future studies, the existing participants of the pilot study will not be enrolled to ensure no undue bias. All tenets of the declaration of Helsinki were duly followed. The enrolled participants were interested in rhinoplasty from only an aesthetic perspective and had no functional impairments in breathing. Participants less than 18 years of age and greater than 50 years of age were excluded. A history of facial trauma associated with breathing problems and having previously undergone surgeries of nose made participants ineligible for the study.

The identity of patients was kept confidential and

they were enrolled in a non-random manner as they presented to the OPD as long as they met the study inclusion criteria.Data pertaining to age, gender, education level was collected in a controlled manner. The same independent plastic surgeon was used to score all the postoperative photos. SPSS version 27 was used to collect data and p values<0.05 were considered significant.

Results

The study enrolled a total of 50 participants. 65 percent of the participants were women while 35 percent were men. Table 2 shows the number of participants in each age group.

JRAS was calculated pre-operatively then again postoperatively at the six months mark to allow for adequate healing. The mean pre-operative JRAS was 41 ±3.2 while postoperative JRAS score was 46.1 ±1.8. This showed an overall substantial improvement from the preoperative scores. Model preoperative and postoperative photographs from a patient are reproduced below with informed consent. Patient and surgeon satisfaction scores were compiled and showed that the numerical ordinal scale corresponding to the likert scale used gave a measure that could be compared to the quantitative JRAS through spearman correlation test. (Table 3 & 4). Figure 13 demonstrates the details of the application of the JRAS score on representative patients figure 14 shows the percentage of patients in different JRAS score groups, pre-operatively (A) post-operatively (B)

Table 2: *Age Distribution of Participants*

Age groups	Number of participants
20-30	15
30-40	21
40-50	9
50-60	5

Table 3: *Correlation of Surgeon's Perspective and Difference between Pre- and Post-op JRAS*

Surgeon's Perspective	Difference between Pre- and Post-op JRAS
Excellent	6 or more
Good	5-Apr
Fair	3-Feb
Bad	2 or less

Table 4: *correlation of Patient's Perspective and post-operative JRAS*

Patient's Perspective	Post-operative JRAS
Extremely satisfied	Greater than 46
Somewhat satisfied	44-46
Somewhat dissatisfied	42-44
Extremely dissatisfied	42 or less

Figure 13: *showing preoperative photograph of a 32years male in frontal(A),Basal(B) and lateral(C) view, presented with mild deformity of dorsum(C-shaped deformity score=3), moderate deformity of tip and dorsal hump(boxy tip score=2, generalized hump score=2) and mild deformity of tip rotation(tip rotation<90 score=3), alar width(alar width>ICD score=3) tip lobule/nostril ratio(mild deformity score=3). His pre-operative J-RAS was 40.*

Same patient after rhinoplasty for above mentioned deformities, showing in frontal(D), basal(E) and lateral(F) views. Postoperative J-RAS after 6 months was 47 as patient still had mild deformity of alar width(alar widht >ICD, score=3)

Spearman's Rank Correlation test was performed to check for the relationship between JRAS and patient satisfaction score as well as between JRAS and surgeon satisfaction score. There was a strong positive correlation between JRAS and patient satisfaction that was statistically significant rho =0.801 p<0.01. There was similarly strong positive correlation between JRAS and patient satisfaction score rho=0.881 p<0.01.(table 5,6)

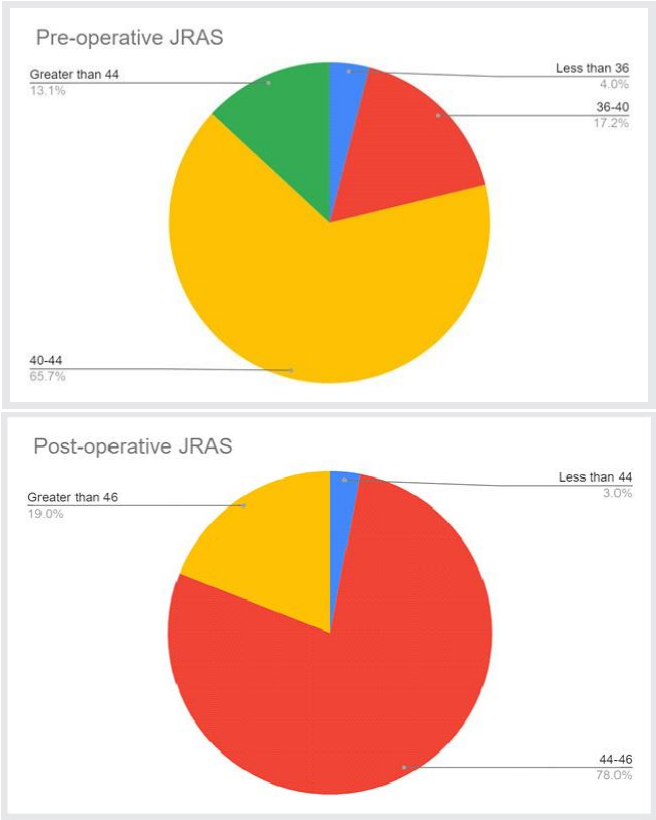

Figure 14: *Demographic age distribution.*

Univariate analyses were conducted to determine the impact of factors like gender, education and age on the patient satisfaction scores. The results showed that patients were more likely to be dissatisfied with their postoperative look if they were women, educated or between 30 to 40 years of age.

Correlation Table 5: *Spearman's rank test between JRAS and Patient Satisfaction*

			JRAS	Patient
Spearman's rho	JRAS	Correlation Coefficient	1	.881**
		Sig. (2-tailed)	.	0.001
		N	50	50
	patient satisfaction	Correlation Coefficient	.881**	1
		Sig. (2-tailed)	0.001	.
		N	50	50

Correlation Table 6: *Spearman's between JRAS and Surgeon Satisfaction*

			JRASP	surgeon
Spearman's rho	JRAS	Correlation Coefficient	1	.803**
		Sig. (2-tailed)	.	0.001
		N	50	50
	surgeon tisfaction	Correlation Coefficient	.803**	1
		Sig. (2-tailed)	0.001	.
		N	50	50

Discussion

Rhinoplasty holds considerable significance within the general population, encompassing a spectrum of aesthetic, functional, and psychological factors. Academic discourse underscores several pivotal aspects regarding the importance of rhinoplasty.[6,7,15] The multifaceted significance of rhinoplasty is evident by interdisciplinary perspectives encompassing plastic surgery, otolaryngology, psychology, and cultural studies in literature. Researchers aim to show interplay between nasal aesthetics, functional outcomes, and psychosocial well-being, thereby forming evidence-based practices and patient-centred care paradigms in the field of rhinoplasty.[16] Sophisticated procedure like rhinoplasty needs a good criteria to compare outcomes in an objective manner and that is what JRAS aims to deliver.

Some methods have been invented to measure outcomes in rhinoplasty from a patient's perspective, pre- and post-op questionnaire is best method to assess outcomes following any aesthetic procedure. In general, outcome assessment scales and instruments ask about change in general health, quality of life, improvement in performing daily routine activities and the patient's opinion regarding success of surgical procedure. Dziewulski et al. solely looked at the level of satisfaction of patient following rhinoplasty at 6 weeks and then at 6 months,[17]while,Guyuron and Bukhari used a more holistic approach by asking about about satisfaction, functional improvement , appearance and success of procedure but again like Dziewulski et all there is no surgeon or assessor perspective.[18] The Glasgow benefit inventory used radiological investigations to score the pre-operative and postoperative nose.[19] Rhinoplasty outcome evaluation(ROE) evaluates for improvement in general and psychological health as result of surgery.[4] Nasal symptoms Questionnaire (NSQ) is used for evaluation of symtoms after rhinoplasty but there was no aesthetic perspective.[20] Slator studied psychological morbidity among patients of rhinoplasty.[21] While Rich studied effect of cephalic resection and dome division on tip projection via pre- and post-operative photographs and Luce stressed quantitative assessment of outcomes in facial plastic surgery via various methods.[22]

Despite heterogeneity associated with different

rhinoplasty approaches,this prospective study here reported showed that JRAS can be considered a useful evaluation tool in the modern plastic surgeon's arsenal for ensuring a more satisfactory rhinoplasty experience. The different statistical tests used in this analysis and their comparison to the existing literature alluded to the fact that JRAS can be superior to the the NOSE questionnaire, hence representing a possible new, simplified and improved scoring system in the ever-evolving face of rhinoplasty.

NOSE Scale has been used for many years to assess rhinoplasty outcomes but our major gripe in comparison with JRAS is that it does not account for aesthetic measures and is solely a functional score. Additionally it relies on patients' subjective reporting of nasal obstruction symptoms, which may vary in interpretation and perception so its utility is only functional. The other end of the spectrum is represented by Visual Analog Scale (VAS) which provides a scoring for different photographic features but it doesn't offer detailed quantification between different aspects of satisfaction or dissatisfaction of results. Due to these reasons, JRAS is superior to both these scales across the spectrum in objectively providing a universal measure.

Another important often used scale is the ROE questionnaire.[4] A very often brought up limitation of the ROE questionnaire is that techniques,measuring methodology and principles should be modified according to local diaspora and anthropometric measures with due diligence . In this perspective, Izu et al. applied the ROE method to the a South American subset of population, suggesting normal distribution of the values for ROE for such a subset. In Europe, a further calibration even suggested a new ROE modification, known as (ROE-D) that took into account preferences of the German population.[6] It is a tall task to calibrate a patient's satisfaction scale combining aesthetic preferences of the patient and the knowledge and technical perspective as well as insight of the plastic surgeon but JRAS is a culmination of ten internationally agreed upon aesthetic features which allows a certain unprecedented degree of objectivity .

Our study shows that women[23] were more likely to be dissatisfied after a rhinoplasty procedure but previous literature such as Bukhari et al showed that the men were more likely to be dissatisfied.[6] This contrast may be due to changing attitudes in the population in the 20 years that have gone by during the two studies. Participants who were educated were more likely to be dissatisfied with the result of their surgery because of greater initial expectations.[23] The often studied correlation that such a subset of the population which has a higher likelihood of body dysmorphic disorder[24] can also be a factor in explaining why patients who scored high a postoperative JRAS might be dissatisfied.

Our study was limited due to the non-random sampling techniques employed and the fact that the sample population was not diverse enough to represent diverse ethnicities and their respectively even more diverse perspectives about aesthetic features.[6] Regardless, we believe that JRAS is a robust tool to effectively tell about outcomes pertaining to rhinoplasty. Further studies with application of JRAS should be conducted to allow for increased data collection and new insights. With the recent advent of Artificial Intelligence models and Deep Learning algorithms we would ideally like to employ these techniques in future studies that stem from this pilot study. This would allow for a more holistic understanding of the data points as well as a more accurate prediction of how each patient would like their nose to look post-operatively. This would further bridge the patient-surgeon divide and increase satisfaction across the spectrum.

Conclusion

JRAS is a good addition to the already existing repertoire of rhinoplasty assessment scores especially because it provides unique perspective in linking the plastic surgeon's assessment in a single numerical score with the patient's preferences . This allows all data points to be present in a concise manner. Further studies should be performed in diverse subsets of population to increase the literature available for this newly proposed score.

Conflict of interest: *None*

Source of funding: *None*

Author's Contribution

Hafiz Khalil Ahmad: Conception and design of the study, data collection, analysis and interpretation, Drafting the work Final approval of the version to be published and ensuring that questions related to the accuracy or integrity of any part of the work are

appropriately investigated and resolved.

Bilal Umar: Drafting the work, Conception and design of the study, critical revision of the article and final approval of the article to be published

Kamran Khalid: Critical revision of the article Study, drafting of work, Data Collection and analysis and interpretation and final approval of the article.

Muhammad Amin Yousaf: Article Editing, Manuscript Revision, analysis and interpretation of data and final approval of the article.

Usman Ishaque: Article Editing, Manuscript Revision analysis and interpretation of data and final approval of the article.

Ammara Rabbani: Conception and design of the study, Critical revision of the article Study, Data analysis and interpretation and final approval of the article.

References

1. Yu K, Kim A, Pearlman SJ. Functional and aesthetic concerns of patients seeking revision rhinoplasty. Arch Facial Plast Surg. 2010 Sep-Oct;12(5):291-7. doi: 10.1001/archfacial.2010.62. PMID: 20855769.
2. Waite PD. Avoiding revision rhinoplasty. Oral Maxillofac Surg Clin North Am. 2011 Feb;23(1):93-100, vi. doi: 10.1016/j.coms.2010.10.007. Epub 2010 Dec 3. PMID: 21126884.
3. Thomson C, Mendelsohn M. Reducing the incidence of revision rhinoplasty. J Otolaryngol. 2007 Apr;36(2):130-4. doi: 10.2310/7070.2007.0012. PMID: 17459286.
4. Mahmoudi S, Rabbani Zadeh M. Development and Validation of the Rhinoplasty Outcomes Evaluation (ROE) Questionnaire: An Analytical Study. World J Plast Surg. 2022 Jul;11(2):68-74. doi: 10.52547/wjps.11.2.68. PMID: 36117897; PMCID: PMC9446128.
5. Alan MA, Kahraman ME, Yüksel F, Yücel A. Comparison of Dorsal Preservation and Dorsal Reduction Rhinoplasty: Analysis of Nasal Patency and Aesthetic Outcomes by Rhinomanometry, NOSE and SCHNOS Scales. Aesthetic Plast Surg. 2023 Apr;47(2):728-734. doi: 10.1007/s00266-022-03151-8. Epub 2022 Oct 27. PMID: 36302983.
6. Bulut OC, Plinkert PK, Wallner F, Baumann I. Quality of life in functional rhinoplasty: rhinoplasty outcomes evaluation German version (ROE-D). Eur Arch Otorhinolaryngol. 2016 Sep;273(9):2569-73. doi: 10.1007/s00405-016-3920-x. Epub 2016 Feb 10. PMID: 26864439.
7. Daniel RK, Brenner KA. Saddle nose deformity: A new classification and treatment. Facial Plast Surg Clin North Am. 2006 Nov;14(4):301-12, vi. doi: 10.1016/j.fsc.2006.06.008. PMID: 17088179.
8. Sharp HR, Rowe-Jones JM. Assessing outcome in aesthetic rhinoplasty. Clin Otolaryngol Allied Sci. 2003 Oct;28(5):430-5. doi: 10.1046/j.1365-2273.2003.00739.x. PMID: 12969346.
9. Brito ÍM, Avashia Y, Rohrich RJ. Evidence-based Nasal Analysis for Rhinoplasty: The 10-7-5 Method. Plast Reconstr Surg Glob Open. 2020 Feb 26;8(2):e2632. doi: 10.1097/GOX.0000000000002632. PMID: 32309081; PMCID: PMC7159929.
10. Jang YJ, Moon H. Special Consideration in the Management of Hump Noses in Asians. Facial Plast Surg. 2020 Oct;36(5):554-562. doi: 10.1055/s-0040-1717144. Epub 2020 Dec 24. PMID: 33368079.
11. Jang YJ, Wang JH, Lee BJ. Classification of the deviated nose and its treatment. Arch Otolaryngol Head Neck Surg. 2008 Mar;134(3):311-5. doi: 10.1001/archoto.2007.46. PMID: 18347259.
12. Rohrich RJ, Malafa MM, Ahmad J, Basci DS. Managing Alar Flare in Rhinoplasty. Plast Reconstr Surg. 2017 Nov;140(5):910-919. doi: 10.1097/PRS.0000000000003786. PMID: 29068925.
13. Steiger JD, Baker SR. Nuances of profile management: the radix. Facial Plast Surg Clin North Am. 2009 Feb;17(1):15-28, v. doi: 10.1016/j.fsc.2008.09.007. PMID: 19181278.
14. Şeneldir S, Dizdar D, Tuna A. Radix saw: a useful tool for rhinoplasty to correct high radix. Braz J Otorhinolaryngol. 2021 Jan-Feb;87(1):59-65. doi: 10.1016/j.bjorl.2019.06.013. Epub 2019 Aug 7. PMID: 31542337; PMCID: PMC9422727.
15. Ching S, Thoma A, McCabe RE, Antony MM. Measuring outcomes in aesthetic surgery: a comprehensive review of the literature. Plast Reconstr Surg. 2003 Jan;111(1):469-80; discussion 481-2. doi: 10.1097/01.PRS.0000036041.67101.48. PMID: 12496620.
16. Meyer L, Jacobsson S. The predictive validity of psychosocial factors for patients' acceptance of rhinoplasty. Ann Plast Surg. 1986 Dec;17(6):513-20. doi: 10.1097/00000637-198612000-00013. PMID: 3827121.
17. Dziewulski P, Dujon D, Spyriounis P, Griffiths RW, Shaw JD. A retrospective analysis of the results of 218 consecutive rhinoplasties. Br J Plast Surg. 1995 Oct;48(7):451-4. doi: 10.1016/0007-1226(95)90119-1. PMID: 7551522.
18. Guyuron B, Bokhari F. Patient satisfaction following rhinoplasty. Aesthetic Plast Surg. 1996 Mar-Apr;20(2):153-7. doi: 10.1007/BF02275535. PMID: 8801805.

19. Kotzampasakis D, Piniara A, Themelis S, Kotzampasakis S, Gabriel E, Maroudias N, Nikolopoulos T. Quality of life of patients who underwent aesthetic rhinoplasty: 100 cases assessed with the Glascow Benefit Inventory. Laryngoscope. 2017 Sep;127(9):2017-2025. doi: 10.1002/lary.26517. Epub 2017 Feb 22. PMID: 28224628.
20. Saito T, Tsuzuki K, Nishikawa H, Okazaki K, Hashimoto K, Sakagami M. Nasal Symptom Questionnaire: Our Proposed Scoring System and Prognostic Factors in Chronic Rhinosinusitis. ORL J Otorhinolaryngol Relat Spec. 2018;80(5-6):296-306. doi: 10.1159/000492965. Epub 2018 Oct 11. PMID: 30308497.
21. Slator R. Rhinoplasty patients revisited. Br J Plast Surg. 1993 Jun;46(4):327-31. doi: 10.1016/0007-1226(93)90014-3. PMID: 8330091.
22. Luce EA. Outcome studies and practice guidelines in plastic surgery. Plast Reconstr Surg. 1999 Sep;104(4):1187-90. doi: 10.1097/00006534-199909040-00051. PMID: 10654764.
23. AlHarethy S, Al-Angari SS, Syouri F, Islam T, Jang YJ. Assessment of satisfaction based on age and gender in functional and aesthetic rhinoplasty. Eur Arch Otorhinolaryngol. 2017 Jul;274(7):2809-2812. doi: 10.1007/s00405-017-4566-z. Epub 2017 Apr 17. PMID: 28417237.
24. Pereira IN, Chattopadhyay R, Fitzpatrick S, Nguyen S, Hassan H. Evidence-based review: Screening body dysmorphic disorder in aesthetic clinical settings. J Cosmet Dermatol. 2023 Jul;22(7):1951-1966. doi: 10.1111/jocd.15685. Epub 2023 Feb 27. PMID: 36847707.

https://doi.org/10.5455/pjps.1717504557

Research Article

A Comparison of Snodgrass & Snodgraft Surgical Procedures for Treating Childhood Hypospadias

Muhammad Shadman,[1] Muhammad Mudassir Mahbob,[2] Irfan Ullah,[3] Hussan Birkhez Shami,[4] Mishkat Arbab,[5] Wajid Inam ,[6]

[1,2,3]Burns and Plastic Surgery Center, Hayatabad, Peshawar; [4]King Saud Medical City Riyadh; [5]Institute of Medical Sciences, PIMS, Peshawar; [6]Burns and Plastic Surgery, Northwest General Hospital and Research Center, Peshawar

Abstract

Background: Hypospadias is a congenital condition characterized by an abnormally positioned external urethral meatus, on the underside of the penis. Surgical repair is the usual course of treatment and more than 300 different surgeries have been described snodgras and snodgraft are among the repair techniques that have stood the test of time.

Methodology: This was a Randomized Controlled Trial conducted at the department of Plastic Surgery Department, Northwest General Hospital and Research Centre, Peshawar over a period of 06 months All hypospadias patients were enrolled in the outpatient department following patient consent. Nonprobability consecutive sampling was used. Cases were randomized into the following groups: the Snodgrass group and the Snodgraft group. The Incidence of postoperative fistula formation was compared between the two groups.

Results: In Snodgrass (Control group), 20 (17.40%) patients developed postoperative fistula. In Snodgraft (Interventional group), 06 (5.021%) patients had the presence of a fistula. The difference was statistically significant in the 3-6 year age group (P<0.008); but not in the 7-10 year age group (P=0.064)

Conclusion: In our study, Snodgraft repair was found to be significantly more effective than Snodgrass Repair.

Received | 04-06-2024 **Revision** | 25-07-2024 **Accepted** | 29-07-2024

Corresponding Author | Dr. Muhammad Mudassir Mahbob, Burns and Plastic Surgery Center, Hayatabad, Peshawar
Email: dr.mudassir@yahoo.com

Keywords | Hypospadias, Urethrocutaneous Fistula, Snodgrass repair, Snodgraft repair, TIPS with dorsal inlay graft.

Introduction

Hypospadias is a congenital condition characterized by an abnormally positioned external urethral meatus, on the underside of the penis, rather than on the tip of the glans. It is among the most prevalent congenital anomalies in the development of male genital organs.[1] It is believed that hypospadias develop embryologically during urethral development between the 08th and 20th week of gestation. Males and females have similar external genital organs until the 8th week of gestation. Following that, Dihydrotestosterone (DHT) largely influences the development of a masculine phenotype in the genitalia of male fetuses.[2] The open urethral groove is present, as the phallus grows from its base to the level of the corona of the glans penis. Hypospadias is a result of aberrant urethral development brought on by a lack of testosterone. Hypospadias can be classified based on the location of an abnormal urethral meatus into the following three types i.e., Granular and sub-coronal in the anterior region, Distal penile, midshaft, and proximal

penile in the middle region or penoscrotal, scrotal and perineal in the posterior region.[3]

Surgical repair is the usual course of treatment except for the type of hypospadias most distal in location, where micturition is unobstructed. Nowadays, the majority of surgeons correct hypospadias in children between the ages of 4 and 18 months. However, the patient's age is less significant than the size of the phallus.[4] An enhanced emotional and psychological outcome has been associated with this. The development of complications, primarily the formation of the urethra-cutaneous fistula occurs in nearly half of the patients having more late correction of hypospadias in the pubertal and post-pubertal ages.[5] After the age of 5, hypospadias repair surgeries retain their psychological effects during reproductive age. Reports have shown a greater frequency of complications in patients of age 5 compared to those of age 1-year-old, indicating that earlier correction is usually preferred.[6]

Although more than 300 different kinds of hypospadias repair surgeries are described. However, only a handful of these techniques have stood the test of time.

When the urethral plate is too narrow, different techniques like the tubularized incised plate (TIP) urethroplasty, as described by Snodgrass, are used, a single-stage which is a readily reproducible technique for hypospadias repair[7]. It involves incising the urethral plate to widen it and then tubularizing it. When the defect is more than 1 cm, additional grafts such as a dorsal inlay graft or preputial graft may be necessary to ensure a functional and cosmetic outcome.[8,9]

However, postoperative complications such as meatal/neo urethral stenosis, bleeding, hematoma formation, edema, wound infection, skin necrosis, penile torsion, and bladder spasm are frequently encountered.[10]

Following hypospadias repair, the incidence of urethra-cutaneous fistula has been observed to range from 0 to 30%. The majority of fistulas (83%), which emerge within 3 days (11%) and 4-7 days (6%), follow the day of catheter removal[11]. To alleviate the stenosis and stress on the suture line, a dorsal inlay graft obtained from the inner side of the prepuce or buccal mucosa can be quilted to cover the longitudinal midline incision of the urethral plate. This modification of Snodgrass tubularized incised repair is called Snodgraft repair. Theoretically, this decreased suture line tension brought on by the dorsal inlay graft should result in a lower incidence of postoperative fistula formation.[12] Our goal is to study the impact of dorsal inlay.

Methodology

A randomized controlled study was designed to accomplish the objective of the research at the Plastic Surgery unit, Northwest General Hospital and Research Centre, Peshawar. The trial ran from 25 February 2021 to 26 August 2021 for 6 months. The study included Patients with primary, anterior, and middle hypospadias who were between the ages of 3 to 10 years while patients with a previous history of surgery for hypospadias, posterior hypospadias, and ages under three and over ten were not included in the study. Following approval from the IREB, all the patients with hypospadias who met the study's eligibility requirements were enrolled in the outpatient department. After describing the study methodology, informed consent was obtained from the parents of the children. Patients were assigned a control group (i.e., Snodgrass) and an Interventional (i.e., Snodgraft group) through non-probability consecutive sampling. All patients were operated under general anesthesia. Surgery in both groups was done by a consultant plastic surgeon. In Snodgrass only tubularized incised plate urethroplasty was done. In Snodgraft repair, a dorsal inlay graft obtained from the inner side of the prepuce or buccal mucosa was positioned following a urethral plate incision and was fixed to bed by a quilting suture. 5 mm incision leads to a 1 cm defect in the urethral plate. For defects measuring 1 cm or less, we typically perform a Snodgrass procedure. If the defect exceeds 1 cm, a Snod graft procedure is performed. In cases where the defect measures 1 cm and involves scarred surrounding tissue, grafting is employed to prevent secondary contracture. Silicon catheter remained for 1 week after surgery in both groups. The patient was followed up for 6 months specifically on the 7th day, the 21st postoperative day, and subsequently after 3 months. During micturition, the patient was visually inspected to see the presence of any urethrocutaneous fistula on each follow-up and the information was documented on a data-collecting sheet. The collected data from both groups was entered and a statistical

package for social sciences (SPSS) version 20 was utilized for data analysis. Qualitative variables such as efficacy and fistula presence were calculated as frequencies and percentages. For quantitative variables such as age, the mean and standard deviation were computed. To compare efficacy in both groups, the Chi-Square test was employed and was stratified among ages to see the effect of modification. A *p*-value of 0.05 or less was regarded as significant.

Results

There were 115 patients in each group. As per age-wise distribution, in the Snodgrass group, the number of patients between the age group of 03-06 years were documented as 65 (56.52%), and patients between 7-10 years age group 50 (43.48%) were recorded. In the Snodgraft group, the number of patients in the age group 03-06 years was also recorded as 65 (56.52%), and in the age group of 07-10 years, 50 (43.48%) patients were recorded. In Snodgrass, 20 (17.40%) had the presence of a fistula whereas in 95 (82.60%) patients there was no presence of a fistula. In the same way, in Snodgraft, 06 (5.021%) patients had the presence of a fistula whereas in 109 (94.79%) patients there was no presence of a fistula. As for the procedural outcome, in the Snodgrass technique, the Effectiveness of the procedure was recorded in 95 (82.60%) patients whereas in the Snodgraft, the Effectiveness of the procedure was recorded in 109 (94.79%) patients. The stratification of Effectiveness according to age is shown in Table 1. As per the results, a significant difference was seen in terms of the Effectiveness of the Snodgraft repair as compared to Snodgrass repair surgery in the age group of 03-06 years (p-value < 0.05) while there was no discernible difference between the Effectiveness of the two surgical procedures in the age group of 7-10 years (p-value > 0.05).

Table 1: *Stratification of Effectiveness according to Age Group (n=230)*

Age Group	Efficacy	Snodgrass technique	Snodgraft technique	Total	*p*- value
03-06 Years	Yes	54 (46.95%)	63 (54.78%)	117 (50.86%)	
	No	11 (9.56%)	02 (1.73%)	13 (5.65%)	**0.008**
07-10 Years	Yes	41 (35.65%)	47 (40.86%)	88 (38.26%)	
	No	09 (7.82%)	03 (2.60%)	12 (5.21%)	**0.064**

Discussion

To guarantee that the families of patients with hypospadias have a positive experience, parental education, and reassurance are crucial because the majority of patients undergoing surgery are very young at the time of surgery. Researchers' Data indicate that participating in online support groups can play a significant role in patients' and parents' ability to manage hypospadias.[13] Urethrocutaneous fistulation is a major concern for surgeons when repairing hypospadias. With most single-stage surgeries usually less than 10% fistulas form but it increases with the degree of severity of hypospadias, approaching 40% with complicated re-operative procedures. Fistulas rarely close spontaneously.[14] Fistulas reoccur in approximately 10% of patients after repair surgery. In cases where the patient is not yet of school age One-stage hypospadias repair surgeries are performed which offer the benefits of a single procedure utilizing an unscarred tissue. The most frequently reported complaints were repeated surgery, a high percentage of urethral fistulas and strictures, extensive scarring, and the presence of hairs in the neo-urethra.[15]

Previously, no comparative study was conducted in Peshawar between the prevalence of postoperative complications i.e uretherocutaneous fistula of two procedures i.e. Snodgrass and Snodgraft technique. As per our results, the frequency of development of postoperative urethrocutaneous fistula in the Snodgrass technique was found to be higher as compared to the Snodgraft technique in children undergoing primary hypospadias repair. An additional study carried out by (Sheng X *et al* [96]) reported that among the recruited patients, 39 patients (32.5%) experienced postoperative urethrocutaneous fistula formation.[16] According to their findings, there was a considerable correlation between the group with urethrocutaneous fistula and the group without urethrocutaneous fistula according to urethral defect length, age, and the history of urethral operation. In another study, (Ahmed et al, 2015) reported that the Snodgraft technique for hypospadias repair has shown outstanding practical, cosmetic, aesthetic, and functional outcomes attained in 96.09% of patients. There was no evidence of urethral diverticulum or meatal stenosis. An outstanding glanular location of a wide slit-like neo-meatus was attained using this technique. Similarly, the parents of the patients

reported excellent urine streams. Nine patients (3.91%) reported having urethrocutaneous fistula development.[17] In the current study, patients who had Snodgraft repair showed excellent results on follow-up i.e, No post-operative urethrocutaneous fistula was formed while the patients who received Snodgrass repair, the Effectiveness was lesser than the Snodgraft repair of patients who developed postoperative urethrocutaneous fistula. The patient was followed up for 6 months. Furthermore, a significant difference was seen in terms of the Effectiveness of the Snodgraft as compared to the Snodgrass technique for hypospadias repair in the age group of 03-06 years. However, there was no discernible difference in the post-operative Effectiveness of the two surgical procedures in the age group of 7-10 years.

Conclusion

To conclude, our study highlights that the Snodgraft procedure effectively reduces postoperative fistula formation, supported by both clinical observations and statistical analysis.

Conflict of Interest: None

Source of Funding: None

Author's Contribution

Muhammad Shadman: Conception and design of the study, data collection, analysis and interpretation, Drafting the work, Final approval of the version to be published and 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.

Muhammad Mudassir Mahboob: Conception and design of the study, critical revision of the article and final approval of the article to be published.

Irfan Ullah: Data collection, Article Editing, Manuscript Revision, analysis and interpretation of data.

Hussan Birkhez Shami: Article Editing, Manuscript Revision analysis and interpretation of data.

Mishkat Arbab: Documentation and Data Collection, Data Interpretation and Analysis.

Wajid Inam: Study design, drafting of work, Data Collection and analysis and interpretation.

References

1. Chan YY, Bury MI, Yura EM, Hofer MD, Cheng EY, Sharma AK. The current state of tissue engineering in the management of hypospadias. Nat Rev Urol. 2020 Mar;17(3):162-175. doi: 10.1038/s41585-020-0281-4. Epub 2020 Feb 5. PMID: 32024995.
2. Siregar S, Sibarani J, Saputra D. The Role of Maternal and Environmental Factors During Pregnancy on the Risk of Hypospadias Occurrence. Glob Pediatr Health. 2022 Aug 11;9:2333794X221105254. doi: 10.1177/-2333794X221105254. PMID: 35983223; PMCID: PMC9379953.
3. Anand S, Lotfollahzadeh S. Hypospadias Urogenital Reconstruction. [Updated 2022 Dec 3]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK564407/
4. Turkyilmaz Z, Karabulut R, Atan A, Sonmez K. Redo Hypospadias Repair: Comparison of Three Different Methods. Urol Int. 2020;104(5-6):391-395. doi: 10.1159/000504947. Epub 2020 Feb 5. PMID: 32023621.
5. Cisu TI, Mingin GC, Baskin LS. An evaluation of the readability, quality, and accuracy of online health information regarding the treatment of hypospadias. J Pediatr Urol. 2019 Feb;15(1):40.e1-40.e6. doi: 10.1016/j.jpurol.2018.08.020. Epub 2018 Sep 6. PMID: 30449679.
6. Van Engelen H, Custers JAE, Kortmann BM, Oerlemans AJM, van Rooij IALM, Verhaak CM. Parental decisional regret after surgical treatment in young boys born with hypospadias. J Pediatr Urol. 2021 Oct;17(5):691.e1-691.e7. doi: 10.1016/j.jpurol.2021.06.020. Epub 2021 Jul 1. PMID: 34305009.
7. Eldeeb M, Nagla S, Abou-Farha M, Hassan A. Snodgrass vs Snodgraft operation to repair the distal hypospadias in the narrow urethral plate. J Pediatr Urol. 2020 Apr;16(2):165.e1-165.e8. doi: 10.1016/j.jpurol.2020.01.006. Epub 2020 Jan 21. PMID: 32144015.
8. Helmy, T. E., & González, R. (2024). "Tubularized incised plate urethroplasty and grafted tubularized incised plate urethroplasty: systematic review, meta-analysis and trial sequential analysis." World Journal of Pediatric Surgery. Retrieved from [BMJ](https://wjps.bmj.com).
9. Al-Saied, G., Elbatarny, A. M., & Shalaby, H. (2024). "Cosmetic outcomes of grafted tubularized incised plate urethroplasty in primary distal penile hypospadias: prospective comparative study with the classic Snodgrass repair." African Journal of Urology. Retrieved from [SpringerOpen](https://-afju.springeropen.com)

10. Afzal M, Ansari GA, Tabash A, Alghnnam RH, Ahmed AM, Alkhazal AS. Is the Snodgrass technique suitable for different types of hypospadias? Single-center experience [Internet]. [Cited 2024 May 20]. Available from: http://jpedas.org/ojs/index.php/-jpedas/article/view/jpas-101.
11. Winberg H, Anderberg M, Arnbjörnsson E, Stenström Winberg H, Anderberg M, Arnbjörnsson E, Stenström P. Urinary flow measurement in hypospadias correlated to surgical procedure and risk of development of urethra-cutaneous fistula. J Pediatr Urol. 2020 Jun;16(3):306.e1-306.e8. doi: 10.1016/j.jpurol.2020.03.004. Epub 2020 Mar 29. PMID: 32295743.
12. SSONG L, WANG Z, ZHANG K, LIANG T, ZHANG J, JIN S, et al. Experience for post-adolescent postoperative urethral stricture of hypospadias in a single center (a report of 71 cases) [Internet]. 1970 [cited 2024 May 20]. Available from: https://pesquisa.bvsalud.org/portal/resource/pt/wpr-884953.
13. Özbey H. The facts and misconceptions in hypospadias surgery. J Pediatr Urol. 2020 Jun;16(3):408-409. doi: 10.1016/-j.jpurol.2020.02.022. Epub 2020 Apr 30. PMID: 32423704.
14. Kashkoush, J.I., Steckler, R. (2022). Hypospadias. In: Coppola, C.P., Kennedy, Jr, A.P., Lessin, M.S., Scorpio, R.J. (eds) Pediatric Surgery. Springer, Cham. https://doi.org/10.1007/978-3-030-96542-6_88.
15. Wu Y, Wang J, Zhao T, Wei Y, Han L, Liu X, Lin T, Wei G, Wu S. Complications Following Primary Repair of Non-proximal Hypospadias in Children: A Systematic Review and Meta-Analysis. Front Pediatr. 2020 Dec 9;8:579364. doi: 10.3389/fped.2020.579364. PMID: 33363061; PMCID: PMC7756017.
16. Sheng X, Xu D, Wu Y, Yu Y, Chen J, Qi J. The risk factors of Urethrocutaneous fistula after hypospadias surgery in the youth population. BMC Urol. 2018 Jul 24;18(1):64. doi: 10.1186/s12894-018-0366-z. PMID: 30041630; PMCID: PMC6057100.
17. Ahmed M, Alsaid A. Is combined inner preputial inlay graft with tubularized incised plate in hypospadias repair worth doing? J Pediatr Urol. 2015 Aug;11(4):229.e1-4. doi: 10.1016/-j.jpurol.2015.05.015. Epub 2015 Jun 12. PMID: 26119452.

https://doi.org/10.5455/pjps.1719568330

Research Article

Out Comes of Surgical Treatment of Brachial Plexus Injuries in a Tertiary Care Hospital of Pakistan and its Impact on Psychosocial Status

Shumaila Dogar,[1] Sadia Hussain,[2] Kanwal Zameer,[3] Ifrah Ali,[4] Komal Saeed[5]

[1-4]Department of Plastic Surgery, Mayo Hospital, Lahore; [5]Queen Elizabeth Hospital, Mindelsohn Way, Birmingham B15 2GW, United Kingdom.

Abstract

Background: Brachial plexus injuries (BPI) are severe injuries that cause significant physical disability and functional Impairment.

Objective: This study aimed to investigate motor recovery, functional ability, and psychological well-being after surgical treatment for BPI in a developing Country.

Methodology: A retrospective study was conducted at Mayo Hospital Lahore, including 12 patients who underwent surgical intervention for BPI. Motor function was assessed using the British Medical Research Council grading system, functional ability was evaluated using the QuickDASH score, and psychological well-being was assessed using the Patient Health Questionnaire-8.

Results: The study found varying degrees of motor recovery, with an average MRC grade of 4.2. Functional assessment revealed moderate disability in all patients, with an average QuickDASH score of 40.15±8.09. Psychological assessment showed no signs of depression in all patients, with an average PHQ-8 score of 4±0.5.

Conclusion: The study highlights the importance of incorporating psychological assessments into initial evaluations to ensure comprehensive care and support for these patients. Further research is needed to fully understand the complexities of BPI and their impact on patient's lives.

Received | 28-06-2024 **1st Revision** | 09-08-2024 **2nd Revision** | 05-09-2024 **Accepted** | 17-11-2024

Keywords | Brachial Plexus, Psychological Impact, BPI, QuickDASH, Functional outcome

Introduction

Brachial plexus injuries (BPI) are severe injuries that cause significant physical disability and functional impairment. Diagnosis is crucial to determine the surgical plan, and involves a detailed history, clinical examination, electro diagnostic studies, and imaging tests. Surgical options include nerve repair, neurolysis, nerve grafting, nerve transfer, tendon transfer, muscle transfer, and joint stabilization, and are chosen based on factors such as injury duration, type, and involved nerve roots.

Studies have shown varying outcomes after surgical treatment for BPI. Some have reported good motor outcomes but poor patient satisfaction, while others have documented good functional outcomes in most patients. (1-3) However, patients often remain significantly disabled after surgery, highlighting the need for improved treatment strategies.

This study aims to investigate motor recovery, functional recovery, and psychosocial status after surgery for BPI to understand overall outcomes in our Centre. By examining these aspects, we can identify areas for improvement and optimize treatment strategies to enhance patient outcomes and satisfaction.

Methodology

This retrospective study was conducted at the Plastic Surgery Department, Mayo Hospital Lahore after IRB approval. A retrospective review of medical records from the last five years was performed to collect data on patients diagnosed with brachial plexus injury.

The data collection included patient demographics, surgical procedures, pre- and post-operative assessments, complications, and follow-ups. Recovery was assessed in three areas: motor function (British Medical Research Council grading system, 0-5 with a score of 3 was considered satisfactory) (4), functional ability (Quick DASH score) (5), and psychological well-being (Patient Health Questionnaire-8). Patients who had undergone surgical treatment for brachial plexus injuries more than 1 year prior were invited to return for a follow-up assessment and 2 observers filled out a questionnaire.

Results

Areview of hospital records revealed 22 patients who sought treatment for brachial plexus injuries. Of these, 10 patients were treated conservatively, while 12 patients underwent surgical intervention. All the patients presented to the Outpatient department between 6-9 months post-injury, and all were referred from peripheral centers. Among the surgically treated patients, 5 underwent double nerve transfer for shoulder stabilization, 4 had the modified Oberlin procedure(fig-1), 2 underwent tendon transfer and the remaining 1 had triple nerve transfer (double nerve transfer for shoulder stabilization and Oberlin procedure for elbow flexion simultaneously) (table-1). All surgical patients underwent thorough clinical and electro-diagnostic evaluation before intervention. The mean follow-up period was 1.9 ± 0.86 years, and the mean age was 28 years. Notably, only one female patient opted for surgical intervention and all patients belonged to the lower middle class socioeconomic group. The majority of injuries resulted from traffic accidents. Despite counseling, none of the patients opted for free functional muscle transfer due to concerns about the lengthy procedure, extended hospital stay, and prolonged follow-up requirements.

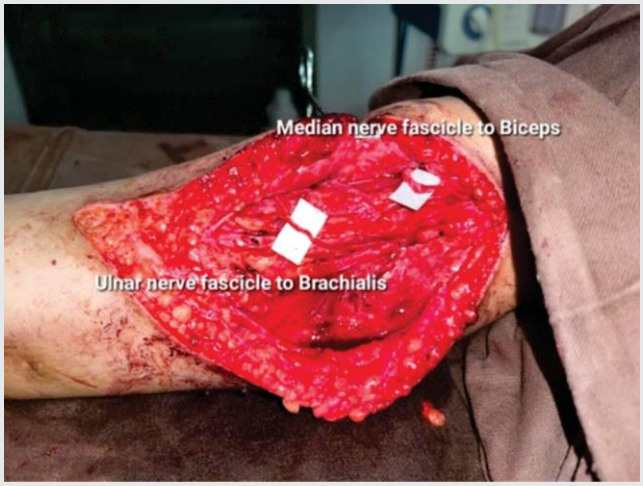

Figure 1: *Modified Oberlin procedure done for R Brachial Plexus Injury.*

Table 1: *(Data of different procedures)*

DOUBLE NERVE TRANSFER	No. of patients
SAN to SSN FCR fascicles to AN	4
SAN to SS FCU fascicles to AN	1
MODIFIED OBERLIN PROCEDURE :	4
TRIPLE NERVE TRANSFER: SAN TO SS FCU fascicles to AN Oberlin nerve transfer	1
Tendon Transfer (Opponensplasty + jones's Transfer)	2
Total no. patients	12

(SAN; Spinal Accessory nerve. SSN; suprascapular nerve. AN; Axillary Nerve. FCU; Flexor carpi ulnaris. FCR: Flexor carpi radialis.)

Motor Assessment: Six patients underwent surgery for shoulder abduction, with varying outcomes: three achieved grade 3 recovery, two achieved grade 5, and one achieved grade 4 according to MRC grade(fig-2). Meanwhile, five patients underwent the modified Oberlin procedure for elbow flexion, with two achieving grade 4 recovery and three achieving grade 5. Additionally, two patients underwent tendon transfer for thumb abduction, wrist flexion, and fingers extension, both achieving grade 4 recovery(table-2).

Table 2: *(MRC GRADING)*

MOTOR FUNCTION	Mean MRC GRADE
Shoulder Abduction	3.8
Elbow Flexion	4.6
Thumb opposition	4
Wrist extension	4
Finger extension	4

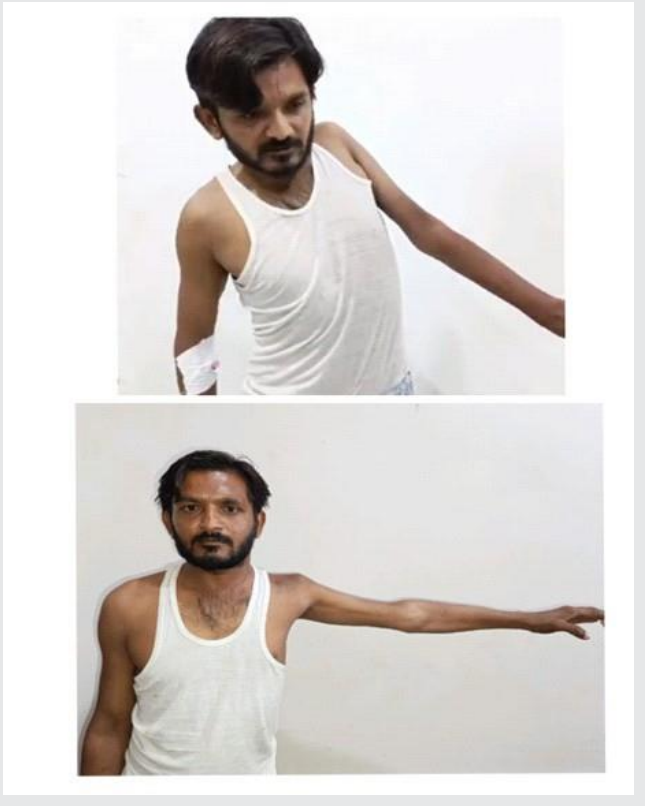

Figure 2. *MRC Grade-4 shoulder abduction.*

Functional Assessment:

The results from the evaluation of QuickDASH-9 score indicated all patients with moderate disability and 1 patient with severe disability. The average QuickDASH-9 score for all patients was 40.15±8.09, which falls within the moderate disability range (scores range from 0 to 100, with higher scores indicating greater disability).

Psychological Assessment:

The Patient Health Questionnaire-8 (PHQ-8) results show that all patients are functioning well, with no signs of depression. The average score of 4±0.5 is significantly below the threshold for major depression (10 or greater) and severe depression (20 or greater).

Discussion

Brachial plexus injuries can result in lifelong functional impairment and psychological trauma for patients. However, with the various surgical options available today, this disability can be significantly reduced. In our Centre, most patients who underwent surgery had a diagnosis of either pan plexus injury or upper brachial plexus injury.

After 1.5 years, the motor assessment results revealed varying degrees of recovery in shoulder abduction, elbow flexion, and hand function, with an average MRC grade of 4.2. This outcome is consistent with previous studies on brachial plexus injuries, particularly in our population (2, 6). Notably, most patients in this study were laborers and had irregular follow-ups and physiotherapy, which may have impacted their recovery.

The functional assessment using the QuickDASH-9 score indicates moderate disability in all patients, with an average score of 40.15±8.09. This suggests that patients still experience significant difficulties with daily activities and functional tasks, despite showing improvements in motor function. Lukas Rasulić investigate the functional outcomes along with motor recovery after surgery for brachial plexus injury. His data showed high DASH score (58.7%) along with depression and anxiety.[3] Another study performed in Tehran showed similar results in 50 patients.[1] This shows that despite good motor recovery patient suffered difficulty in doing daily routine activities.

The psychological assessment results in our study are notable, as they indicate no signs of depression in all patients. This contrasts with studies in developed countries populations, which have reported higher rates of depression and anxiety in patients with brachial plexus injuries.[7,8] This difference may be attributed to cultural and societal factors, as well as differences in healthcare systems and support networks.

A qualitative study on life satisfaction conducted in the USA after surgery for traumatic brachial plexus injury supports our findings.[9] The study, which included 15 patients, labeled brachial plexus injury as a "disability paradox," where patients experience a high quality of life despite their physical limitations.[10] Notably, patients who returned to work early reported higher satisfaction, which is consistent with our study's findings. This highlights the importance of

early rehabilitation and return to work in promoting overall well-being and life satisfaction in patients with brachial plexus injuries.

Our study has several limitations. Firstly, we did not conduct pre-operative functional and psychological assessments, which would have provided a more comprehensive understanding of the patient's improvement. Additionally, these assessments should have been included in the follow-up evaluations to monitor patient's progress at various stages. Furthermore, we only explored the variable of occupation and could not assess other factors that may influence the relationship between psychological stress and patient characteristics. Lastly, we had limited cases which may not be representative of the larger population. To address these limitations, future studies should aim to include larger sample sizes, involve multiple centers from both developed and developing countries, and explore a range of variables to gain a deeper understanding of how to effectively address patient satisfaction in surgically treated brachial plexus injuries.

Conclusion

In conclusion, our study demonstrates that patients with brachial plexus injuries in a developing country like Pakistan can achieve moderate functional improvement and surprisingly high quality of life after surgery. This highlights the resilience and adaptability of patients in resource-constrained settings. However, further research is needed to fully understand the complexities of brachial plexus injuries and their impact on patient's lives. Moreover, we emphasize the importance of incorporating psychological assessments into initial evaluations to ensure comprehensive care and support for these patients. By addressing these gaps, we can work towards improving outcomes and enhancing the well-being of individuals with brachial plexus injuries worldwide.

Conflict of Interest: *None*

Source of Funding: *None*

Author's Contribution

Shumaila Dogar: Conception and design of the study, Data collection, Data analysis and interpretation, Final approval of the version to be published and 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.

Sadia Hussain: Substantial contribution to acquisition of data, Data analysis and interpretation and final approval of the version to be published.

Kanwal Zameer: Concept and design, substantial contribution to acquisition of data, critical review and final approval of the study.

Ifrah Ali: Acquisition of data, Data analysis and interpretation and final approval of the version to be Published.

Komal Saeed: Critical review, Data analysis and interpretation and Final approval of the Version.

References

1. Yavari M, Shahrokh Shahraki S, Mousavizadeh SM, Karimi Rouzbahani A, Mahmoudvand G, Sedghi Asl H. Satisfaction and Functional Outcome of Surgical Treatment in Patients with Brachial Plexus Injury: A Decade of Retrospective Comparative Study. World J Plast Surg. 2022;11(3):28-37. doi: 10.52547/wjps.11.3.28. PMID: 36694682; PMCID: PMC9840768.
2. Ahmad S, Masood K, Shafi HMK, Qureshi KZ, Saadat B, Basra KR. Traumatic Brachial Plexus Injuries: HULS Protocol of Management. J Pak Ortho Assoc 2020;32(04):206-10.
3. Rasulić L, Savić A, Živković B, Vitošević F, Mićović M, Baščarević V, Puzović V, Novaković N, Lepić M, Samardžić M, Mandić-Rajčević S. Outcome after brachial plexus injury surgery and impact on quality of life. Acta Neurochir (Wien). 2017 Jul;159(7):1257-1264. doi: 10.1007/s00701-017-3205-1. Epub 2017 May 24. PMID: 28540442.
4. Committee MRCNI, Riddoch G. Aids to the investigation of peripheral nerve injuries: HM Stationery Office; 1943.
5. Beaton DE, Wright JG, Katz JN; Upper Extremity Collaborative Group. Development of the QuickDASH: comparison of three item-reduction approaches. J Bone Joint Surg Am. 2005 May;87(5):1038-46. doi: 10.2106/JBJS.D.02060. PMID: 15866967.
6. Ali M, Cheema TA, Makki MKH, Shami HB, Hussain B, Qureshi HMA. Outcome of Dual Nerve Transfer in C5-C6 Brachial Plexus Injuries. J Pak Ortho Assoc 2021;33(03)-:107-11.

7. Yannascoli SM, Stwalley D, Saeed MJ, Olsen MA, Dy CJ. A Population-Based Assessment of Depression and Anxiety in Patients With Brachial Plexus Injuries. J Hand Surg Am. 2018 Dec;43(12):1136.e1-1136.e9. doi: 10.1016/j.jhsa.2018.03.056. Epub 2018 May 19. PMID: 29789186; PMCID: PMC6242776.
8. Landers ZA, Jethanandani R, Lee SK, Mancuso CA, Seehaus M, Wolfe SW. The Psychological Impact of Adult Traumatic Brachial Plexus Injury. J Hand Surg Am. 2018 Oct;43(10):950.e1-950.e6. doi: 10.1016/j.jhsa.2018.02.019. Epub 2018 Apr 17. PMID: 29678427.
9. Dy CJ, Brogan DM, Rolf L, Ray WZ, Wolfe SW, James AS. Aqualitative study of life satisfaction after surgery for adult traumatic brachial plexus injury. Bone Jt Open. 2021 Jan 3;2(1):9-15. doi: 10.1302/2633-1462.21.BJO-2020-0175.R1. PMID: 33537671; PMCID: PMC7842160.
10. Albrecht GL, Devlieger PJ. The disability paradox: high quality of life against all odds. Soc Sci Med. 1999 Apr;48(8):977-88. doi: 10.1016/s0277-9536(98)00411-0. PMID: 10390038.

https://doi.org/10.5455/pjps.1721573915

Research Article

Adequate Chest Wall Reconstruction for Composite Defects Achieved by Soft Tissue Flap + Mesh Only

Fatima Askari,[1] Saad-ur-Rehman,[2] M. Ibrahim Khan,[3] Rafiya Masud,[4] Shahrukh Mohmand[5]

[1-5]Shifa International Hospitals, Islamabad

Abstract

Background: Chest wall tumor resechious create large defects requiring composite reconstruction.

Objective: The objective of our study is to evaluate the outcomes of patient undergoing bony stabilization with poly propylene mesh and soft tissue coverage with pedicled flaps.

Methodology: Comparative cross sectional study was done at Shifa hospital, Islamabad. 4 years period. All patients who underwent composite chest wall reconstructions after tumor resections were included bony stabilization was done with polypropylene mesh and soft tissue coverage was done with pedicles latissimuss dorsi or transverse rectus abdominis. Variables assessed included tumor type, location and resected ribs and flap used. Duration of hospital stay and any major or minor complications were noted.

Results: Total of 17 patients were included in the study. 11 (64.7%) were females and 6(35.3%) were males. The causes were primary chest wall tumors in 12 (70.6%) and breast carcinoma in 5 (29.4%). Ribs along with sternum were resected in 1 case and ribs only in 16 patients. The average number of ribs resected were 3.3. The average chest wall defect was 161.1cm^2 (ranging from 88cm -228 cm^2). Mean postoperative hospital stay was 7.41 days. There was no perioperative mortality.

Conclusion: Synthetic polypropylene mesh alone can be used for composite chest wall defects as it has less infection rate than rigid prosthesis, is easy to use, safe and cost effective.

Received | 21-07-2024 **Revision** | 16-08-2024 **Accepted** | 16-08-2024

Corresponding Author | Dr. Fatima Askari, Shifa International Hospitals, Islamabad

Email: fatima.askari89@gmail.com

Keywords | Chest Wall, Defects, Reconstruction, pedicle Flaps, Nonrigid, Mesh.

Introduction

Primary chest wall tumors are considered a rare entity and represent 5% of all thoracic neoplasms, approximately 50-80% are malignant. Among them chondrosarcomas are the most common.[1] In the era of modern surgical and technological advancements, extensive resections of malignant chest wall tumors have become possible but, the reconstruction of composite defects remain challenging.[2]

Most recent studies show that chest wall defects less than or equal to 5 cm in the greatest dimension do not require reconstruction.[3,4] The anterolateral chest wall has weak and thin layer of muscles due to which any defect >5 cm including 4 or more ribs should be reconstructed due to high risk of lung herniation and respiratory compromise due to paradoxical breathing[4]. In contrast defects <10 cm in apico-posterior chest wall do not require bony reconstruction due to strong musculature and presence of scapula and shoulder girdle.[5,8]

The goals of chest wall reconstruction are to guard intrathoracic organs, maintain cardiac and pulmonary functions and provide soft tissue coverage to resist infections, facilitate radiotherapy if needed and achieve aesthetically pleasing appearance.[6] Different metallic, synthetic and biological materials have been developed to restore chest wall stability, but their usage is arguable as there are no established guidelines, therefore it is usually based on surgeons' preference and experience.[5,7] The purpose of this

study is to evaluate the results of composite chest wall reconstruction in which bony restoration was done with polypropylene mesh and soft tissue coverage with pedicled musculocutaneous flaps after resection of malignant tumors.

Methodology

This study was approved by institutional review board (IRB# 184-24) and conducted in the department of plastic surgery, Islamabad over a period of 4 years from 1st January 2020 to 31st December 2023. It included a total of 17 patients who had undergone composite chest wall resections and reconstruction. This is a cross-sectional study in which patient's demographics such as age, gender, type of tumor, site of tumor, defect size, number of ribs resected, flap type, hospital stay, immediate postoperative complications were recorded.

The inclusion criteria was patients with malignant chest wall tumors in which reconstruction of bony defects was done with polypropylene mesh and soft tissue reconstruction was done with pedicled flaps after resection of malignant chest wall tumors. Exclusion criteria was benign tumors of chest wall, infected sternal wounds, trauma cases and those chest wall resection patients in which less than 3 ribs were resected or reconstruction was done for soft tissue coverage only with pedicle flaps.

Computed tomography or magnetic resonance imaging was performed in all cases to evaluate the extent of disease and suspected distant metastasis after which histological diagnosis was made through biopsy. Patients were discussed in multidisciplinary meeting by a thoracic and plastic surgeon, oncologist, radiologist and histopathologist. The patients were also evaluated by ICU specialist and pulmonologist prior to surgery.

Wide local excision was performed in all the cases taking a 4-5cm margin and specimen were sent for frozen section intraoperatively. The defect size was assessed, and bony reconstruction was done by polypropylene mesh by doubling it on itself and anchoring under slight tension to the cut edges of ribs for achieving skeletal stabilization. For soft tissue defect pedicled latissimus dorsi or transverse rectus abdominis flaps were used. Chest tube was instituted. Drains were placed under the flap and in the donor area. Postoperatively patients were kept in ICU for monitoring. Follow-up for any minor or major complications were done for a year in postoperative period.

Results

A total of 17 patients in our institution underwent composite chest wall reconstruction. Table 1 departs the clinical details of all patients. There were 64.7% females (11/17) and 35.3%males (6/17). Mean age was 40.2 years (ranging from 14 -65 years). The causes of composite chest wall defect were 12 (70.6%) primary chest wall tumors and 5 (29.4%) advance breast carcinoma. Pathological diagnosis was Chondrosarcoma [N=5] (29.4%), Ewing sarcoma [N=4] (23.5%), Leiomyosarcoma [N=1](5.9%) , Synovial sarcoma[N=1](5.9%) & Liposarcoma [N=1](5.9%).

After wide local excision the location of defect was anterolateral in 8 patients (47%), anterior in 7(41.1%), lateral in 1(5.9%) and central in 1(5.9%) case. There were no posterior defects in our study. Ribs along with lower part of sternum was resected in 1 case and ribs only in 16 patients. The average number of ribs resected were 3.3 (ranging from 3-5). The average chest wall defect after wide resection was 161.1cm^2 (ranging from 88cm -228 cm^2). Polypropylene mesh was used for skeletal reconstruction in all patients and for soft tissue coverage pedicled musculocutaneous latissimus dorsi (LD) flap was used in 12 patients (70.6%) and Pedicled Transverse rectus abdominis flap (TRAM) based on superior epigastric pedicle was used in 5 patients (29.4%). Figure 1 shows a patient who underwent resection of liposarcoma and coverage with LD flap. Figure2 shoes a patient who underwent TRAM flap resection of invasive breast cancer. Donor site was closed primarily in all TRAM flaps and in 7 LD flap patients, whereas split thickness skin grafting was used for donor sites of remaining 5 LD flap patients.

Postoperatively none of our patients had paradoxical respiratory movements. Mean postoperative hospital stay was 7.41 days (range 5-12 days). No perioperative mortality was seen. Post-operative complications seen during routine follow-ups after discharge included wound infection with negative cultures in 1 patient that was managed conservatively, LD donor site seroma in 3 patients, which was

aspirated and subsided eventually. Flap site wound dehiscence in 2 patients which was managed conservatively with repeated dressings. The mean follow-up period was 5.5 months (range 3-12 months).

3 patients received adjuvant chemotherapy, 9 patients were given radiotherapy and 5 received chemo-radiation. Two patients lost follow-up after 3 months. Two patients had recurrence at 5th and 7th month for which second surgery for re-excision and coverage with free anterolateral thigh flap was done. Rest of the patients had satisfactory results.

Assessment of the chest wall integrity was done once the chest tube was removed and surgical wounds were healed, by MRI (magnetic resonance imaging) that revealed concordant chest wall movements during respiration without any signs of paradoxical movements or displacement of mesh. There was no physical deformity on clinical examination and the patients were satisfied with overall postoperative results as there was no complain of limitations in routine activities.

Table 1: *Summary of Patients*

#	AGE/ SEX	TYPE OF TUMOR	SITE OF TUMOR ON CHEST	DEFECT SIZE (cm)	AVERAGE SURFACE AREA (cm)	SKELETAL RESECTION	Stay (no.of days)	SKELETAL STABILIZATION	TYPE OF PEDICLED FLAP	COMPLICATIONS
1	51/F	Advanced breast CA	Antero-lateral	16x11	176	4 ribs	9	Mesh	TRAM	SEROMA
2	33/F	Ewing sarcoma Chemo	Anterior	13x11	143	3 ribs	7	Mesh	LD	None
3	35/M	Chondro-sarcoma	Central	18x12	216	Sternum+ bilateral 5 Costocho-ndral ribs	11	Mesh	LD	None
4	65/M	Liposarcoma	Anterior	14x11	154	3 ribs	6	Mesh	LD	None
5	60/F	Advanced breast CA	Anterior	14x10	140	3 ribs	7	Mesh	TRAM	None
6	35 /F	Synovial sarcoma	Antero-lateral	11x8	88	3 ribs	5	Mesh	LD	None
7	52/F	Chondro-sarcoma	Antero-lateral	19x12	228	5 ribs	8	Mesh	TRAM	None
8	65/F	Advanced breast ca	Antero-lateral	16x10	160	4 ribs	6	Mesh	LD	Wound dehiscence
9	21/M	Chondro-sarcoma	Anterior	16x13	208	3 ribs	8	Mesh	LD	Infection
10	14/F	Ewing sarcoma	Lateral	13x10	130	3 ribs	7	Mesh	LD	None
11	57/M	Chondro-sarcoma	Antero-lateral	17x12	204	4 ribs	12	Mesh	LD	Infection
12	25/F	Ewing sarcoma	Anterior	13x9	117	3 ribs 1	1	Mesh	LD	None
13	16/M	Leiomyo-sarcoma	Antero-lateral	15x12	180	3 ribs	5	Mesh	LD	Seroma donor site
14	15/F	Ewing Sarcoma	Anterior	12x10	120	3 ribs	6	Mesh	LD	None
15	26/M	Chondro-sarcoma	Anterior	14x10	140	3 ribs	5	Mesh	LD	None
16	54/F	Advanced breast ca	Antero- lateral	14x13	182	3 ribs	7	Mesh	TRAM	None
17	61/F	Advanced breast ca	Antero-lateral	14x11	154	3 ribs	6	Mesh	TRAM	None

Abbreviations: *CA=carcinoma, LD= latissimus dorsi, TRAM= transverse rectus abdominis musculocutaneous*

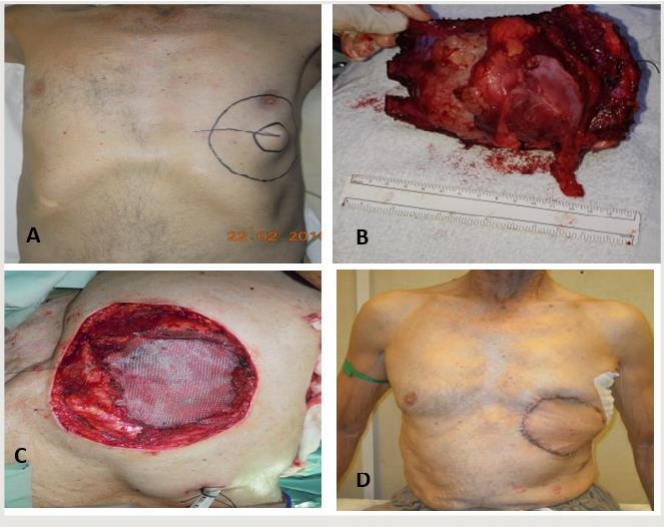

Figure 1: *A) liposarcoma of left chest wall. B) resected specimen showing 3 ribs. C) defect showing mesh placement. D) coverage with pedicled LD flap. D) follow-up picture at 3 weeks.*

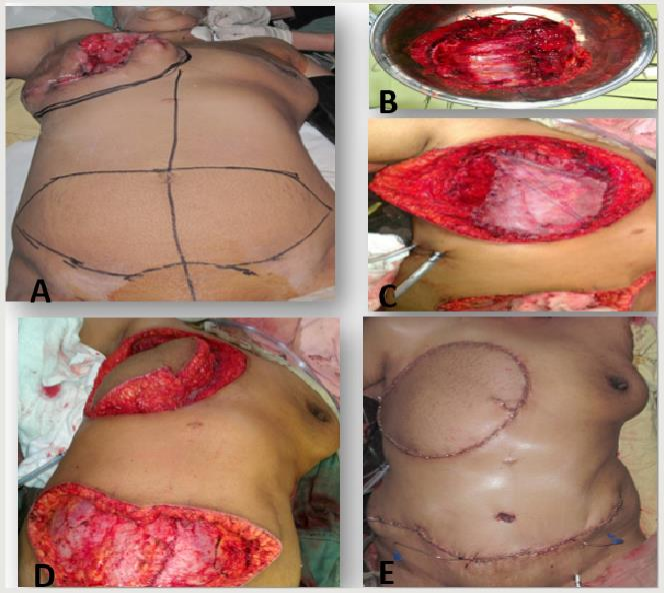

Figure 2: *A) Invasive right breast CA. B) resected specimen showing 5 ribs. C) mesh placement over defect. D) TRAM flap for inset. E) early follow-up at 2 weeks.*

Discussion

The common indications of chest wall reconstruction are malignant tumors (primary and secondary), congenital anomalies, infection, trauma, and osteoradionecrosis.[2] In our study cases of only primary malignant chest wall tumors and advanced breast carcinomas were included. The patients falling in the age range of our study is comparable to others.[2] The planning for composite chest wall tumor resection and reconstruction should always have a multidisciplinary approach[10-14]as done in our study.En bloc surgical extirpation with approximately 4cms of clear margin is recommended to avoid recurrence as suggested by following studies.[2,3,10,14] In our study, we also followed the recommended margins of 4cm. Our study has mean chest wall defect of 161.1 cm^2 which is comparable to other studies.[4,9] The mean number of ribs resected in the present study was 3.3, which is comparable to Finckh et al [5] (3 ribs) and Hameed et al[12](3.5 ribs).

An ideal prosthesis is firm enough to avoid abnormal motion, bio compliant in promotion of tissue ingrowth, moldable, radiolucent, resist infection, durable and affordable.[3,10-14] Many different rigid materials are available for reconstruction such as methyl methacrylate, titanium plates and silicone.[13,14] Non-rigid mesh and patches are further subdivided into synthetic mesh such as (polypropylene, marlex, vicryl, polyglactin, PTFE)[3] and biological mesh (porcine, bovine, human).[6] Recently 3D printed customized prosthesis[4,7,10,19] have become available. In our centre, polypropylene mesh was used for all chest wall defects and none of our patients showed signs of chest wall instability or flail chest. Alexander et al in his study of 34 cases showed excellent results using polypropylene mesh for ventral chest wall reconstruction without the use of metallic or biological implants regardless of the extent of chest wall resection.[5] Hameed et al had average bony defect of 16.5x13 cm for which they used polypropylene mesh and found it to be safe and effective[12]. Malathi et al in their series of 32 patients required skeletal stabilization in 13 cases for which they used mesh alone in 11 cases and rib grafts for other 2 central defects[2] whereas we used mesh for central defects as well. Another study of 146 patients showed comparison between synthetic mesh and ADM for skeletal reconstruction and concluded that ADM has less surgical site complication than synthetic mesh i.e., 32.6% vs 15.7%[9] but due to high cost of ADM, present study doesn't suggest it. Chang et al has suggested an algorithm in which a mesh only reconstruction is applied in a defect <4 ribs, however when 4 or more ribs or sternum is involved mesh with methyl methacrylate is used.[13] Spicer et al reviewed 427 patients with 82 rigid prostheses and 345 non rigid prostheses and claims no significant difference.[16]

In our study soft tissue coverage with pedicled flaps

was performed immediately after mesh placement in a single stage. The torso provides options of many vascularized flaps such as pectoralis major, rectus abdominis, serratus, external oblique, trapezius and latissimus dorsi.[11,17] However, the pedicled myocutaneous latissimus dorsi flap has stood the test in time. It was first reported by Italian surgeon Tansini after radical mastectomy in 1896.[11] Due to its large arc of rotation and reliable pedicle when latissimus dorsi is mobilized adequately leaving just the insertion intact, it can reach any part of the thorax such as lateral, anterior or midline easily.[12] We have used LD flap in 70% of our patients with no flap loss which is similar to Hameed et al[12] who used LD flap for all 20 cases in their study. For large anterolateral defects TRAM flap based on superior epigastric artery is a reliable option. It can easily cover defects up to 40 cm.[18,19] In our study 30% patients underwent coverage with TRAM flap. Omentum flap is considered as a salvage flap for large defects with small volumes in times of infection, irradiation, and flap failure.[17-19] Free flaps due to their long operative time are restricted only when regional flaps are deficient, irradiated or failed earlier.[12,17,20] Free anterolateral thigh flaps were used as a secondary procedure in 2 recurrent cases. Our study has a shorter period of hospital stay as compared to others.[8,13,21]

The limitation of the study are it's a retrospective study and that the sample size is small. A larger multi centric study can be planned in the future for more definitive assessment.

Conclusion

Despite availability of different rigid, non-rigid material and modification in flap techniques, composite chest wall reconstruction is still considered challenging. A multidisciplinary collaboration between thoracic and plastic surgeons makes it possible to achieve one stage tumor resection and appropriate chest wall reconstruction, providing maximal oncological results with minimal patient complications. Synthetic polypropylene mesh alone can be used for complex full thickness chest wall defects as it has less infection rate than rigid prosthesis is easy to use, is cost effective and most importantly is safe for the patient.

Source of Funding: None

Conflict of Interest: None

Author's Contribution

Fatima Askari: Data collection, Data analysis and interpretation, conception and design of the study, Final approval of the version to be published and 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.

Saad-ur-Rehman: Substantial contribution to acquisition of data, concept and design and final approval of the version to be published

M. Ibrahim Khan: Concept and design, substantial contribution to acquisition of data, critical review and final approval of the study.

Rafiya Masud: Conception and design of the study, critical revision of the article and final approval of the article to be published.

Shahrukh Mohmand: Data analysis, concept and design and final approval of the version to be published

References

1. Shah AA, D'Amico TA. Primary chest wall tumors. J Am Coll Surg. 2010 Mar;210(3):360-6. doi: 10.1016/j.jamcollsurg.2009.11.012. Epub 2009 Dec 22. PMID: 20193901.
2. Malathi L, Das S, Nair JTK, Rajappan A. Chest wall reconstruction: success of a team approach-a 12-year experience from a tertiary care institution. Indian J Thorac Cardiovasc Surg. 2020 Jan;36(1):44-51. doi: 10.1007/s12055-019-00841-y. Epub 2019 Jul 9. PMID: 33061093; PMCID: PMC7525737.
3. Gritsiuta AI, Bracken A, Abbas AE, Petrov RV. Complex anterior chest wall reconstruction after extensive oncologic resections: a narrative review. Shanghai Chest. 2021 Oct;5:41. doi: 10.21037/shc-21-8. Epub 2021 Oct 30. PMID: 35495182; PMCID: PMC9049198.
4. Jo GY, Ki SH. Analysis of the Chest Wall Reconstruction Methods after Malignant Tumor Resection. Arch Plast Surg. 2023 Feb 6;50(1):10-16. doi: 10.1055/s-0042-1760290. PMID: 36755660; PMCID: PMC9902099.
5. Schroeder-Finckh A, Lopez-Pastorini A, Galetin T, Defosse J, Stoelben E, Koryllos A. Anterior Chest Wall Reconstruction Using Polypropylene Mesh: A Retrospective Study. Thorac Cardiovasc Surg. 2020 Jun;68(4):341-351. doi: 10.1055/s-0039-1694033. Epub 2019 Aug 8. PMID: 31394575.

6. Colella S, Brandimarte A, Marra R, Marinari S, D'Incecco A, Di Genesio Pagliuca M, De Vico A, Crisci R, Divisi D. Chest wall reconstruction in benign and malignant tumors with non-rigid materials: An overview. Front Surg. 2022 Aug 3;9:976463. doi: 10.3389/fsurg.2022.976463. PMID: 35990091; PMCID: PMC9381953.
7. Egan KG, Emanuelli E, Butterworth JA. Chest Wall Reconstruction: A Comprehensive Analysis. Current Surgery Reports. 2022 Aug;10(8):109-18.
8. Maniscalco P, Fabbri N, Quarantotto F, Tamburini N, Cavallesco G. Titanium mesh in chest wall stabilization and reconstruction: a single center experience. Current Challenges in Thoracic Surgery. 2020 May 25;2.
9. Giordano S, Garvey PB, Clemens MW, Baumann DP, Selber JC, Rice DC, Butler CE. Synthetic Mesh Versus Acellular Dermal Matrix for Oncologic Chest Wall Reconstruction: A Comparative Analysis. Ann Surg Oncol. 2020 Aug;27(8):3009-3017. doi: 10.1245/s10434-019-08168-z. Epub 2020 Mar 9. PMID: 32152778.
10. Gonfiotti A, Salvicchi A, Voltolini L. Chest-Wall Tumors and Surgical Techniques: State-of-the-Art and Our Institutional Experience. J Clin Med. 2022 Sep 20;11(19):5516. doi: 10.3390/jcm11195516. PMID: 36233384; PMCID: PMC9573184.
11. Mansour KA, Thourani VH, Losken A, Reeves JG, Miller JI Jr, Carlson GW, Jones GE. Chest wall resections and reconstruction: a 25-year experience. Ann Thorac Surg. 2002 Jun;73(6):1720-5; discussion 1725-6. doi: 10.1016/s0003-4975(02)03527-0. PMID: 12078759.
12. Hameed A, Akhtar S, Naqvi A, Pervaiz Z. Reconstruction of complex chest wall defects by using polypropylene mesh and a pedicled latissimus dorsi flap: a 6-year experience. J Plast Reconstr Aesthet Surg. 2008 Jun;61(6):628-35. doi: 10.1016/j.bjps.2007.04.011. Epub 2007 Jul 25. PMID: 17656168.
13. Chang RR, Mehrara BJ, Hu QY, Disa JJ, Cordeiro PG. Reconstruction of complex oncologic chest wall defects: a 10-year experience. Ann Plast Surg. 2004 May;52(5):471-9; discussion 479. doi: 10.1097/01.sap.0000122653.09641.f8. PMID: 15096930.
14. Leuzzi G, Facciolo F. Lateral chest wall defects: reconstructive strategies. Current Surgery Reports. 2015 Jun;3:1-0.
15. Dai Z, Maihemuti M, Sun Y, Jiang R. Resection and reconstruction of huge tumors in the chest wall. J Cardiothorac Surg. 2022 May 12;17(1):116. doi: 10.1186/s13019-022-01877-9. PMID: 35551615; PMCID: PMC9097317.
16. Spicer JD, Shewale JB, Antonoff MB, Correa AM, Hofstetter WB, Rice DC, Vaporciyan AA, Mehran RJ, Walsh GL, Roth JA, Swisher SG, Sepesi B. The Influence of Reconstructive Technique on Perioperative Pulmonary and Infectious Outcomes Following Chest Wall Resection. Ann Thorac Surg. 2016 Nov;102(5):1653-1659. doi: 10.1016/j.athoracsur.2016.05.072. Epub 2016 Aug 12. PMID: 27526650.
17. Kua EH, Chia HL, Goh TL, Lim CH, Ng SW, Tan BK. A general algorithm for chest wall reconstruction based on a retrospective review. European Journal of Plastic Surgery. 2015 Jun;38:211-20.
18. Seder CW, Rocco G. Chest wall reconstruction after extended resection. J Thorac Dis. 2016 Nov;8(Suppl 11):S863-S871. doi: 10.21037/jtd.2016.11.07. PMID: 27942408; PMCID: PMC5124596.
19. Harati K, Kolbenschlag J, Behr B, Goertz O, Hirsch T, Kapalschinski N, Ring A, Lehnhardt M, Daigeler A. Thoracic Wall Reconstruction after Tumor Resection. Front Oncol. 2015 Oct 29;5:247. doi: 10.3389/fonc.2015.00247. PMID: 26579499; PMCID: PMC4625055.
20. Brito ÍM, Teixeira S, Paupério G, Choupina M, Ribeiro M. Giant chondrosarcoma of the chest wall: a rare surgical challenge. Autops Case Rep. 2020 Jun 5;10(3):e2020166. doi: 10.4322/acr.2020.166. PMID: 33344295; PMCID: PMC7703468.
21. Deschamps C, Tirnaksiz BM, Darbandi R, Trastek VF, Allen MS, Miller DL, Arnold PG, Pairolero PC. Early and long-term results of prosthetic chest wall reconstruction. J Thorac Cardiovasc Surg. 1999 Mar;117(3):588-91; discussion 591-2. doi: 10.1016/s0022-5223(99)70339-9. PMID: 10047664.

https://doi.org/10.5455/pjps.1716100379

Case Report

Successful Microsurgical Penile Replantation Following Amputation by Assault: A Case Report

Shahzad Ahmad,[1] Waqas Hayat,[2] Adnan Shakeel,[3] Danish Khattak[4]

[1-4]*Burns and Plastic Surgery Center, Peshawar*

Abstract

Penile amputation by assault or by any other cause including self-inflicted injury is a rare urological/plastic surgery trauma for which immediate replantation is required. It is a highly specialized and challenging procedure that requires microsurgical techniques due to the small blood vessels and nerves involved. We present a case who presented to us in emergency department of Burns and Plastic Surgery Center, Peshawar, Pakistan with a history of assault, resulting in amputation at the base of penis. Micro surgically, the penis was replanted. Mild to moderate edema was observed in the postoperative period for up to 4 weeks but it resolved on its own. After 6 weeks, the patient exhibited good urinary flow, morning erection and progressive sensory recovery.

Received | 19-05-2024 **Revision** | 31-05-2024 **Accepted** | 01-06-2024

Corresponding Author | Shahzad Ahmad, Burns and Plastic Surgery Center, Peshawar

Email: shahzad_94@yahoo.com

Keywords | Penile replantation, penile amputation, Microsurgery

Introduction

Penile amputation is a rare surgical emergency which needs urgent management. Most common causes include self mutilation, trauma, domestic violence with traumatic circumcision being the most common cause in pediatrics population.[1] There is no set management guideline for penile amputation except urgent microsurgical replantation of the amputee (Introduced by Cohen et al. In 1977).[2] The novel PENIS Score stratified penile amputations based on 5 criteria: position along the shaft, extension through the penis, neurovascular repair, ischemia time and type, and severed edge condition and contamination[3]. . In our case we started microsurgical replantation 3 to 4 hours after ischemia.

Case Presentation:

A 23-year-old unmarried male presented to us in plastic surgery emergency with a history of assault resulting in amputation of his penis, by a group of people in his native village. He presented at our center after 2 hours of incident. On admission, he was stable and lucid, the general physical examination was unremarkable. Local examination of phallus revealed a straight cut through all penile structures, with no avulsion component and no major lacerations. There was diffuse bleeding of corpora cavernosa tissue and vascular bleeding from the dorsal vessels. His phallus was amputated at the base and the stump was retracted to the pubic area, with the testes and scrotum intact. (Fig 1). Tetanus prophylaxis was given followed by intravenous administration of Antibiotics. Patient was prepared for General Anesthesia and replantation surgery attempted after proper wash and debridement of the amputated part. A 14-Fr silicone catheter was inserted into the patient's bladder through the amputated and stump section of the urethra, and was then connected from one end to the other using a series of anastomoses with vicryl 6-0 sutures applied in two layers. Subsequently, the repair of the cavernosal bodies was carried out. The following action involved pinpointing the dorsal penile arteries, which were then micro-surgically connected to the closer end of

the arteries with 8-0 prolene sutures following the process of irrigation with lignocaine and saline mixed with heparin. Following the connection of arteries, the deep dorsal penile vein was revealed and underwent a delicate surgical connection using 8-0 prolene sutures. The nerves on each side were identified and sutured together from epineurium to epineurium with the same type of sutures. Following the repair of the nerves and blood vessels, a healthy blood circulation was noted. The surrounding Buck's fascia was brought together, and the skin was sutured with 5-0 vicryl rapide sutures.

Postoperatively, glans scoring using sterile needle and heparin soaked gauzes were placed for first 48 hours but still a venous congestion was noted which was intense at day 4 and then gradually reduced over the next 3 days. Catheter was in place for 3 weeks. At the 6 week follow-up, patient exhibited good urine flow, morning eraction and progressive sensory recovery (figure-2)

Informed consent was obtained from the patient to publish his photos and information.

Figure 1: *(a) amputed part, (b) stump on presentation and (c) immediate post op after replant.*

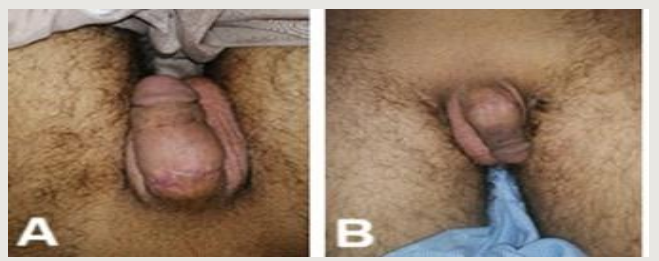

Figure 2: *(a) three weeks post op and (b) six weeks post op.*

Discussion

Penile amputation is an emergency which needs urgent microsurgical intervention. Macroscopic surgical repair as described by Ehrich et al in 1927 is less reliable as compared to microsurgical intervention as described by Cohen et al in 1977.[2] Arterial, venous anastomosis and nerve repair as well as cavernosa and urethral approximation are crucial in restoring the anatomy and physiology back to normal. Male is more prone to genital injury than a female due to the more exposed organ. Adequate treatment revolves around the mechanism of injury, time since injury and other structures and involvement of other tissues.[4] Following a replantation of penis, it was noted by Morison et al in 2017 that there is a 96% successful return of urinary function and a 77.5% return of erectile function.[5] Venous anastomosis is necessary for successful replantation but in case of venous congestion bloodletting and leech therapy is advised.[6] Cold chain of the amputated part is necessary as warm ischemia can limit the timeframe for successful replantation. However, a successful replantation even up to 24 hours has been achieved by Riyach et al.[7] Skin necrosis frequently occurs following penile re-implantation, with reports indicating it in nearly half of all cases. Possible contributing factors may involve ischemic time, postoperative edema, and congestion.[8] Several case studies have shown successful resolution of this complication through debridement and regrafting procedures.[7]

In this particular instance, as a result of prompt microsurgical artery repair and the prompt initiation of heparin scoring, there was minimal skin necrosis observed. Also erectile function was appreciable by the patient after 6 weeks post surgery.

Conclusion

Clean cut injury, timely arrival at a specialized center, preservation of the amputated part along with a trained and experienced microsurgical team plus a meticulous microsurgical technique and vigilant post operative monitoring are the key elements to any successful microsurgical penile replantation.

Source of Funding: *None*

Conflict of Interest: *None*

Author's Contribution

Shahzad Ahmad: Conception and design of the study, data collection, interpretation, Drafting the work Final approval of the version to be published and accountable for all aspects of the work.

Waqas Hayat: Conception and design of the study, **c**ritical revision of the article and final approval of the article to be published.

Adnan Shakeel: Interpretation of data, Manuscript Revision and final approval of the version.

Danish Khattak: Acquisition of data, Manuscript Revision and final approval of the version.

References

1. Fazi J, Adkins D, Knight J, Luchey A. Unusual mechanisms of penile amputation. Case reports in urology. 2019 Dec 26;2019.
2. Henry N, Bergman H, Foong D, Filobbos G. Successful penile replantation after complete amputation and 23 hours ischaemia time: the first in reported literature. BMJ Case Reports CP. 2020 Jun 1;13(6):e234964.
3. Tran AA, Machado BLC, Kuykendall KH, Spencer HJ, Scherzer ND, Almajed WS, Saghir N, Saghir R, Hellstrom WJGSex. The Revised PENIS Score and proposal of the PACKAGE Checklist: a meta-epidemiologic study on penile amputation and replantation. Sex Med Rev, 11(3):278-290, 01 Jun 2023.
4. Liarto J, Adi K. Traumatic penile partial amputation caused by rubber band a case report. International journal of surgery case reports. 2021 Sep 1;86:106358.
5. Elmaraghi S, Chen TJ, Heckman JE, Shiau JM, Williams DH, Abel EJ, Afifi AM. Functional penile replantation after traumatic avulsion amputation below the pubis: a case report. Microsurgery. 2020 Jan;40(1):70-3.
6. Yang K, Liu Y, Wang W, Xiao Y, Li X, Zhou L. Successful penile replantation after macroscopic repair using vein blood-letting therapy. Urology Case Reports. 2020 Jan 1;28:101069.
7. De M, Dawar R. The challenges and complications of re-implantation of the penis following amputation. Ghana Medical Journal. 2022 Mar 31;56(1):49-52.
8. Fujiki M, Ozaki M, Kai A, Takushima A, Harii K. Successful second microsurgical replantation for amputated penis. Plast Reconstr Surg Glob Open. 2017;5(9):e1512.

https://doi.org/10.5455/pjps.1718987581

Case Report

Flame Burn Injury in a 9-Year-Old Male Due to Severe Peripheral Neuropathy Following Incorrect Casting: ACase Report

Ansa Naseem,[1] Aqsa Younas,[2] Naureena Munawar,[3] Iqra Nosheen[4]

[1]Medical Student, King Edward Medical University, Lahroe; [2-4]Department of Plastic Surgery, Mayo Hospital, Lahore

Abstract

Distal radial fracture (DRF) can lead to various nerve injuries primarily due to direct trauma. However manipulation of fracture by quacks and application of tight cast can rarely lead to Ischemic injury to the nerves. We present the case of 9 years old male who had DRF that was managed by quacks. The manipulation and application of tight cast led to ischemic injury to nerves. Later on due to loss of sensation, patient had burn injury while attempting to warm up near the fire. This led to loss of middle and distal phalanges of the hand. Flame burn injuries due to peripheral neuropathy post-incorrect casting are rare but severe. Prompt recognition and management are crucial in pediatric orthopedic care.

Received | 21-06-2024 **Accepted** | 16-08-2024

Corresponding Author | Dr. Ansa Naseem, Medical Student, King Edward Medical University, Lahore.
Email: ansanaseem17@gmail.com

Keywords: Flame Burn, Peripheral Neuropathy

Case Presentation

Here we present the case of a 9-year-old male who presented to the outpatient department of Hospital with complaints of loss of sensation in the right hand and forearm, along with a burn injury to the right hand. The patient sustained a distal radial fracture (DRF) approximately one month prior while playing. However, due to limited resources and health education in underdeveloped areas, the initial response as is a practice in such areas was seeking treatment from a local unqualified practitioner, or quack. The quack applied a cast and dressing, resulting in significant swelling, loss of sensation, discoloration of the hand, and forearm pain up to the elbow. The mother removed the dressing after 24 hours.

Subsequently, the patilahent was taken to another quack who performed an x-ray and applied a cast, which led to a burning sensation on the forearm overnight. Upon removal of the plaster, blisters were observed. The parents opted for oil massage therapy, which continued for 20 days, during which the patient experienced further loss of sensation in the forearm and hand. The patient developed burn injuries to the hand while attempting to warm up near a fire during the winter months, due to the neuropraxia-induced lack of pain perception. This resulted in the loss of the middle and distal phalanges of the hand.

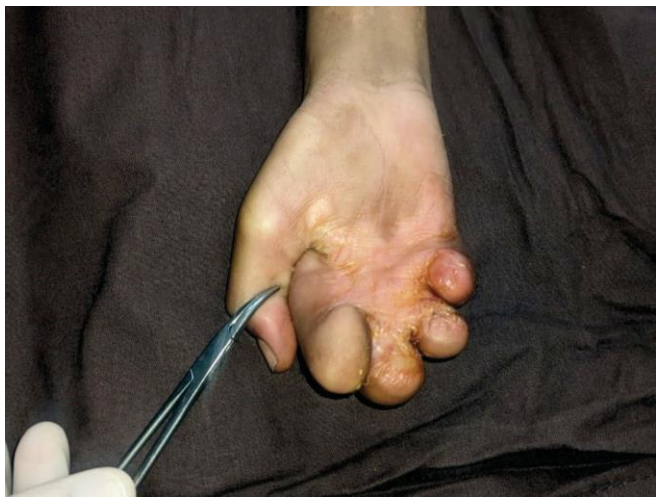

Figure 1: *Palmar view of hand showing thenar and hypothenar wasting from severe neuropathy post incorrect casting.*

Discussion

This case underscores the critical importance of adhering to proper casting techniques to mitigate potential complications, particularly the development of severe peripheral neuropathy. It emphasizes the need for healthcare providers and the public to be well-informed about the inherent risks associated with incorrect casting practices. Timely recognition and intervention are essential to prevent dire consequences, in particular, the recognition of associated neuropathy in the pediatric population can be challenging and is required to avoid permanent motor and sensory neurological losses for a lifetime.[4]

Comparative analysis with existing literature highlights the rarity and complexity of flame burn injuries resulting from severe neuropathy post-incorrect casting. While documented instances of nerve damage and sensory loss following improper casting exist,[5,6] the progression to such severe neuropathy, leading to a flame burn injury as observed in this case, is a unique phenomenon. This underscores the importance of further research to understand the underlying mechanisms and identify optimal management strategies.

Furthermore, the pervasive issue of quackery exacerbates the risks associated with incorrect casting and poses a significant challenge to healthcare delivery in underserved communities.[7] Addressing this multifaceted problem requires a comprehensive approach, including enforcement of regulations, targeted public awareness campaigns, and robust community education initiatives. By empowering individuals with knowledge about the dangers of seeking medical treatment from unqualified practitioners, informed decisions can be made and potential harm can be mitigated.

Efforts to improve access to legitimate healthcare services, particularly in marginalized and remote areas, are paramount.[8] This requires substantial investments in healthcare infrastructure, comprehensive training programs for healthcare providers, and the implementation of policies to ensure equitable access to quality care for all individuals. Strengthening healthcare systems and fostering a culture of awareness and accountability can effectively mitigate the risks associated with incorrect casting and other forms of medical malpractice, thereby safeguarding the health and well-being of vulnerable populations, especially children.[9]

Conclusion

Flame burn injuries due to peripheral neuropathy post-incorrect casting are rare but severe. Prompt recognition and management are crucial in pediatric orthopedic care. Addressing socio-economic factors like poor resources and poverty in remote areas is vital to ensure healthcare access and prevent similar incidents.

Conflict of Interest: *None*
Source of Funding: *None*

Author's Contribution

Ansa Naseem: Data Collection, Conception and design of the study, data analysis and interpretation, agreement to be accountable for all aspects of the work and final approval of the version to be published.

Aqsa Younas: Data analysis, Critical revision of the article, conception and design of the study and final approval of the study.

Naureena Munawar: Substantial contribution to acquisition of data, concept and design and final approval of the version to be published.

Iqra Nosheen: Concept and design, substantial contribution to acquisition of data, critical review and final approval of the study.

References

1. Shah AS, Guzek RH, Miller ML, Willey MC, Mahan ST, Bae DS; Pediatric Distal Radius Fracture (PDRF) Study Group. Descriptive Epidemiology of Isolated Distal Radius Fractures in Children: Results From a Prospective Multicenter Registry. J Pediatr Orthop. 2023 Jan 1;43(1):e1-e8. doi: 10.1097/BPO.0000000000002288. Epub 2022 Oct 26. PMID: 36299238.
2. Lutz K, Yeoh KM, MacDermid JC, Symonette C, Grewal R. Complications associated with operative versus nonsurgical treatment of distal radius fractures in patients aged 65 years and older. J Hand Surg Am. 2014 Jul;39(7):1280-6. doi: 10.1016/j.jhsa.2014.04.018. Epub 2014 Jun 2. PMID: 24881899.
3. Singh R, Seth I, Seth A, Singh S, Aiyappan RK, Yadav CM, Jain H, Tawde A, Agrawal GK, Jain A. How Not To Fix a Tibial Fracture: A Case Report on Treatment By a Quack. Cureus. 2023 Jun 9;15(6):e40203. doi: 10.7759/cureus.40203. PMID: 37435249; PMCID: PMC10331172.

4. Zabane Z, Andresen CH, Bünger MH, Hellfritzsch MB. Median nerve entrapment during closed reduction of antebrachium fracture in a child. Ugeskr Laeger. 2023 Dec 18;185(51):V05230320. Danish. PMID: 38105734.
5. Cortesi E. L'impatto della patologia neoplastica sullo stato di benessere del paziente [The impact of cancer on the healing status of patients]. Tumori. 1998 Jan-Feb;84(1 Suppl):S20-3. Italian. doi: 10.1177/03008916980841s105. PMID: 9617380.
6. Compartment Syndrome –orthoinfor-AAOS
7. Kotela I, Bednarenko M, Wilk-Frańczuk M, Kotela A. Znachorstwo--wciaz aktualny problem polskiej wsi. Na podstawie doświadczeń w chorobach narzadu ruchu [Quack medicine--a continual problem in Polish rural communities. Illnes occurring within the musculo-sceletal system]. Przegl Lek. 2010;67(5):402-4. Polish. PMID: 20684347.
8. Coombs NC, Campbell DG, Caringi J. A qualitative study of rural healthcare providers' views of social, cultural, and programmatic barriers to healthcare access. BMC Health Serv Res. 2022 Apr 2;22(1):438. doi: 10.1186/s12913-022-07829-2. PMID: 35366860; PMCID: PMC8976509.
9. Healthcare Facilities in Developing Countries: Infrastructure. Available from: https://link.springer.com/referenceworkentry/10.1007/978-3-030-74786-2_209-1.

INSTRUCTIONS TO THE AUTHORS AND REVIEWERS OF THE MANUSCRIPTS

(Base upon Minimum Requirements for Writing and Editing of Manuscripts)

Introduction

The new Editorial Board of Pakistan Journal of Plastic Surgery during its meeting held on January, 2019 decided to follow the "Uniform requirements for manuscripts submitted to Biomedical Journals: writing & Editing for Biomedical Publications by International Committee of Medical Journal Editors. A brief account of minimum requirements is given below for assisting the authors, reviewers and editors, the full text can be read, (www.icmje.org). Moreover plagiarism policy of ICMJE, Higher Education Commission and PMDC will be observed. It is authors' responsibility to apprise them of plagiarism in any form including paraphrasing and self plagiarism. The Plagiarism Standing Committee of Pakistan Journal of Plastic surgery would deal with cases of plagiarism and comprise of staff members, and editors. Those claiming intellectual/ idea or data theft of an article must provide documentary proof in their claim otherwise their case will be sent for disciplinary action.

General Principles

1. Title Page

The title page should carry the following information:

1. The title of the article. Concise titles are easier to read than long, convoluted ones. Authors should include all information in the title that will make electronic retrieval of the article both sensitive and specific.
2. Authors' names and Title of the Program. The names and other relevant information should be on title page only to ensure blind peer review of research article.
3. The name of the department(s) and institution(s) to which the work should be attributed.
4. Disclaimers, if any.
5. Corresponding authors. The name, mailing address, telephone and fax numbers, and e-mail address of the author responsible for correspondence about the manuscript.
6. Source(s) of support in the form of grants, equipment, drugs, or all of these.
7. Word counts. A word count for the text only (excluding abstract, acknowledgments, figure legends, and references). Aseparate word count for the Abstract is also useful for the same reason.
8. The number of figures and tables.
9. Conflict of Interest Notification Page

2. Conflict of Interest Notification Page

To prevent the information on potential conflict of interest for authors from being overlooked or misplaced, it is necessary for that information to be part of the manuscript. It should therefore also be included on a separate page or pages immediately following the title page.

3. Abstract and Key Words

An abstract (requirements for length and structured format vary by journal) should follow the title page. The abstract should provide the context or background for the study and should state the study's purposes, basic procedures (selection of study subjects or laboratory animals, observational and analytical methods), main findings (giving specific effect sizes and their statistical significance, if possible), and principal conclusions. It should emphasize new and important aspects of the study or observations.

Authors are requested to provide, and identify as such, 3 to 10 key words or short phrases that capture the main topics of the article. These will assist indexers in cross-indexing the article and may be published with the abstract. Terms from the Medical Subject Headings (MeSH) list of Index Medicus should be used.

4. Introduction

Provide a context or background for the study (i.e., the nature of the problem and its significance). State the specific purpose or research objective of, or hypothesis tested by, the study or observation; the research objective is often more sharply focused when stated as a question. Both the main and secondary objectives should be made clear, and any pre-specified subgroup analyses should be described. Give only strictly pertinent references and do not include data or conclusions from the work being reported.

5. Material and Methods

The Methods section should include only information that was available at the time the plan or protocol for the study was written; all information obtained during the conduct of the study belongs in the Results section.

(a) Selection and Description of Participants

Describe your selection of the observational or

experimental participants (patients or laboratory animals, including controls) clearly, including eligibility and exclusion criteria and a description of the source population. The guiding principle should be clarity about how and why a study was done in a particular way. When authors use variables such as race or ethnicity, they should define how they measured the variables and justify their relevance.

(b) Technical Information

Identify the methods, apparatus (give the manufacturer's name and address in parentheses), and procedures in sufficient detail to allow other workers to reproduce the results. Give references to established methods, including statistical methods (see below); provide references and brief descriptions for methods that have been published but are not well known; describe new or substantially modified methods, give reasons for using them, and evaluate their limitations. Identify precisely all drugs and chemicals used, includ-ing generic name(s), dose(s), and route(s) of administration. Also describe diagnostic or therapeutic procedures if part of the study design.

(c) Statistics

Describe statistical methods with enough detail to enable a knowledgeable reader with access to the original data to verify the reported results. When possible, quantify findings and present them with appropriate indicators of measurement error or uncertainty (such as confidence intervals). Define statistical terms, abbreviations, and most symbols. Specify the computer soft-ware used.

6. Results

Present your results in logical sequence in the text, tables, and illustrations, giving the main or most important findings first. Do not repeat in the text all the data in the tables or illustrations; emphasize or summarize only important observations.

When data are summarized in the Results section, give numeric results not only as derivatives (for example, percentages) but also as the absolute numbers from which the derivatives were calculated, and specify the statistical methods used to analyze them. Restrict tables and figures to those needed to explain the argument of the paper and to assess its support. Use graphs as an alternative to tables with many entries; do not duplicate data in graphs and tables.

7. Discussion

Emphasize the new and important aspects of the study and the conclusions that follow from them. Do not repeat in detail data or other material given in the Introduction or the Results section. For experimental studies it is useful to begin the discussion by summarizing briefly the main findings, then explore possible mechanisms or explanations for these find-ings, compare and contrast the results with other relevant studies, state the limitations of the study, and explore the implications of the findings for future research and for clinical practice.

Link the conclusions with the goals of the study but avoid unqualified statements and conclusions not adequately supported by the data. Avoid claiming priority and alluding to work that has not been completed. State new hypotheses when warranted.

8. References

(a) General Considerations Related to References

Although references to review articles can be an efficient way of guiding readers to a body of literature, review articles do not always reflect original work accurately. Small numbers of references to key original papers will often serve.

Avoid using abstracts as references. References to papers accepted but not yet published should be designated as “in press” authors should obtain written permission to cite such papers as well as verification that they have been accepted for publication. Informa-tion from manuscripts submitted but not accepted should be cited in the text as “unpublished observations” with written permission from the source.

Avoid citing a “personal communication” unless it provides essential information not available from a public source, in which case the name of the person and date of communication should be cited in parentheses in the text. For scientific articles, authors should obtain written permission and confirmation of accuracy from the source of a personal communication.

For articles published in journals indexed in MEDLINE, the Pakistan Journal of Plastic Surgery considers PubMed (http://www.pubmed.gov) the authoritative source for information about retractions.

(b) Reference Style and Format

The Uniform Requirements style is based largely on an ANSI standard style adapted by the National Library of Medicine (NLM) for its databases. For samples of reference citation formats, authors should consult National Library of Medicine web site.

References should be numbered consecutively in the order in which they are first mentioned in the text. Identify references in text, tables, and legends by Arabic numerals in parentheses. The titles of journals should be abbreviated according to the style used in Index Medicus. Consult the list of Journals Indexed for MEDLINE, published annually as a separate publication by the National Library of Medicine.

9. Tables

Tables capture information concisely, and display it efficiently; they also provide information at any desired level of detail and precision. Including data in tables rather than text frequently makes it possible to reduce the length of the text.

Type or print each table with double spacing on a separate sheet of paper. Number tables consecutively in the order of their first citation in the text and supply a brief title for each. Do not use internal horizontal or vertical lines. Give each column a short or abbreviated heading. Authors should place explanatory matter in footnotes, not in the heading. Be sure that each table is cited in the text.

10. Illustrations (Figures)

Figures should be either professionally drawn and photo-graphed, or submitted as photographic quality digital prints. In addition to requiring a version of the figures suitable for printing, Pakistan Journal of Plastic Surgery ask authors for electronic files of figures in a format (e.g., JPEG or GIF) that will produce high quality images in the web version of the journal; authors should review the images.

For x-ray films, scans, and other diagnostic images, as well as pictures of pathology specimens or photomicrographs, send sharp, glossy, black-and-white or color photo-graphic prints, usually 127 x 173 mm (5 x 7 inches). Letters, numbers, and symbols on Figures should therefore be clear and even throughout, and of sufficient size that when reduced for publication each item will still be legible. Figures should be made as self-explanatory as possible, since many will be used directly in slide presentations. Titles and de-tailed explanations belong in the legends, however, not on the illustrations themselves.

Photomicrographs should have internal scale markers. Symbols, arrows, or letters used in photomicrographs should contrast with the background.

If photographs of people are used, either the subjects must not be identifiable or their pictures must be accompanied by written permission to use the photograph. When-ever possible permission for publication should be obtained.

Figures should be numbered consecutively according to the order in which they have been first cited in the text.

11. Legends for Illustrations (Figures)

Type or print out legends for illustrations using double spacing, starting on a separate page, with Arabic numerals cor-responding to the illustrations. When symbols, arrows, numbers, or letters are used to identify parts of the illustrations, identify and explain each one clearly in the legend.

12. Units of Measurement

Measurements of length, height, weight, and volume should be reported in metric units (meter, kilogram, or liter) or their decimal multiples.

Temperatures should be in degrees Celsius. Blood pressures should be in millimeters of mercury, unless other units are specifically required.

13. Abbreviations and Symbols

Use only standard abbreviations; the use of non-standard abbreviations can be extremely confusing to readers. Avoid abbreviations in the title. The full term for which

14. Drug Name

Generic names should be used. When proprietary brands are used in research, include the brand name and the name of the manufacturer in parentheses after first mentioning of the generic name in the Methods section.

15. Guidelines for Authors and Reviewers

All material submitted for publication should be sent exclusively to the Pakistan Journal of Plastic Surgery. Work that has already been reported in a published paper or is described in a paper sent or accepted elsewhere for publication, should not be submitted. Multiple or duplicate submission of the same work to other journal should be avoided as this fall into the category of publication fraud and are liable for disciplinary consequences, including reporting to Pakistan Medical & Dental Council and Higher Education Commission. A complete report following publication of a preliminary report, usually in the form of an abstract, or a paper that has been presented at a scientific meeting, if not published in full in a proceedings or similar publication, may be submitted. Press reports of meetings will not be considered as breach of this rule, but additional data or copies of tables and illustrations should not amplify such reports. In case of doubt, a copy of the published material should be included with a

manuscript for editors' consideration.

Authors can submit their articles by post or by E-mail: pjpspakistan@gmail.com to the Editor, Pakistan Journal of Plastic Surgery. Article can also be submitted by post or by hand on a Compact Disc (CD) with three hard copies. Articles submitted by E-mail are preferred mode of submission and do not require any hard copy.

All authors and co-authors must provide their contact telephone/cell numbers and E-mail addresses only on the title page of manuscript.

A duly filled-in author's certification proforma is mandatory for publication. The duly signed ACP must be returned to the Pakistan Journal of Plastic Surgery office as soon as possible. The sequence / order of the authors on ACP once submitted shall not be changed at any stage.

It is mandatory to provide the institutional ethical review board / committee approval for all research articles, at the time of submission of article.

The editors reserve the right to edit the accepted article to conform to the house-style of the Journal.

16. General archival and linguistic instructions

Authors should submit the manuscript typed in MS Word. Manuscripts should be written in English in British or American style/format (same style should be followed throughout the whole text), in past tense and third person form of address. Sentences should not start with a number or figure. Any illustrations or photographs should also be sent in duplicate. Components of manuscript should be in the following sequence: a title page (containing names of authors, their postal and Email addresses, fax and phone numbers, including mobile phone number of the corresponding author), abstract, key words, text, references, tables (each table, complete with title and footnotes) and legends for llustrations and photographs. Each component should begin on a new page. The manuscript should be typed in double spacing as a single column on A4 (8-1/2" x 11" or 21.5 cm x 28.0 cm), white bond paper with one inch (2.5 cm) margin on one side.

Sub-headings should not be used in any section of the script except in the abstract. In survey and other studies, comments in verbatim should not be stated from a participating group. Acknowledgements are only printed for financing of a study or for acknowledging a previous linked work.

From January 2016, all randomized trials should also provide a proof of being registered at the **International RCT Registry.**

17. Material for Publication

The material submitted for publication may be in the form of an Original research (Randomized controlled trial - RCT, Meta-analysis of RCT, Quasi experimental study, Case Control study, Cohort study, Observational Study with statistical support etc), a Review Article, Commentary, a Case Report, Recent Advances, New techniques, Debates, Adverse Drug Reports, Current Practices, Clinical Practice Article, Short Article, KAP (Knowledge, Attitudes, Practices) study, An Audit Report, Evidence Based Report, Short Communication or a Letter to the Editor. Ideas and Innovations can be reported as changes made by the authors to an existing technique or development of a new technique or instrument. A mere description of a technique without any practical experience or innovation will be considered as an update and not an original article. Any study ending three years prior to date of submission is judged by Editorial Board for its suitability as many changes take place over the period of time, subject to area of the study. Studies more than three years old are not entertained. In exceptional cases, if Editorial Board is of the view that data is important, an extension of one year may be granted. Pakistan Journal of Plastic Surgery also does not accept multiple studies/multiple end publications gathered/derived from a single research project or data (wholly or in part) known as 'salami slices'.

Original articles should normally report original research of relevance to clinical medicine. The original paper should be of about 2000-2500 words excluding abstract and references. It should contain a structured abstract of about 250 words. Three to 10 keywords should be given for an original article as per MeSH (Medical Subject Headings). There should be no more than three tables or illustrations. The data should be supported with 20 to 25 references, which should include local as well as international references. Most of the references should be from last five years from the date of submission.

Clinical Practice Article is a category under which all simple observational case series are entertained. The length of such article should be around 1500 - 1600 words with 15 - 20 references. The rest of the format should be that of an original article. KAP studies, Audit reports, Current Practices, Survey reports and Short Articles are also written on the format of Clinical Practice Article. Evidence based reports must have at least 10 cases and word count of 1000 - 1200 words with 10 - 12 references and not more than

2 tables or illustrations. It should contain a non-structured abstract of about 150 words. Short communications should be of about 1000 - 1200 words, having a non-structured abstract of about 150 words with two tables or illustrations and not more than 10 references. Clinical case reports must be of academic and educational value and provide relevance of the disease being reported as unusual. Brief or negative research findings may appear in this section. The word count of case report should be 800 words with a minimum of 3 key words. It should have a non-structured abstract of about 100 - 150 words (case specific) with maximum of 5 - 6 references. Not more than 2 figures shall be accepted.

Review article should consist of critical overview/analysis of some relatively narrow topic providing background and the recent development with the reference of original literature. It should incorporate author's original work on the same subject. The length of the review article should be of 2500 to 3000 words with minimum of 40 and maximum of 60 references. It should have non-structured abstract of 150 words with minimum 3 key words. An author can write a review article only if he/she has written a minimum of three original research articles and some case reports on the same topic.

Letters should normally not exceed 400 words, with not more than 5 references and be signed by all the authors-maximum 3 are allowed. Preference is given to those that take up points made in contributions published recently in the journal. Letters may be published with a response from the author of the article being discussed. Discussions beyond the initial letter and response will not be entertained for publication. Letters to the editor may be sent for peer review if they report a scientific data. Editorials are written upon invitation.

Between 3 to 10 key words should be given for all the category of manuscripts under the abstracts as per mesh [medical subject heading].

18. Thesis Based Article

Thesis based article should be re-written in accordance with the journal's instructions to the author guidelines.

Article shall undergo routine editorial processing including external review based upon which final decision shall be made for publication. Such articles, if approved, shall be published under the disclosure by author that 'it is a Thesis based article'.

19. Ethical Considerations

If tables, illustrations or photographs, which have already been published, are included, a letter of permission for re-publication should be obtained from author (s) as well as the editor of the journal where it was previously published. Written permission to reproduce photographs of patients, whose identity is not disguised, should be sent with the manuscript; otherwise the eyes will be blackened out. If a medicine is used, generic name should be used. The commercial name may, however, be mentioned only within brackets, only if necessary. In case of medicine or device or any material indicated in text, a declaration by author/s should be submitted that no monetary benefit has been taken from manufacturer/importer of that product by any author. In case of experimental interventions, permission from ethical committee of the hospital should be taken beforehand. Any other conflict of interest must be disclosed. All interventional studies submitted for publication should carry Institutional Ethical & Research Committee approval letter.

Ethical consideration regarding the intervention, added cost of test, and particularly the management of control in case-control comparisons of trials should be addressed: multi-centric authors' affiliation may be asked to be authenticated by provision of permission letters from ethical boards or the heads of involved institutes.

20. Authorship Criteria

As stated in the Uniform Requirements, credit for authorship requires substantial contributions to (a) the conception and design or analysis and interpretation of the data, (b) the drafting of the article or critical revision for important intellectual content, critical appraisal of findings with literature search and actual write up of manuscript, (c) final approval of the version to be published. Each author must sign a statement attesting that he or she fulfills the authorship criteria of the Uniform Requirements.

The Journal discourages submission of more than one article dealing with related aspects of the same study. The journal also discourages the submission of case reports unless unreported from Pakistan. Unusual but already reported cases should, therefore, be submitted as letters to the editor.

21. Copyright

The Pakistan Journal of Plastic Surgery is the owner of all copyright to any work published by the journal. Authors agree to execute copyright transfer of their

requested with respect to their contributions accepted by the journal.

 Instructions to authors appear on the last page of each issue. Prospective authors should consult these before submitting their articles and other material for publication. The PAKISTAN JOURNAL OF PLASTIC SURGERY accepts only original material for publication with the understanding that except for abstracts, no part of the data has been published or will be submitted for publication elsewhere before appearing in this journal. The Editorial Board makes every effort to ensure the accuracy and authenticity of material printed in the journal. However, conclusions and statements expressed are views of the authors and do not necessarily reflect the opinions of the Editorial Board of PJPS. Publishing of advertising material does not imply an endorsement by the PJPS.

22. Proofs

Page proofs will be emailed, without the original manuscript, to the corresponding author for proof correction and should be returned to the editor within three days. Major alterations from the text cannot be accepted. Any alterations should be marked, preferable in re