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Research Article

Medical Training Affected During COVID-19 Pandemic and Measures to Overcome it

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Abstract

Background: The COVID-19 pandemic has affected the medical training due to lockdowns and ever changing SOP's that has resulted in cancelling elective cases and restructuring of healthcare system. In all of this, the profound effect on resident's wellness and effects on their clinical skills have not been characterized.

Objective: To evaluate the impact of Covid-19 pandemic on training of plastic surgery residents in Pakistan.

Methodology: It is a cross-sectional survey based study done in Liaquat National Hospital. An online questionnaire comprising of 21 questions were sent using online platform and the study includes all current residents working in affiliated hospitals in Pakistan. Respondents were asked about healthcare restructuring, educational experiences and impact on their wellness.

Results: A total of 120 residents participated in the study, having response rate of 46.7 percent. Gender, postgraduate year, and city were well represented within the sample. Roughly all of the residents (82.1 percent) informed the restructuring of their residency program and most of them (75 percent) were assigned in the management of Covid-19 patients. Most of the residents has likely negative (4 percent) or somewhat negative (35.7 percent) impact on their training and wellness. Overall, 85.7 percent were discontented that they will not be able meet minimum case numbers due to reduced numbers of elective procedures. Most of the residents accepted that virtual lectures from professors outside the hospital were of the greatest value. Forty-six percent of the respondents felt isolated due to social-distancing during lockdown.

Conclusions: The COVID-19 pandemic had a great amount of impact on plastic surgery resident's education and wellness. Although reductions in elective cases may be temporary, this may represent a loss of critical clinical experience. Some effects were positive like conducting virtual meetings which have somewhat balanced the learning experience of residents.

Keywords | COVID-19, SAR-COV-2, Health, Adaptation, Psychologic, Surgery, Plastic

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Introduction

This Covid-19 pandemic has hit the world so hard that medical training is also affected by lockdowns and newly formed SOP's. Due to this lockdown it has become so important to find different ways to improve the knowledge of residents.¹ Most teaching hospitals have reorganized their healthcare systems by cancelling elective surgical procedures and out-patients appointments which has caused missed diagnosis, delayed treat-

ment or getting no treatment at all.² This has also resulted a profound impact on training programs of Pakistan, but very limited data has been published so far. Other specialties like Urology and Ophthalmology were also published data about the impact of pandemic on resident training.^{3,4} This pandemic has not just affected the learning capabilities of residents by reducing the number the patients but also affected the mental health of residents which may hinder their clinical skills learning.⁵

Introduction

This Covid-19 pandemic has hit the world so hard that medical training is also affected by lockdowns and newly formed SOP's. Due to this lockdown it has become so important to find different ways to improve the knowledge of residents.¹ Most teaching hospitals have reorganized their healthcare systems by cancelling elective surgical procedures and out-patients appointments which has caused missed diagnosis, delayed treatment or getting no treatment at all.¹² This has also resulted a profound impact on training programs of Pakistan, but very limited data has been published so far. Other specialties like Urology and Ophthalmology were also published data about the impact of pandemic on resident training.^{3,4} This pandemic has not just affected the learning capabilities of residents by reducing the number the patients but also affected the mental health of residents which may hinder their clinical skills learning.⁵ The restructuring by hospitals include deployment of surgical residents to medical activities like Covid-HDU/ICU to cope with the burden of increasing number of corona positive patients. Although it was necessary but it has affected the training and wellness of plastic surgery residents.⁶ In-house meetings were cancelled and training programs switched to virtual meetings/teaching classes which do not have such interactive sessions like physically attending a class.⁷

This COVID-19 pandemic has formed sudden stressors across numerous domains in departments of plastic surgery. We as a plastic surgery community must pay special attention to not only our patients but also ourselves and our community to go through this Covid-19 pandemic and its outcome⁸. Admitting the fact that mental health is important but during this pandemic it has become even more essential.

Based on the fact that rapidly changing healthcare system has affected the residents by redeployment, reduced number of cases, limited learning, social-distancing and fear of spread of infection to themselves or their family members, there has been limited data gathered and published in Pakistan. The goal of this was to evaluate the impact of the COVID-19 pandemic on the plastic surgery residency training program from resident perspective.

Methods and Materials:

This is a retrospective cross-sectional survey study done in Liaquat National Hospital after Institutional board approval in Pakistan. To evaluate the impact on resident

training and wellness a questionnaire was formed.

An online questionnaire comprising of 21 questions was sent using online platform and after accepting the informed consent, was completed by plastic surgery residents. The questionnaire was sent to current plastic surgery residents of whole Pakistan, regardless of gender. Those who have completed the residency but waiting for exams or those on leave during the time of study were excluded. The questionnaire consisted of 3 parts. In first includes demographic data like gender, city and training year and in the second part we evaluated the plastic surgery program restructuring like virtual mee-

Table 1: Demographic of Residents

| | Frequency | Percent |
|--|-----------|---------|
| Gender | | |
| Female | 28 | 50 |
| Male | 28 | 50 |
| PGY | | |
| R3 | 18 | 32.1 |
| R4 | 10 | 17.9 |
| R5 | 22 | 39.3 |
| R6 | 6 | 10.7 |
| City | | |
| Faisalabad | 2 | 3.6 |
| Hyderabad | 4 | 7.1 |
| Islamabad | 2 | 3.6 |
| Karachi | 32 | 57.1 |
| Lahore | 10 | 17.8 |
| Quetta | 2 | 3.6 |
| Rawalpindi | 2 | 3.6 |
| Rehim yar khan | 2 | 3.6 |
| Living Condition | | |
| Living alone | 6 | 10.7 |
| Living with an adult aged >65 | 14 | 25.0 |
| Living with an adult not working in a healthcare field | 8 | 14.2 |
| Living with an adult working in a healthcare field | 20 | 35.7 |
| Living with your children | 8 | 14.2 |

tings, number of procedures or redeployment and lastly residents were asked about psychological impact on their wellbeing like how they feel about it or has it affected their clinical approach. Data were collected without disclosing identity of residents.

Collected data was analyzed statistically using statistical Package for Social Sciences (SPSS) v.18 (IBM Inc.). Categorical data is shown as numbers or percentages for descriptive statistics. Collected data of questionnaire also analyzed according to resident's gender. Chi-square test was performed for all univariate analysis of dichot-

motous data and p-value less than 0.05 was considered significant.

Results

From all over the Pakistan, 120 residents in Plastic surgery Program were invited but 56 of them have participated in the survey after giving informed consent. The response rate was 46.7 percent.

50 percent residents were male (n=28) and remaining twenty-eight of the respondents were female. 57 percent of the respondents were from Karachi city, 17.8 percent from Lahore city, 7.1 percent from Hyderabad and remaining 3.6 percent of the respondents were doing training in Faisalabad, Quetta, Rawalpindi and Rahim Yar Khan respectively. 32.1 percent of the respondents were R3, 17.9 percent were R4, only 10.7 percent of R5 participated in the study and 39.5 percent of R6 showed the greatest response. Only 10.7 percent of residents were living alone and most of them (89.3 percent) were living with someone. Almost one-third were living with

Table 2: Program Restructuring

| | Frequency | Percent | P-value |
|--------------------------------|-----------|---------|---------|
| Restructuring of Residency | 46 | 82.1 | |
| Redeployment | 42 | 75.0 | |
| Area Of Posting | | | |
| Emergency Department | 8 | 14.2 | |
| ICU/HDU/Ward Covid specific | 40 | 71.4 | |
| Medicine Ward | 8 | 14.2 | |
| Gender and redeployment | | | |
| Male | 22 | 47.8 | 0.485 |
| Female | 24 | 52.2 | |
| PGY and redeployment | | | |
| R3 | 14 | 33.3% | 0.051 |
| R4 | 8 | 19.0% | |
| R5 | 18 | 42.9% | |
| R6 | 2 | 4.8% | |

someone working in healthcare field, 14.2 percent were living someone not working in healthcare field and remaining 14.2 percent were living with a child in house. During the pandemic, roughly all of the residents (82.1 percent) informed the restructuring of their residency program and most of them (75 percent) were assigned in the management of Covid-19 patients. 71.4 percent were assigned to Covid-specific ICU/HDU/Ward and remaining 14.2 percent were redeployed to emergency department and medicine general ward respectively, so most of the residents were involved in the management

Table 3: Effects on Residency and postponement of cases

| | Frequency | Percent |
|--|-----------|---------|
| Effects on residency due to postponement of cases | | |
| Maximally | 4 | 7.1 |
| Minimally | 2 | 3.6 |
| Not much | 6 | 10.7 |
| To full extent | 20 | 35.7 |
| To some extent | 24 | 42.9 |
| Net Effect on training | | |
| Likely negative | 26 | 46.4 |
| Likely positive | 4 | 7.1 |
| No effect | 6 | 5.3 |
| Somewhat negative | 20 | 35.7 |

of Covid-19 patients. Mostly the residents, who were redeployed, were males than females but this difference was statistically non-significant (p= 0.12, 57.1 percent vs 42.9 percent).

Most of the residents has likely negative (4 percent) or somewhat negative (35.7 percent) impact on their training and wellness, whereas 7.1 percent of the trainees has likely positive impact.

Thirty-five percent of the respondents reported that reduce number of cases has impacted their surgical skills training to full extent while forty-two percent have

Table 4: Trainee experience with restructuring

| | Frequency | Percent |
|---|-----------|---------|
| Net effect of redeployment | | |
| It caused anxiety and psychological stress | 22 | 39.2 |
| It caused strain on physical health | 4 | 7.1 |
| To protect my family and reduce the spread it disrupted my life | 30 | 53.6 |
| Would you volunteer again to manage covid -19 patients? | | |
| No | 16 | 28.6 |
| Yes | 40 | 71.4 |
| Any Psychological support by institution? | | |
| No | 16 | 28.5 |
| Yes | 40 | 71.4 |
| If there was insufficient support, why is it then? | | |
| Not adequate family services (e.g. childcare) | 2 | 3.6 |
| Not adequate financial support (e.g. Extra pay) | 34 | 60.7 |
| Not adequate PPE | 7 | 12.5 |
| Not adequate psychosocial support | 13 | 23.2 |

been affected to some extent and ten percent were relieved that pandemic hasn't affected them at all. Overall, 85.7 percent were discontented that they were not or will not be able meet minimum case numbers due to reduce numbers of elective procedures, however this varied greatly

Table 5: Effects of Pandemic on education and career

| | Frequency | Percent |
|---|-----------|---------|
| Effective activity in increasing your knowledge? | | |
| Continuing hospital work | 14 | 25.0 |
| Practicing surgical skills | 8 | 14.3 |
| Reading | 16 | 28.6 |
| Virtual teaching | 18 | 32.1 |
| Your career path has been affected in any way? | | |
| Delay in commencement of job | 4 | 7.1 |
| Delay in interview/match | 2 | 3.6 |
| None of the above | 50 | 89.2 |

by institution and year of residency. Seventy-two percent of final year residents were fearful that they will not be able to reach the required number of cases.

Most preferred learning activity was virtual meeting followed by reading, continuing hospital work and then practicing surgical skills. 25.9 percent of residents admitted that 1-2 meetings were conducted per week during the pandemic but 59.3 percent revealed that no such meeting was conducted, whereas 95 percent of the respondents says 1-2 or 2-4 teaching classes were conducted before the pandemic. Most of the residents accepted that virtual lectures from professors outside the hospital who also shared their experiences were of the greatest value.

Only 11 percent reported that the pandemic has affected

Table 6: Support from Department Or Institution

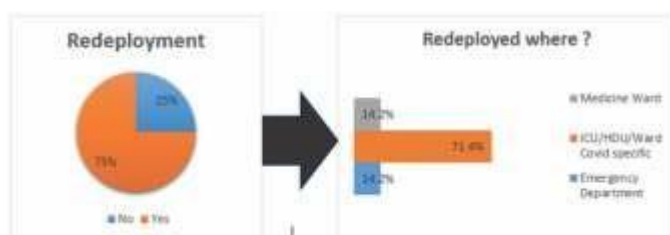
| | Frequency | Percent |
|---|-----------|---------|
| How much your department was supportive during the pandemic? | | |
| Minimally | 36 | 64.2 |
| Reduced clinical work hours | 20 | 35.7 |
| Did your department employed an on call rota or reduced workforce during pandemic? | | |
| No | 10 | 17.9 |
| Yes | 46 | 82.1 |

their career pathway by delay in taking interview/match and delay in commencement of training, while a huge number of respondents say their career wasn't affected at all (89.2 percent).

The trainees who were redeployed revealed (64.2 percent) shockingly that they had no or minimal support from their department during the pandemic. Those who were redeployed, 82.1 percent of them had adequate PPE and those who were not satisfied (66.7 percent) with department support expected financial support and that was not given. Twenty-two percent were not satisfied due to lack of psychosocial support and remain-

Table 7: Feeling of Isolation

| | Frequency | Percent |
|---|-----------|---------|
| Did social distancing made you feel isolated from your colleagues? | | |
| No | 30 | 53.5 |
| Yes | 26 | 46.4 |
| How did you maintain contact with your colleagues? | | |
| In-person with social distancing | 26 | 46.4 |
| In-person without social distancing | 8 | 14.3 |
| Telecommunication (calls/sms) | 22 | 39.3 |



ing 11.2 percent were dissatisfied due to lack of family services (like childcare) or adequate PPE. Though, 71.4 percent would happily volunteer again to help with the management of Covid-19 patients. Both male and females equally feel that there was no enough support from department or institution but this result was not significant statistically, $p=0.58$.

Although many of the residents felt that their department has provided psychosocial support that they needed while 20 percent of the respondents did not feel the same way. Only forty-six percent of the respondents felt isolated due to social-distancing during lockdown because most of them (46.4 percent) maintained contact in-person with social distancing and 39.3 percent maintained contact through telecommunication (calls/sms), whereas 14.3 percent did not maintain social-distancing while meeting with the colleagues during the lockdown period.

Figure 1: Percentage of redeployment shown in pie chart while location of postage is shown in a bar chart.

Discussions:

The surgical skills is the core dogma of training in residency and consists of several key factors of learning⁹. Our cross-sectional study is aimed towards the impact of COVID-19 pandemic on resident training in Plastic Surgery in Pakistan. Our study was done only in Pakistan and does not reflect the data of other countries. Like in all over Pakistan, our institution also reacted to pandemic and imposed limitations of resident training. When program restructuring was done several key elements

of resident training was affected and our study shows that this pandemic was associated significantly with impairment of training. This has also affected the residents negatively on their wellness as shown by our survey. The damage to residency was more severe in surgical specialties where surgical hands-on was key element in towards learning and it cannot be replaced by virtual meetings¹⁰. Almost all of the plastic surgery residents were redeployed to COVID-19 related ICU/HDU or Ward due to the restructuring of the training. May be plastic surgery residents were more fit for redeployment, partly due to their critical care experience during their training in General surgery. This has caused fear of contagion related anxiety among most of the residents as showed by our study and in previous studies, there is significant psychological impact on different populations including healthcare workers and patients¹¹⁻¹³.

In our study, several plastic surgery residents reported that restructuring in their training has negative impact on surgical education. Reduction in number of cases, cancellation of in-person conferences, reduced hands-on experience has resulted in a negative impact on education. Maximal effect on surgical experience was reported by half of residents during the pandemic. This perception was more pronounced who were at the end of their training program. More residents showed their interest in pursuing fellowship programs or employment hospital-based environment due to the pandemic. Final year residents who were about to complete their residency already had significant financial stress and job instability due to COVID-19 pandemic further caused exaggeration on anxiety levels.¹⁴ This stress amongst plastic surgery residents may cause shift in career paths in the coming years due to the pandemic.

As the surgical hands-on experiences suffered, other new educational ways were adopted and became available.¹⁵ Residents of plastic surgery noted that zoom-meetings and virtual education has become most important for learning as a medium. This has allowed residents to learn from outside the institution and improve their knowledge by lectures from visiting professors. Residents also reveal that the number of these virtual meetings increased significantly and the number in-person meetings were low to none. This showed that switching to virtual education has significantly improve the knowledge that was lacking among the residents during the pandemic. This can prove that innovative solution can provide equity to surgical training and further expand resident knowledge outside the surgical operating room.

Residents, especially those doing training in surgical specialties, are already facing burnout and attrition¹⁶ but this pandemic has multiplied the negative impact on wellness of residents which is often overlooked.¹⁷ Our study showed that significant number of residents think that this restructuring has impacted negatively on psychological health. These findings are alarming, as previous studies already showed that there is increasing burnout and stress among plastic surgery residents and adding the impact of this pandemic further caused detrimental effects on resident wellness. This stress and burnout have negative impact on patient care and further cause residents to make medical error.¹⁸ The redeployment of residents caused stress, guilt and grief connected with managing COVID-19 patients can be tough for some who are not familiar with loss/death. After all this, residents still volunteer for redeployment and this shows the passion of these residents towards management of patients.

Limitations:

Our study was limited as like all other survey-based studies. This is a cross-sectional study and long-term challenges and their impact were not explored in this study. The questionnaire and study methods were constructed with multi-institutional expert input but reliability was not tested. We still think that 47% response rate is strong and can reflect the results to be generalized. It is also limited in that we captured the feelings of residents at single point in time and as the pandemic continues to adapt, the well-being and surgical education may change significantly. Further studies will be needed to find the full extent of COVID-19 pandemic on the wellness of plastic surgery residents.

Conclusion

This cross-sectional survey reveals that most Pakistani residents had a considerable negative impact on plastic surgery training program and deleterious effects on their personal well-ness. As surgical hands-on decreased, virtual meetings augmented the surgical education and much appreciated as an alternative to in-person teaching among residents.

Conflict of Interest: None

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Research Article

Complex Heel Defect: A Comprehensive Study on Combined Regional Flaps For Sensate and Stable Coverage

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Abstract

Background: Heel defect has remained a challenging situation for reconstructive surgeons. In large post traumatic defects, the goal is to provide a sensate and stable soft tissue coverage, especially for the weight-bearing part of the heel. The paucity of local tissue options makes the scenario difficult to deal with.

Objective: This study is aimed to reconstruct large defect, involving both the weight-bearing and non-weight-bearing part of the heel by combining two regional flaps.

Methodology : A retrospective study, comprising of 11 patients from January 2016 to December 2019 with large traumatic heel defects, operated in our setup with combined medial plantar and reverse sural artery flap within 72 hours of injury. Follow up period was 6 months postoperatively.

Results: All flaps survived well except one reverse sural flap, which was congested and later debrided and 2 had distal edge necrosis which were managed conservatively. All the reverse sural flaps were noted to have lymphedema, but only 3 patients opted for debulking surgery. The functional outcome was excellent, with all the patients being able to walk normally, both barefoot and with footwear. The weight-bearing area was sensate, a clear advantage of utilizing instep skin.

Conclusion: In our experience, the combined strategy of utilizing local tissue for large heel defects, not only provides a sensate, stable, and reliable coverage but also avoids the lengthy procedure of free tissue transfer that in the end would not be able to give similar results.

Keywords | Complex heel defects, Sural flap, Medial plantar flap

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Introduction

Heel injuries with extensive soft tissue loss remained challenging for reconstructive surgeons.¹ The heel has an anterior weight-bearing and posterior non-weight bearing area. In large post-traumatic soft tissue defects, the main aim is to provide a sensate and stable soft tissue coverage to the weight-bearing part of the heel for normal ambulation.² The reconstruction is difficult in this complex anatomical region owing to the poor blood supply and lack of local tissue availability.³ The provision of sensate and stable soft tissue padding in the weight-bearing part along with the soft and supple

cover in the non-weight bearing part is the goal of reconstruction.

Various strategies and procedures have been proposed and implied in the past for the coverage of large heel defects but none of them was sufficient enough to cover the defects involving anterior and posterior areas of the heel.^{4,5} In recent times, medial plantar artery flap, reverse sural artery flap and free tissue transfer is being done in many centers which provide an adequate amount of tissue to cover complex heel defects, but medial plantar artery flap has the superior edge on the reverse sural flap as mentioned in previous studies.^{6,7} Masquelet

and Romana in 1990 described that reconstruction with medial plantar artery most closely resembled the skin surface and there is less donor site morbidity postoperatively.⁸ Medial plantar artery flap can replace "like with like tissue", this specialized tissue is harvested from the non-weight bearing medial arch of the foot and is placed directly on the weight-bearing area of the heel.⁹ It provides a sensate and weight-bearing fat pad to the heel.⁷ Similarly, the reverse sural artery flap is a distally based fasciocutaneous flap used for coverage of defects that involve the distal third of the leg, ankle, and foot.¹⁰ The major advantage of reverse sural artery flap is a constant blood supply that is not sacrificed or manipulated.^{11,12} However, the disadvantage of this flap is venous congestion that can lead to early postoperative flap necrosis, but with improvement in surgical technique, the survival outcome is getting better.^{13,14} Zheng L et al reported complete survival of the flap in twenty-three cases, with excellent reconstruction outcome for small to moderate soft tissue defects with dead space in heel and ankle, especially those with weight-bearing area defect.¹⁰

The medial plantar artery flap can only provide coverage to the anterior weight-bearing part of the heel, though a carefully planned sural flap or free flap can cover the most areas of the heel but the skin will be insensate and won't be suitable for weight-bearing, that can lead to ulceration of the skin, and the patient must wear customized footwear. In this study, we described our experience of employing the utility of combining two regional tissues to reconstruct a large heel defect, involving weight-bearing and non-weight-bearing parts of the heel, that is, medial plantar artery flap and reverse sural artery fasciocutaneous flap. The aim is to provide a tough tissue similar to heel at the weight-bearing area from the instep tissues and coverage of posterior heel with soft pliable tissue from the calf in selected cases.

Methodology

This is a retrospective descriptive study, spanning over 4 years from January 2016 to December 2019, conducted at the Department of Plastic and Reconstructive surgery at a tertiary care hospital. As a teaching hospital, written consent is taken routinely from all the patients for possible use of data for research purposes, keeping the identity anonymous. The data was retrieved from the registry of Hospital Information Management System (HIMS) and reviewed for large traumatic heel defects reconstructed with combined sural and medial plantar artery flap. Total 11 patients were included in the study. The data

was assessed for demographic profile, mechanism of injury, involved limb, associated injuries, early complications (hematoma/bleeding, infection, venous congestion, flap failure) and late complications (infection, lymphedema, contour abnormalities, flap loss), flap survival, and follow-up. The outcome was assessed in terms of walking ability barefoot and with routine footwear/shoes, flap texture (soft/supple, firm, and hard/contracted) and presence of protective sensation over the transferred flap.

Wound debridement was done in 8 patients immediately after the injury to remove all devitalized tissue and to prepare the wound for reconstruction. All patients underwent heel coverage with combined pedicled locoregional medial plantar and reverse sural artery flap within 72 hours of injury. A standard reverse sural artery flap was used for the coverage of the posterior non-weight bearing area of the heel. The sural flap was harvested; the deep fascia, sural nerve, artery, and short saphenous vein were included in the flap. The medial plantar artery flap was harvested based on the superficial branch of the medial plantar artery, lateral sensory branch of the medial plantar nerve was included in the flap after neurolysis to gain additional length. The flap was rotated 180° to cover the anterior weight-bearing area of the heel.⁷ Donor sites of both the sural and medial plantar artery flap were covered with split-thickness skin grafts. Figure-1-3, showing pre and postoperative photographs of the procedure. Partial weight-bearing was allowed at 6 weeks while full weight-bearing was allowed at 12 weeks after the procedure. All patients were advised for flap and foot care. Follow up period was 6 months postoperatively. SPSS version 25 was used for statistical analysis.



Figure 1: Complex heel defect (A), medial plantar artery flap inset, and bolster dressing on graft at the donor site (B)



Figure 2: Completely covered heel defect (C and D), after 1 week of the flaps inset



Figure 3: Sural flap debulking after 6 months of flap inset (E), Follow-up after 12 months of the procedure (F)

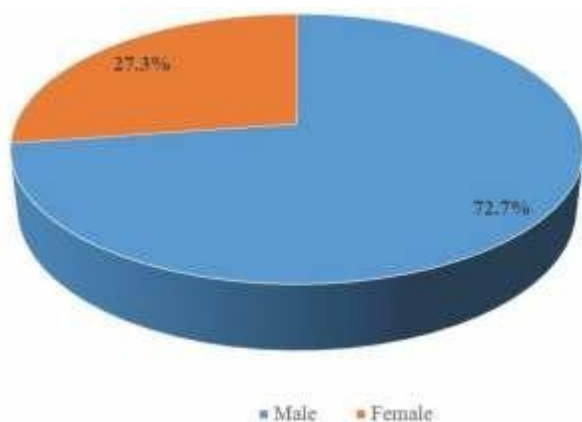


Figure 4: Gender distribution

Results

Total 11 patients were operated for the coverage of large heel defects with combined reverse sural and medial plantar artery flap with a mean age of 31+ 8.6 years, out of which 8 (72.7%) were male and 3 (27.3%) were female [Figure-4]. Most of the patients (54.5%) were field workers. Mechanism of injury was road traffic accident in majority of the patients, that is, 9 (81.8%) and blast injury in 2 (18.2%) patients while the right

Table 1: Frequency distribution

| | Age | Years (\pm SD) | 31 (\pm 8.6) |
|---|-----|-----------------------|-----------------|
| Occupation | | Students | 2 (18.2%) |
| | | Desk job | 3 (27.3%) |
| | | Field Job | 6 (54.5%) |
| Mechanism of injury | | Road Traffic Accident | 9 (81.8%) |
| | | Blast Injury | 2 (18.2%) |
| | | Other | 0 (0.0%) |
| Involved limb | | Right | 7 (63.6%) |
| | | Left | 4 (36.4%) |
| Associated Injuries | | Yes | 1 (9.1%) |
| | | No | 10 (90.9%) |
| The revision or Additional procedure | | Yes | 1 (9.1%) |
| | | No | 10 (90.9%) |

lower limb was the most affected limb. One patient out of 11 was presented with associated injury i.e. open wound at thigh [Table-1].

All medial plantar artery flaps survived well while 3 of the 11 sural flaps developed complications. Out of those 3 flaps, one was congested initially and ended up with partial flap loss which was debrided and required surgical revision later. Two sural flaps had distal edge necrosis and were managed conservatively with dressings. All sural flaps were noted to have lymphedema, but only three patients opted for debulking surgery. The functional outcome was excellent, with all the patients being able to walk normally both barefoot and with shoes. The texture was soft and supple for both medial plantar artery flap and reverse sural flap in all the patients. The weight-bearing area was sensate in all the patients.

Discussion

Plastic and reconstruction surgeons globally encounter formidable challenges, particularly when addressing soft tissue defects in the complex anatomy of the heel. The intricacies involve both anterior and posterior sections, with the anterior heel covered by robust thick skin, ideal for weight-bearing, while the posterior heel requires supple coverage.^{15,16}

Numerous operative procedures, including muscle flaps, have been attempted over the years, but have proven insufficient for addressing large defects^{6,17-20} Sommerlad and McGrouther also explained in a study that how majority of these techniques are neither sufficient nor desirable to cover large defects.⁵

In the contemporary medical landscape, several health-care centers are incorporating procedures such as the medial plantar artery flap, reverse sural artery flap, and free tissue transfer to address complex heel defects. Notably, these techniques offer enough tissue for coverage. However, it is worth noting that previous studies have highlighted the superior advantages of the medial plantar artery flap over the reverse sural flap in this context but the size of it is insufficient to cover the large defects involving anterior and posterior heel.²⁵

An innovative investigation conducted by Shanan and Gingrass outlined the utilization of the medial plantar artery fascio-cutaneous flap, establishing it as a cornerstone in contemporary foot and ankle reconstruction.^{21,9} Medial planter artery flap not only demonstrates its effectiveness in providing appropriate soft tissue coverage through its sensate skin but also stands out for offering the most adequate blood supply and innervation. This distinction arises from its unique feature, encompassing two pedicles that include both the superficial and deep branches of the medial plantar artery.²²⁻²⁴ A noteworthy advantage of selecting this flap lies in the potential recovery of sensation in the skin, attributable to the inclusion of sensory nerves within the flap.⁷ Conversely, the reverse sural artery flap presents itself as a viable alternative for addressing posterior heel defects, especially in instances where the medial plantar artery flap falls short in providing sufficient coverage.²⁵ This alternative involves harvesting soft skin from the posterior leg, containing lower peroneal septo-cutaneous perforators in a reverse configuration, thus justifying its nomenclature. It is essential to acknowledge, however, that this method is associated with the development of tissue edema over time.^{26,27} While it can deliver sensate and pliable soft tissue coverage from the posterior leg to the weight-bearing regions of the heel, it's important to note that the skin obtained through this method may not be suitable for weight-bearing. In the case of extensive and intricate heel defects, relying solely on either of these flaps proves insufficient to adequately cover the wound. Free tissue transfer emerges as an alternative, capable of providing ample coverage for such large defects; however, it is crucial to recognize

that the skin acquired through this technique may also not be conducive to weight-bearing. Recognizing the limitations of individual flaps, our study advocates for the combined use of both the local flaps in a single procedure to effectively cover extensive, complex heel defects.

Compared to free microvascular tissue transfer, combined local flaps were simple, involving a concise surgical duration, minimal blood loss, and added convenience of being a one-step surgical procedure as discussed by J. Benito-Ruiz et al in a study.²⁸ The mean hospital stay in our patients was very less (mean 6 days) as compared to the patients with free tissue transfer done by Yücel et al¹ and there was no need for extensive monitoring as in cases of free tissue transfer.

The results of our study were almost similar to the results of the study done by J. Benito-Ruiz et al,²⁸ as all of the medial plantar artery flaps survived and all the patients regained sensation and were able to walk normally with or without routine foot ware. The regained sensations are inferior when compared to the normal foot as reported in a study by Siddiqi et al.²⁹ Out of 11 only one of the sural flaps suffered partial flap loss, which was managed by debridement and readjustment. The utilization of local tissue for the coverage of complex heel defects not only provides sufficient sensate skin but also aids early restoration of the normal walk and improved quality of life.

Conclusion

Drawing from our firsthand experiences, we assert that fascio-cutaneous flaps, specifically the instep medial planter artery flap for addressing anterior heel defects and the reverse sural flap for managing posterior heel defects, stand as the primary preference in our reconstruction algorithm for soft-tissue heel defects. The utilization of free flaps can be considered in complex situations when none of the aforementioned flaps can be feasibly executed.

Conflict of Interest: *None*

Funding Source: *None*

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Research Article

Efficacy of Bi-lobed Second Dorsal Metacarpal Artery Flap in Pediatric Electric Hand Burns

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Abstract

Background: Electrical injuries are considered a worldwide problem, with hand burns being most common in pediatric population. Reconstruction in this age group is quite challenging due to multiple factors like age, vessel size and noncompliance etc., Bi-lobed second dorsal metacarpal artery (SDMA) flap is a viable option for the reconstruction of electrical burns of hand in the pediatric patients with minimal effect on range of motion of donor site.

Objective: The purpose of this study is to evaluate the success rate and donor site range of motion after SDMA flap.

Methodology: A prospective observational cohort study was undertaken in all patients who underwent reconstruction with SDMA flap at institution from March 2016 to March 2018. Data was collected regarding flap success rate and active motion arcs of metacarpophalangeal joint (MCPJ) and proximal interphalangeal joints (PIPJ) of donor area and compared with the normal side. Patients were followed on outdoor basis for a period of 02 years

Results: Among 32 patients, survival rate of flap is 96.87 percent (n=31) with only partial loss of 3.12 percent (n=1). At mean follow up of 12 months, donor finger movements at MCPJ and PIPJ were almost similar to that on opposite side.

Conclusion: Second dorsal metacarpal artery flap is useful and reliable flap in complex reconstruction of burn hands in pediatric group in terms of survival and range of motion.

Keywords | Second dorsal metacarpal artery flap, Metacarpophalangeal joint, Hand burn, Pediatric electrical burn, Pediatric burn

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Introduction

Electrical injuries (EIs) are considered to be the worldwide problem given the widespread use in our daily life. It's of no surprise that most of these victims are small children & teenagers.¹ In this pediatric population, hand burns remain the most common as children mostly explore their surroundings with hands.² Etiology also differs from adult population as dorsal hand burns are mostly scald burn and volar ones are mostly due to contact and electrical burns.³ Electrical injuries are

divided into low (60–1000 V, usually 220 to 360 V) and high voltage (>1000 V) injuries.⁴ Low voltage injuries mostly are due to biting electrical cords, placing metallic objects in wall sockets and direct contact with live wires and electrical appliances.⁵ Hand electrical burns are challenging considering their anatomy. Volar hand skin is unique due to high density of Merkel's tactile disks, Meissner's tactile corpuscles, Vater-Pacini's corpuscles and free nerve ending, causing a devastating sensory loss after burns. Also close approximation of bones, tendons and blood vessels to overlying skin making

them easily vulnerable to deep burns leading to functional disability⁶. As compared to adults, pediatric skin is thinner and more prone to injury. These injuries require hospitalization in specialized burn centers, and may need multiple debridement. As electric burns tend to be deep, exposure of tendons and bones are common. The reconstruction is challenging in these patients considering factors like age, vessel size, non-compliance etc. The use of first dorsal metacarpal artery flap from index finger by Coleman and Anson reported its use to cover such defects⁷. Later on Earley used second dorsal metacarpal artery to raise flap from long finger⁸. Both traditional flaps from either fingers are usually of inadequate size (>2.4 x 4 cm) for coverage of complex defects⁹. Dauphin and Casoli illustrated that dorsal inter-carpal arch give rise to second dorsal metacarpal artery¹⁰. Smith and Harrison used both the first and second dorsal metacarpal arteries to raise pedicled bi-lobed flap¹¹, but Zhang et al. modified this technique by raising flap only on second dorsal metacarpal artery (SDMA) thus avoiding sacrificing first dorsal metacarpal¹². Theoretically there is decreased range of motion of metacarpophalangeal joint and proximal interphalangeal joint after flap harvesting from dorsum of 1st and 2nd digit. However, in this study no compromise of joint movement is observed. The main focus of this study is to establish success rate and the postoperative range of motion of donor areas joints after SDMA flap.

Methodology

This is a prospective cohort observational study done in Jinnah Burn and Reconstructive Centre, Lahore from March 2016 to March 2018.

After approval from our institutional board and ethical committee, all patients were identified through our record and registry. All pediatric group patients who have exclusively hand burns due to electrical injury are included in the study as shown in figure 1. Exclusion and inclusion criteria of patients are shown in Table 1. Prior to SDMA flap, all the wounds were debrided as shown in figure 2. The flap survival rate is observed post operatively in terms of partial and complete loss. Patients were followed on outdoor basis for the period of 2 years during this period all patients received standard post-op care and physiotherapy. Range of motion is measured at 2years follow up of MCPJ and IPJ of index and middle finger of donor hand and compared with normal hand corresponding digits. The functional outcome of metacarpophalangeal and proximal inter-

phalangeal joints of index and middle finger by comparing them to normal hand shown in figure 3.

Table 1: Inclusion and exclusion criteria

| Inclusion criteria |
|---|
| All hand burn due to electrical injury. |
| Only involving unilateral hand |
| Age <12 years |
| No associated injuries. |
| Exclusion criteria |
| Soft tissue loss other than electrical burns. |
| Age >12 years |
| Electrical burns Involving both hands |
| Patients with associated injuries (fractures, vascular compromise etc.) |
| Patients with congenital hand anomalies, vascular diseases, Diabetes. |

Results

Overall 32 patients (Male 24 , Female 08) with mean age of 09 years were accepted in this study. At the end of study, the mean dimension of flaps from index and long finger was 3.6×1.8cm (range, 3.2×1.6 cm to 4.0×2 cm) and 3.8×1.8 cm (range, 3.1 ×1.5 cm to 4.0×2 cm) respectively, with mean pedicle length of 3.4 cm (range, 2.9 cm to 3.8 cm). Survival rate was 96.78 percent (n=30) with partial loss of 3.12 percent (n=1), which healed without any intervention.

At the end of follow up, the active motion arcs of metacarpophalangeal joints (MCPJ) and proximal interphalangeal joints (PIPJ) were measured and compared with contralateral uninjured hand. The average active motion arc was measured over index finger which showed value of 82 degrees (range 80 to 85 degrees) at MCPJ and 98 degrees (range, 90 to 108 degrees) at PIPJ, as compared to contralateral unaffected side where active motion was measured to be 87 degrees (range, 83 to 90 degrees) at MCPJ and 105 degrees (range, 94 to 112 degrees) at PIPJ.

Similarly, average active motion arc was measured over middle finger which showed value of 82 degrees (range, 80 to 90 degrees) at MCPJ and 99 degrees (range, 93 to 104 degrees) at PIPJ, as compared to contralateral unaffected side where mean active motion is calculated to be 86 degrees (range, 82 to 93 degrees) at MCPJ and 105 degrees (range, 98 to 110 degrees) at PIPJ.

The comparison of normal side with injured side of both joints of middle and index finger is represented in figure 4&5 respectively.



Figure 1: 7 year old male presented history of electrical burn over left thumb.



Figure 2: Per-operative planning and execution of SDMA flap after debridement of wound.



Figure 3: 1 year follow up.

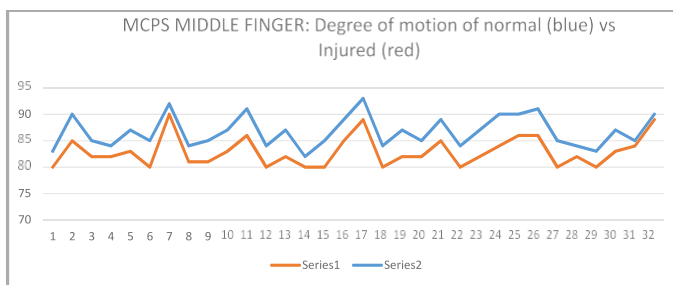
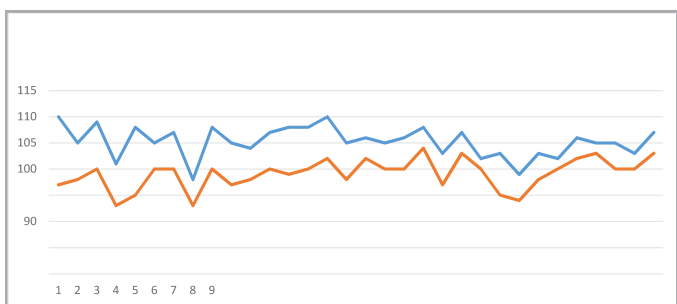


Figure 4:- PIPJ & MCPJ of middle finger

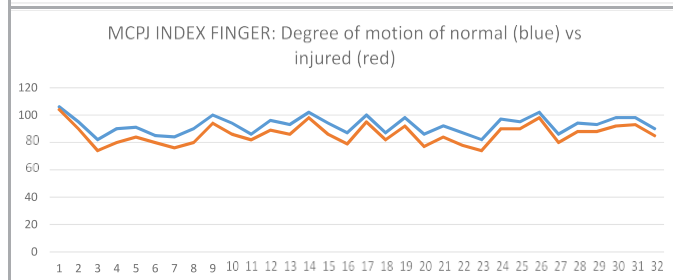
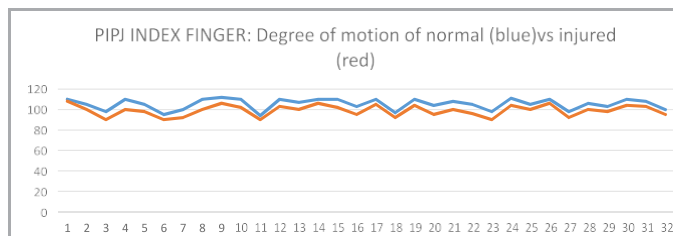


Figure 5: PIPJ & MCPJ of index finger

Discussion

Electrical injuries usually involve deep tissues and needs multiple debrima before definitive cover. Most of the volar wounds can be treated with simple grafting but in case of such injuries it is not uncommon if bone or tendon gets exposed, such perplex wounds are often problematic and require complex reconstruction.

Among vast majority of options for coverage, first dorsal metacarpal artery usage is limited by its reach and size.^{13,14} Likewise, distant flaps like cross-abdomen flap, pedicle groin flaps are two staged procedures associated with high infection rate.^{15,16} Other alternatives like reverse dorsal metacarpal artery flap or reverse radial artery perforator flap may solve the problem but are associated with risk of vascular compromise due to their reverse blood supply.^{17,18} Last but not least, free flap or free venous flaps may solve the problem, but such procedures require specialized centres, microvascular anastomosis and carries significant risk of anastomosis failure.^{19,20,21}

The bi lobed second dorsal metacarpal flap is an ideal option for combined defects requiring sensate coverage with additional benefit of long pedicle with sufficient reach without any tension.²² The only complication we encountered was the distal end necrosis in one flap,

which is not uncommon, and it healed with secondary intention.²³

The contraindications include damage to donor area of the metacarpal artery and a defects which are small enough to be covered by other local flaps.

This technique provides many advantages including a single stage, vast reach, minimal donor site morbidity, and adequate flap size. The disadvantages include minimal sensory loss at donor site and tedious dissection.

Conclusion

The bi-lobed second dorsal metacarpal artery flap is an excellent sensate option for intricate defects of hand in paediatric patients after electrical injuries with minimal donor site morbidity in terms of range of motion.

Conflict of Interest: *None*

Funding Source: *None*

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Research Article

Tenolysis of Stiff Fingers: Outcome Analysis of Our Technique

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Abstract

Background: Hand trauma invariably leads to stiffness and reduced range of motion which may be attributed to adhesions and fibrosis. Flexor tenolysis involves resection of all adhesive tissue around the tendon inside and outside the tendon sheath. Many methods have been described in the literature for tenolysis, and all have their pros and cons.

Objective: This study seeks to present findings from employing our approach to treat stiff fingers, which involves tenolysis of both flexor and extensor tendons in patients under local anesthesia whereby patients can actively move their digits to facilitate complete release.

Methodology: A retrospective analysis was done of the charts of all the patients who underwent tenolysis with this method during the 4-year study period. All demographic and clinical data was recorded, including the initial trauma mechanism. The pre-operative and post-operative total active motion (TAM), and flexion lag, were noted and compared. Any complications were also documented.

Results: 34 hands (in 30 patients) were operated upon in the given period. Average age was 41 years. 19 patients were males, 11 were females. Average pre-operative TAM was 102° and average post-operative TAM was 210°. This result was statistically significant ($p < 0.05$). There were no surgical complications seen.

Conclusion: complete removal of all adhesions around the flexor and extensor tendons greatly improves the active range of motion of involved digits. Moreover, performing the procedure under local anesthesia allows the patient to vigorously move their fingers pre-operatively, which facilitates a complete and effective release.

Keywords | finger stiffness, tenolysis, hand trauma, total active motion

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Introduction

Adhesions in the flexor tendons are most frequently seen with fractures involving the middle and proximal phalanges.¹ The possibility of the adhesions are very high if there is marked fracture displacement and malalignment. Mode of injury including crush and post operative prolonged splintage with volar angulation lead to excessive adhesion formation.²

Tendon adhesions occur when the surface of the tendon is damaged during the healing process. Adhesions commonly include the long length of the concerned tendon but may also involve the short segment. To counteract resulting adhesions, tenolysis is a known strategy

to get the proper tendon slide and uninterrupted range of motion.^{2,3} The operation is difficult, and the outcomes are unimpressive most of the times. There is a serious danger of further lowering the blood supply and innervation to an already compromised finger. Successful tenolysis requires a skillful surgeon, properly monitored hand physiotherapy, and a motivated patient.^{4,5}

We explain our tenolysis technique using the active finger motion approach, which is performed in a conscious patient under controlled sedation while addressing both the flexor and extensor tendons and performing joint arthrolysis if necessary

Methodology

Between 2010 and 2013, all patients (of all ages and both genders) who underwent tenolysis using the active finger motion approach, were selected. Patients who hand completed at least 12 months of follow-up were included. Cases included injury due to any mechanism resulting in stiffness of fingers. Cases with Complex Regional Pain Syndrome (CRPS), Reflex Sympathetic Dystrophy, and those with severe comorbid diseases were excluded.

After obtaining approval from the intuitional review board, we performed a retrospective review of patient's notes on the mechanism of the injury, the tissues involved, the type of fracture and the method of treatment. The length of time before requiring tenolysis was also documented, as well as any complications that occurred.

The primary outcomes assessed were; Total active motion (TAM) defined as the sum of active motion at Distal Inter-Phalangeal, Proximal Inter-phalangeal, and Metacarpo-phalangeal joints; and Flexion lag, defined as flexion deficit at PIPJ and DIP.

TAM and flexion lag were determined from the records of the follow-up visits. The findings were then rated using the criteria of the American society for Hand Surgery.⁶ $P < 0.05$ was chosen as the level of significance.

Surgical Technique

All patients were operated upon under regional block. Intravenous anesthesia was supplemented in four individuals. The flexor tendon sheath was explored via z-plasty like skin incision extending from the distal transverse crease of palm to the distal transverse crease of finger. A slit in the transverse manner was done in the flexor tendon sheath's A1 pulley, which was seen like an opening between the A1 and A2 pulleys in the middle third of the A2 pulley. The flexor tendons were carefully liberated using a fine periosteal elevator or via rounded knife blade. The tendon sheath strips were preserved to make pulleys.

Flexor tendon motion was evaluated after adhesions were released by asking patient to perform full active finger flexion. In patients under IV anesthesia, regional wrist tenodesis was used to evaluate range of motion. Complete tenolysis was only confirmed after both the active and passive flexion were seen to be same, (though active flexion could not be assessed in patient under IV anesthesia). If there was a lag in active flexion, additional maneuvers were required. These included more

proximal release of tendon adhesions, removal of A2 pulley, release of joint, and release of adhesions around the extensor tendon.

On the first post-operative day, patients were advised to make a full fist and hold it for as long as possible. On the 3rd day, they were advised to perform passive and active movements to the fullest extent possible. Although exercises in motion were conducted, no specific rehabilitation program was suggested.

Results

A total of 34 Surgeries were done in 30 patients using this method, over a 4-year period from January 2010 to December 2013. Mean age was 41 years. Nineteen patients were male (63%), while 11 were female (37%). The majority of the cases (n=22, 65%) had a history of fracture, caused by high energy impact injury (Table 1). The average time between fracture fixation and mobilization was four weeks (range 3-7 weeks). The mean time between the first procedure and secondary tenolysis was 15 months (range 3-75 months).

All patients had completed a minimum follow-up of 12 months. At the 12-month follow-up, the average pre-operative TAM was 102°, whereas post-operatively it improved to 210°. Flexion lag reduced from 90° to 20°. Both these results were statistically significant (Table 2). According to the American Society for Surgery of the Hand criteria, the outcome was poor in 2, fair in 8, good in 12 and excellent in 6 (Table 3).

There was no tightening of the extensor tendon, and the average decrease in the angle of extension at all the finger joints including proximal and distal interphalangeal joints, and metacarpophalangeal joints was about 5° (range 0- 10).

Adhesions were most commonly present between the A1 and A4 pulleys. The adhesions were never encountered beyond A5 or in the carpal tunnel. The A2 pulley was totally removed in two and preserved in rest of the individuals, while the A4 pulley was preserved in all. 3 patients required pulley reconstruction, and two required joint release. In four cases, extensor tenolysis was also required.

There were no incidences of tendon rupture in any of the patients. During the follow-up period, 5 patients experienced recurrence leading to loss of active mobility, and a second tenolysis was considered. Digital neuropraxia and Infection were not reported as surgical consequences.

Table 1: fracture patterns and their management in the patients that had a history of fracture at initial trauma (n=22)

| | n | % |
|--------------------------|----|------|
| Fracture type | | |
| Comminuted | 17 | 77.3 |
| Transverse | 5 | 22.7 |
| Fracture location | | |
| Distal phalanx | 4 | 18.2 |
| Middle phalanx | 6 | 27.3 |
| Proximal phalanx | 12 | 54.5 |
| Treatment | | |
| Percutaneous K wire | 18 | 81.8 |
| ORIF | 4 | 18.2 |

Table 2: Pre- and post-operative TAM and flexion lag

| | Pre tenolysis Mean (range) | Post tenolysis Mean (range) |
|---------------------------|-------------------------------|--------------------------------|
| Total active motion (TAM) | 102 (35-160) | 210 (175-270) |
| Average flexion lag | 90 (50-160) | 20 (5-35) |

Table 3: Improvement in Range of Motion according to the American society for surgery of the hand criteria

| Percentages of improvement | No. of cases (n=30) |
|----------------------------|---------------------|
| Excellent (75 -100%) | 6 |
| Good (50-75%) | 12 |
| Fair (25-50%) | 8 |
| Poor (0-25%) | 2 |

Discussion

Flexor tendon tenolysis is regarded to be very effective in counteracting the stiffness caused by phalangeal fractures. We observed a similar scenario as evidenced by a statistically significant difference between preoperative TAM and postoperative TAM after complete tenolysis.

Previous researches found no relation between the results of the tenolysis and different types of hand fractures. In a study by Kulkarni et al, flexor tenolysis produced good outcomes regardless of the injury type, structures affected or the period between injury and mobilization.⁷ In this study, the pre-operative Total passive motion was a good indicator of effective TPM achieved after tenolysis.

Agee (1992) proposed that even slight flexor epitenon abrasions at a fracture site, could form focal site for adhesions.² Furthermore, if the fracture fragment make hole in the flexor sheath's dorsal wall, then it would be exposed to the sharp edges of the broken bone.

Jin Bo Tang has documented his use of wide awake anesthesia technique in which the surgeon asks the

patient to flex and extend the digit to assess active gliding.⁸ If there was any difficulty in tenolysis, further scar release was performed, or in some cases tendon reconstruction as well as pulley reconstruction with tendon grafting was performed by the surgeon.

F Ahmad from Chicago orthopaedic institute proposed traction tenolysis method in which tendon was put on traction by use of Allis forceps and consequently an alternative minimal invasive method of tenolysis was proposed.⁹ The result of TAM was in good to excellent range, comparable to our study.

Schneider in his paper about tenolysis post replantation has shown comparison of TAM and TPM post tenolysis.¹⁰ He has demonstrated this to be a very good outcome tool to assess the effectiveness of tenolysis.

The position and density of adhesions varies greatly and is related to immobilization period, fracture type, and time between fracture and tenolysis.¹¹ This is most likely owing to edema and fibrin production after the original injury. Also, post-injury hemorrhage within the flexor sheath also contributes to development of adhesions. Long immobilization period as a result of injury allows the adhesions to become more dense. Following a number of studies, surgeons around the world now recommend early mobilization after stabilization of phalangeal fractures, preferably within 24 to 48 hours.

Conclusions

Tenolysis is an effective method of treating stiffness of fingers as a result of blunt trauma. Timely intervention is crucial in preventing permanent disabilities. Complete removal of all adhesions around the flexor and extensor tendons greatly improves the active range of motion of involved digits. Moreover, performing the procedure under local anesthesia allows the patient to vigorously move their fingers per-operatively, which facilitates a complete release and better long-term outcomes.

Conflict of Interest: None

Funding Source: None

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Research Article

Frequency of Patients Presenting with Hand Infection and Treatment modalities

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Abstract

Background: Infections of the hand are one of the most common infections reported by physicians and surgeons and include: bite wounds, felon, necrotizing fasciitis, paronychia, flexor tenosynovitis, cellulitis, osteomyelitis and septic arthritis.

Objective: The aim of this study was to identify the etiological factors, possible complications due to acute hand infection and treatment modalities performed in our patients.

Methodology: This was a prospective observational study conducted at King Abdullah Hospital, Bisha, Saudi Arabia, from May 2022 to April 2023. Patients of all age groups presenting with hand infections were included. Outcomes assessed were etiological factors, management and complications.

Results: 58 patients presented with hand infections during the study period. Male patients were 16 (27.5%) while females were 42 (72.4%). Majority of the patients were gardener/farmer by profession [n=15, (25.9%)]. Major mechanism of injury was penetrating trauma [n=41 (70.7%)]. Associated risk factors included diabetes mellitus in 13 (22.4%), smoking in 13 (22.4%), and hypertension in 5 (8.6%). Surgical intervention included incision and drainage in 40 (68.9%) cases while amputation was performed in 3 (5.2%) cases. Most common organism causing infection was staphylococcus aureus 28 (48.30%) including methicillin resistant staphylococcus aureus (MRSA). Subcutaneous infection was the most common diagnosis on presentation (24., 41%).

Conclusion: Hand infections are a common presentation in the working age group. Identification of etiological patterns and risk factors is thus important for timely diagnosis and treatment of these potentially devastating infections.

Keywords | Diabetic hand, infection, amputation, smoking

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Introduction

Infections of the hand are one of the most common infections reported by the treating physicians and surgeons. Common types of hand infections include: subcutaneous infection, bite wounds, webspace/ mid-palmer infection, paronychia (felon), flexor tenosynovitis, cellulitis, osteomyelitis and septic arthritis.^{1,2} Primary care physicians and orthopedic surgeons frequently encounter infections of the hands. Under such situation late diagnosis and inappropriate treatment

may cause morbidity and mortality for the patients.¹ Infections when lead to underlying deep soft tissue and skeletal damage needs surgical intervention. The tissue damage due to infection is thought to be excessive host innate immunological reaction. While drainage and decompression is a traditional surgical method, now there is a focus on early diagnosis and medicinal treatment by conservative protocols. This knowledge provide practical implications.³ Clerc, Olivier et al.⁴ are of the opinion that systemic coverage of MRSA should be

done only under known carriers. Harrison, Bridget et al.^[5] have mentioned that hand infection with MRSA has increased rapidly during the last two decades and are responsible for majority of purulent hand infections.

Methodology

This was a prospective Observational Study carried out at King Abdullah Hospital, Bisha, Kingdom of Saudi Arabia, after obtaining approval from the Institutional review board. Period of study was 1 year from May 2022 to April 2023. Patients of all age groups with hand infection were included. Non-compliant patients were excluded from the study. All demographic data of the patients was recorded. Outcomes assessed were etiological factors, type of infection, common microorganisms and type of treatment given. All complications were also noted, as well as their management

Results

Total number of patients that presented with hand infection during the study period was 58. Male patients were 16 (27.5%) while females were 42 (72.4%). Majority of the patients were adults. Figure 1 shows the age distribution

of the study population. Most of the patients were gardener/farmer by profession. [n= 15 (25.9%)]. 12 were children/ students (20.7%), and 9 were housewife/maid (15.5%). Major mechanism of injury was penetrating trauma in 41 (70.7%). Most common risk factors associated with hand infection were diabetes mellitus in 13 (22.4%) and smoking in 13 (22.4%). Occupation related risk factor were present in 27 (46.5%). Most of the patients were Saudi national (n=30, 51.7%), followed by Egyptian (n=12, 20.7%), Pakistani and Sudanese (n=4, 6.9%) each. Table 1 depicts the demographic and clinical findings of the participants.

The most common organisms causing infection was Staphylococcus aureus 16 (27.6%) including MRSA 12 (20.7%). There was no growth in 5 (8.6%) patients and for 19 (32.8%) patients no drainage collection was available and therefore their samples were not sent for culture sensitivity (figure 2).

We categorized the diagnoses of hand infection in this study into six groups; Subcutaneous infection 17 (41.5%), Acute paronychia 11 (16.9%), Web space infection 10 (15.4%), Pulp space infection (Felon) 7(10.8%), Flexor

Table 1: Demographic and clinical findings of study population

| MECHANISM OF INJURY | | | DURATION | | |
|---|-----------|--------------|---------------------------------|-----------|--------------|
| | Frequency | Percent | | Frequency | Percent |
| Blunt - hammer | 1 | 1.7 | Less than 10 days | 27 | 46.6 |
| Burn | 1 | 1.7 | 10-19 days | 7 | 12.1 |
| Cat-bite | 1 | 1.7 | 20 days or more | 24 | 41.4 |
| Human bite | 1 | 1.7 | Total | 58 | 100.0 |
| No history of penetrating or blunt trauma | 13 | 22.4 | COMORBIDITY/RISK FACTORS | | |
| Penetrating injury | 41 | 70.7 | Smoking | 13 | 22.4 |
| Total | 58 | 100.0 | Dm | 13 | 22.4 |
| HAND DOMINANCE | | | HTN | 5 | 8.6 |
| RHD | 58 | 100 | Occupation | 27 | 46.5 |
| LHD | 00 | 00 | Total | 58 | 100.0 |
| Total | 58 | 100.0 | OCCUPATION | | |
| NATIONALITY | | | Gardner/Farmer | 15 | 25.8 |
| Saudi | 30 | 51.7 | Children/Student | 12 | 20.9 |
| Egypt | 12 | 20.7 | Housewife/Maid | 9 | 15.5 |
| Sudan | 4 | 6.9 | Construction worker | 6 | 10.3 |
| Pakistani | 4 | 6.9 | Driver | 4 | 6.9 |
| India | 3 | 5.2 | Shepherd | 4 | 6.9 |
| Uganda | 2 | 3.4 | Policeman | 4 | 6.9 |
| Indonesia | 1 | 1.7 | Painter | 1 | 1.7 |
| Morocco | 1 | 1.7 | sweeper | 1 | 1.7 |
| Yemen | 1 | 1.7 | Cement factory worker | 1 | 1.7 |
| Total | 58 | 100.0 | Doctor | 1 | 1.7 |
| | | | Total | 58 | 100.0 |

tenosynovitis 6(9.2%) and Midpalmar/Thenar 4(6.2%). There were 15 (25.9%) patients treated with conservative treatment protocol. Incision and drainage was performed in 40 (68.96 %) cases while amputation was required in 3 cases (5.2%) (table 2).

Table 2: *Diagnosis and management of hand infections*

| DIAGNOSIS | | |
|-------------------------|----|------|
| | No | % |
| Subcutaneous | 24 | 41.4 |
| Acute paronychia | 10 | 17.2 |
| Web space infection | 9 | 15.5 |
| Pulp space (Felon) | 6 | 10.3 |
| Flexor Tenosynovitis | 5 | 8.6 |
| Midpalmer/Thenarabscess | 4 | 6.9 |
| Total | 58 | 100 |
| TREATMENT | | |
| Conservative | 15 | 25.9 |
| Incision and drainage | 40 | 60.9 |
| Amputation | 3 | 5.2 |
| Total | 58 | 100 |

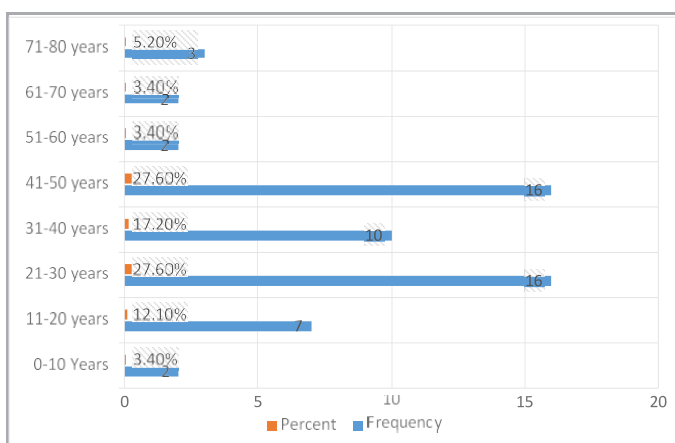


Figure 1: *Age distribution of the patients*

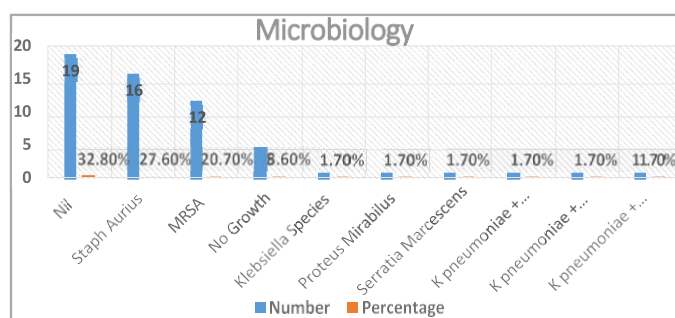


Figure 2: *Microbiology pattern of hand infections observed in this study*

Discussion

Hand infections vary significantly in terms of their etiology and site of infection. When misdiagnosed or left untreated result into significant morbidity or even mortality to some patients. While superficial infection may be treated by using conservative treatment, deep

infection involving tendons and their sheaths, bone or joint or deep spaces of the hand require surgical management in addition to medical treatment.⁷

A complete history, physical examination and relevant investigations should be performed to confirm the diagnosis. Cultures should always be obtained to provide appropriate antimicrobial coverage. The most common organisms reported in the literature are: Staphalococcus aureus (80%), Streptococci, anaerobes, E corrodens and P multocida^{3,5}. In our study too, staphylococcus aureus in the most common organism seen (48.3%). In a study on pulp space infection (felon), author found that mostly the types of microorganism involved were staphylococci and streptococci. In addition to antibiotic, warm or saline soak and elevation of the fingertips aid to the recovery. In case of abscess formation or if fluctuance or tension is present the wound should be drained with incision.⁸

Most commonly reported cause of hand infections is penetrating trauma^{1,2}, as was seen in our study too. Some authors found that human bite wounds are the second most common hand infection⁶. However in this study, second most common cause was insidious onset without an underlying history of trauma. This was most likely due to underlying comorbidities. It is a common scenario to encounter patients with multiple comorbidities. Some of these patients may be taking certain medications, especially anticoagulants with the background history of hypertension. A trivial injury in these patients on anticoagulants leads to bleeding and hematoma formation at the site of either blunt or penetrating injury. The chances of having superadded infection with uncontrolled diabetes mellitus and smoking is quite high and lead to deep penetration of infection resulting in osteomyelitis and septic arthritis.

It is quite interesting to note that all 3 patients who required either partial or total hand amputation as a result of development of osteomyelitis/septic arthritis, were having long-standing uncontrolled diabetes mellitus. 2 of these patients underwent partial/total hand amputation (figures 3 and 4). The third patient with uncontrolled diabetes mellitus underwent partial amputation of the hand. Due to old age, immunosuppressed and on hemodialysis due to renal failure developed carpal bones infection and soft tissue infection around the wrist joints. She refused to have her diabetic hand amputation and developed regional axillary lymphadenopathy. Unfortunately, she passed away due to loco-regional infection, septicemia and multi organ failure.

A study was done on small septic joints of the hands in which all patients had incision, irrigation and debridement of the joints. Out of 110 patients, 83 were treated successfully, and 27 patients required either arthrodesis or amputation. Major influencing factors included time to diagnose and treatment, number of irrigation and debridement procedures, comorbidities and postoperative recurrent infection.⁹ In hand infection, late diagnosis and inappropriate treatment are two important factors causing morbidity of the hand and mortality for the patients.^{10,11} Acute infection of hands and upper extremities should be treated as surgical emergencies. This will avoid pain, stiffness, contracture and amputation. For established infection, antibiotic treatment should be considered a necessity^[12,13].



Figure 3: A,B: pre-op views, and C,D: post-op views of a 46 year old male with uncontrolled diabetes mellitus who underwent amputation of middle finger.



Figure 4: 81 year old male with insulin dependent diabetes mellitus presented with recurrent infection of left ring and little finger (A). he underwent amputation

of involved digits (B,C). he presented one month later with unresolved infection (D). he eventually required an above wrist amputation (E,F).

Some less common and severe infections such as flexor tenosynovitis and necrotizing fasciitis needs urgent attention for identification and medical and surgical management. Adelay will result in permanent functional deficits and may require amputations.^{14,15} A 10-year longitudinal study observed that MRSA was the most commonly cultured bacteria in hand infections.¹⁷ Resistance of the pathogen to common antibiotics is steadily increasing, further highlighting the need for appropriate and effective antibiotic treatment.¹⁸

Conclusion

This study corroborates evidence that early clinical diagnosis based on occupational history and control of comorbid disease such as diabetes mellitus, smoking etc is effective in the treatment and prevention of hand infection to avoid devastating surgical intervention of partial or total diabetic hand amputation.

Conflict of Interest: None

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Research Article

Decoding a Decade: The Daring Dance of Over inflation in Tissue Expanders – Unveiling our Unique Journey

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Abstract

Background: Reconstruction of large scalp defect like post burn alopecia, post traumatic alopecia and congenital naevi require not only well-vascularized skin but also hair bearing scalp for better aesthetic outcome. Tissue expansion has always been the valuable reconstructive option in scalp reconstruction and is superior to any other option as it provides hair-bearing scalp. We have changed the traditional way of tissue expansion by using over expansion to two to three times of its recommended expansion to prevent multiple expansions.

Objective: The objective of this study is to established the safety of tissue expander in overexpansion.

Methodology: This prospective case series was conducted from January 2013 - December 2022. Patients requiring scalp expansion for reconstruction of post burn alopecia , congenital melanotic naevi and post traumatic alopecia were included in this study. Flap advancement for covering the percentage area of the scalp defect was assessed as the outcome.

Results: 13 patients were included, 6 (46%) patients required 2 expanders and 7(54%) patients required single tissue expander. Average flap advancement was 9 cm. Average tissue expansion was 650 ml, over expanded twice to thrice the recommended volume. No patient had any expander complication, wound breakdown or flap necrosis. Hair density was adequate on visual analogue scale.

Conclusion: Two to three times over expansion in tissue expander is valuable and safe tool for covering large area of alopecia without the need of expansion multiple times.

Keywords | Tissue expansion, scalp alopecia, post burn scalp defects, congenital melanotic nevus scalp

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Introduction

Since its introduction in 1957, tissue expansion has been used widely for various reconstructions in plastic surgery. Role of tissue expansion is well established in paediatric population in reconstruction of giant congenital melanotic naevia, sebaceous naevi, abdominal wall reconstruction and various other body defects.^{1,2}

Tissue expansion has been used for last many years as an important reconstructive tool for reconstruction of scalp defect and for excision of scalp lesions like CMN and post traumatic defects.³⁻⁶ Scalp is ideal for expansion

as it has thick skin and less chances of expander extrusion and minimal infection due to rich vascularity of scalp skin and having solid base of skull bone for maximal tissue expansion.

Tissue expansion is two stage procedure, one for placement of expander and other for removal of expander and advancement of expanded flap and there may be chances of complications during the process of expansion which in literature has been described to range from 13-40 %.^{6,7}

Large scalp lesions sometime may need multiple expansions sessions, which increase duration and the cost

of the treatment. We have over expanded the tissue expanders two to three fold to its recommended volume for maximum tissue expansion in single session to avoid further sessions without complication. Objective of this study is to establish the safety of tissue expander in overexpansion and changing the traditional way of expansion.

Methodology

This study was conducted at The Children's Hospital Lahore from January 2013 to December 2022. After obtaining permission from ethical review board, we included patients who needed scalp reconstruction by hair bearing skin. Patients who were unable to get regular expansion from hospital or self-inflation were excluded.

All the preoperative data was recorded on proforma. Overexpansion of expander above the recommended volume, total flap advancement and percentage of total defect coverage was recorded. Hair density before expansion and 6 months after the flap inseting was assessed by visual analogue scale by two different plastic surgeons on the scale of 1-10 from preoperative and post-operative pictures. Data was recorded for any complication like tissue infection, implant extrusion, port failure.

Operative Technique:

All surgeries were performed under general anesthesia with local infiltration. Expander size was selected by careful measuring the defect size and available donor area. Expander length was selected as per defect parallel length. Width and height were selected from available expander sizes and low profile less volume expander was chosen from available chart. Average size of 250 ml expander was chosen for more than 7 cm wide defect. Width of expander was kept at least half of expander length to expand maximal area of available scalp. Incision was planned in the normal skin 2-3 cm away from interface of normal and burned area. Long incision were preferred for ease of insertion. Subgaleal pocket was made by blunt dissection and adequate pocket was made larger than the base of expander to accommodate expander without tension. Separate incision was made for the port and small size port was used and placed approximately 6-8 cm away from expander. Pocket was packed for 10 minutes with gauze followed by wash with saline. 100ml, 200ml, 250ml and 320ml rectangular expander (Polytech, Germany) were used. Expander was folded over the base to prevent any fold on the upper surface to prevent any pressure on skin flap. Closure was done with single layer continuous polypropylene stitching. Small port was used and placed on average 6cm away from the expander through separate incision. Expander was inflated 10-20 % of its volume by sterile water and leakage was identified. Drain was placed for at least for 24 hours and loose dressing was applied.

Table 1: Data of all patients included in this study

| No. | Gender | Age in Years | Etiology | Soft tissue defect location | No. of expanders | Expander size | Total volume expanded | Average duration of expansion | Average flap advancement |
|-----|--------|--------------|----------|-----------------------------|------------------|----------------|-----------------------|-------------------------------|--------------------------|
| 1 | Male | 6 | Burn | Frontal | One | 250ml | 600ml | 12 weeks | 9 cm |
| 2 | Female | 5 | Trauma | Temporal | One | 250ml | 650ml | 14 weeks | 8 cm |
| 3 | Male | 7 | Trauma | Frontal and temporal | Two | 250ml 200ml | 450ml 400ml | 16 weeks | 8 cm |
| 4 | Male | 6 | Trauma | Frontal and temporal | Two | 250ml 200ml | 650ml 500ml | 13 weeks | 7 cm |
| 5 | Female | 4 | CMN | Frontal, Temporal | Two | 100ml 200ml | 300ml 600ml | 18 weeks | 6 cm 10 cm |
| 6 | Male | 10 | CMN | Frontal | Two | 250ml 200ml | 625ml 500ml | 12 weeks | 8 cm 7cm |
| 7 | Female | 13 | Trauma | Frontal | One | 320ml | 750ml | 12 weeks | 14cm |
| 8 | Male | 11 | CMN | Temporal | Two | 200ml 200ml | 520ml 520ml | 18 weeks | 7 cm 9cm |
| 9 | Female | 5 | Trauma | Frontal , Temporal | Two | 250ml 100ml | 650ml 375ml | 13 weeks | 7cm 5cm |
| 10 | Female | 6 | Trauma | Frontal | One | 320ml | 800ml | 20 weeks | 15cm |
| 11 | Male | 9 | CMN | Frontal | One | 250ml | 470ml | 17 weeks | 9cm |
| 12 | Male | 6 | Trauma | Temporoparietal | One | 320ml | 800ml | 15 weeks | 13cm |
| 13 | Male | 9 | Burn | Frontal | One | 320ml | 640ml | 16 weeks | 9cm |

No antibiotic solution was used for expander pocket instillation. Patient were followed regularly. Any notable sign and symptoms like extreme pain on inflation, persistent blanching and any redness were recorded in follow up visits and were considered the end point for expansion during session. All expanders were expanded 2-3 time over to expander recommended volume. Expansion was stopped one month prior to flap advancement after achieving sufficient length of the advancement flap. Expansion was done twice weekly.[Figure 1], [Figure 2]



Figure 1: A 10 years old girl with post burn scalp alopecia (120cm^2) on the fronto-temporal and parietal regions (a)frontal view (b)right lateral view (c) posterior view pre-operative (d)frontal view post implant placement and expansion (e)lateral view post implant placement and expansion (f) posterior view post implant placement and expansion (g)frontal view pre implant removal (h)lateral view pre implant removal (i)posterior view pre implant removal (j)final frontal view(k)final lateral view (l)final posterior view



Figure 2: A patient with Post-Burn Scalp Alopecia on

temporoparietal regions (a, b), with expander placed (c, d), almost all the area covered by rotation advancement flap as can be seen in frontal and lateral views of the patient (e,f)

Results

Out of 13 patients 8 (62%) were male and 5 (32%) were female. Mean age of expansion was 7 years (Age range 4 years to 13 years). 3 (23%) patients had post burn alopecia, 6 (24%) patients had post trauma scalp reconstruction using skin graft and 4 (30%) patients had congenital melanotic nevi. Most of patients had frontal (76%) and temporoparietal (46%) defects. 14 weeks were the average expansion time.[Table:1]

The average amount of flap advancement was 9 cm (Ranged from 5 to 15 cm) and average overexpansion factors was 2.5 times (Ranged from 1.8 to 3 times) . In patients who underwent two-time expansion resulted in 86% coverage of the defect, whereas those who underwent three-time expansion achieved approximately 96% coverage of the defect. None of the patients in this study had any complications during the expansion period. Hair density was slightly reduced after expansion on visual analogue scale but it was not significant enough to alarm parents.

Discussion

The revolutionary impact of tissue expansion on modern plastic surgery is indisputable, transforming the landscape of reconstructive and aesthetic procedures. One illustrative example of physiological tissue expansion is evident in the remarkable changes that occur during pregnancy. Beyond the realm of contemporary practices, ancient rituals in Thailand and Chad have involved cervical and oral-labial expansion for centuries, providing cultural insights into the enduring significance of tissue modification.⁸ In 1905, Codvilla ventured into uncharted territory by attempting to lengthen a femur through tissue expansion, a testament to the early curiosity surrounding its potential.⁹ Neumann's 1957 publication documented successful tissue expansion in the reconstruction of a traumatic ear defect, utilizing a rubber balloon over a four-month period without complications.¹⁰ Subsequent milestones include Radovan's 1976 experience with breast reconstruction.¹¹ The pediatric application of tissue expansion emerged prominently in 1981 when Argenta et al. pioneered its use for post-burn neck contracture in children.¹² Tissue expansion has become as the treatment of choice in secondary burn

reconstruction in children and adults.¹³⁻¹⁵

In our study most of children were in their early age as there is no age limit for expansion and trend is to early age expansion to prevent peer pressure and behavioral changes in children at later age.^{16,17,18} Many people often utilize external ports in children to avoid the discomfort of repeated needle pricks during follow-up visits. However, Lozano and Drucker¹⁹ conducted a study and found that the rate of infection and exposure in patients with external ports was 17.6%. In order to prevent excessive pressure on the port and minimize the risk of accidental puncture, we utilized an internal low profile port positioned at least 6 cm away from the expander. This approach aligns with the findings of Bauer et al,²⁰ who emphasized the importance of aseptic measures during each expansion to reduce the likelihood of infection. Our research supports these recommendations.²¹

We made incisions that were positioned at right angles to the direction of expansion. A study has demonstrated that when an incision needs to be made close to the prospective defect, it is advisable to dissect the pocket as far away from the lesion as feasible. When utilizing expansion for the reconstruction of a large nevus, the incision should be positioned 2cm within the nevus itself. However, in the case of a burn, the incision should be made within the surrounding healthy skin.²² Our strategy in tissue expansion has been the same to enhance blood flow at the incision margins, so preventing wound infection and promoting optimal wound healing.

It is usual in clinical practice to inflate tissue expanders beyond the capacity suggested by the manufacturer. This practice is supported by studies indicating that overexpansion leads to fewer complications compared to under expansion. The importance of this is emphasized by few other clinical investigations that have demonstrated the ability to overinflate expanders to their indicated capacity without any problems.^{23,24} In this research, an expander was inflated to a volume that was 2-3 times greater than what the manufacturer had specified, and no issues were encountered. An ex vivo investigation conducted on expanders from various vendors has demonstrated that an average over inflation of 80 times the capacity specified by the manufacturers can be attained.²⁵

Though we had successfully expanded and covered most of defects in patients included in this study without any complication which can be attributed to the meticulous selection process for patients and the expertise of a single surgeon performing the operations. In

order to establish this procedure as a standard practice in tissue expansion, it is necessary to develop a randomized controlled study that includes participation from several surgeons and centers.

Conclusion

Expanding the volume of the expander by two to three times is a safe and effective method to increase the length of the flap for rotation advancement, without generating significant issues.

Conflict of Interest: *None*

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Case Report

Short-Term Valproate Use & Hematological Disturbances in a Young Burn victim – an Observational Case Report

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Abstract

Background: Valproic acid (VPA) is an anticonvulsant drug used for seizures, bipolar disorder, and migraines. Therapeutic levels range from 50-100 µg/mL, with higher levels causing adverse effects like coagulopathies. VPA can cause thrombocytopenia, platelet dysfunction, acquired von Willebrand disease, and other bleeding disorders. These complications are rarely fatal but are more common in children. This case report examines VPA-induced coagulopathy resulting in mortality in a pediatric burn patient.

Case Presentation: A 16-year-old female with a history of seizures presented with 10% total body surface area superficial partial thickness scald burns to her face, neck and chest. She was started on intravenous VPA for seizure prophylaxis. On hospital day 8 she developed severe gastrointestinal bleeding unresponsive to resuscitation attempts and died due to hemorrhagic shock on day 10. Extensive workup excluded other etiologies like inherited coagulopathies, dengue fever, sepsis, and medications. Falling platelet counts, albumin, lymphocyte and hemoglobin levels were noted with elevated d-dimers, pointing to a VPA-induced bone marrow suppression and platelet dysfunction.

Conclusion: This case demonstrates the potential for fatal bleeding complications with short-term VPA use even at therapeutic doses. It highlights the need for close monitoring of hematologic parameters and maintaining a low threshold for changing anticonvulsant therapy in vulnerable patient populations.

Keywords | Valproic acid, coagulopathy, thrombocytopenia, platelet dysfunction, hemorrhage, burn

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Introduction

2-Propylpentanoic acid or commonly known as Valproic Acid (VPA), is a branched-chain fatty acid approved by FDA for therapeutic use in Bipolar disorders, migraine prophylaxis and primarily the treatment of seizures.¹ The mechanism of action through which it accomplishes these therapeutic abilities is mainly by amplifying the inhibitory action of the GABA neurotransmitter.² The therapeutic threshold of the drug lies between dosages of 50-100 µg/mL, with serum levels beyond this range presenting a spectrum of side effects. These range from trivial symptoms such as nausea, vomiting, weight gain, and sedation, to more serious

complications like liver damage, metabolic encephalopathy³, and fatal bleeding complications (e.g., pulmonary⁴ or intracerebral hemorrhages).⁵ Certain blood tests are bound to show derangements with its administration, exhibiting both primary & secondary haemostatic abnormalities. Immune system activation against platelets and bone marrow suppression⁶ have been linked to VPA-induced thrombocytopenia. Furthermore, this drug is associated with various other coagulopathies, including platelet function disorders,⁷ factor XIII deficiency, hypofibrinogenemia, and an acquired form of von Willebrand disease (VWD).⁸ Another hematological disturbance seen with respect to this drug includes

leucopenia alongside thrombocytopenia, termed Bicytopenia,⁹ particularly at serum VPA levels above 120 µg/mL.¹⁰ However, instances of fatal hemorrhages are rare. These side effects can be either dose-related or idiosyncratic, and have been found to be more common in the pediatric age group.¹¹

The purpose of this case report is to divert attention in acute presentations of burns in epileptic patients to the medication used to prevent further fit episodes thereafter – making sure it doesn't accelerate the injury to the hematological system that may have already been initiated by the burn. Measuring plasma levels of Free/Unbound form of Valproic acid in the body becomes essential therefore, so that to adapt our management plans accordingly with close regular monitoring of the blood tests, & quick resuscitative protocols kept in place to combat any side effects of the drug that may enhance the morbidity and mortality of the burn victim. A handful of case reports have been written but none of them narrate VPA-induced Coagulopathy in a burn victim to my knowledge.

Case Vignette

A 16 year old female, with a prior history of generalized body seizures, presented in the Emergency Burn Unit, Mayo Hospital Lahore on the 8th of October, 2023 five hours after sustaining a scald burn to the front of her neck, face as well as upper chest – totaling to be about 10% burn as per the total surface area of the body (TBSA)

that were of Superficial Partial Thickness variety. On examination, there were swollen eyelids, lips as well as entire oral mucosa with blistering seen in the affected area. The cause of the burn was hot water on the stove that spilled during a seizure episode witnessed by the sister. The victim's body was found in a state of generalized rigidity and complete loss of consciousness.

The patient arrived in a comatose state on the Emergency (ER) Floor, where general baseline samples were taken, wounds washed and an elective tracheostomy performed. The patient was eventually shifted to the Burn High Dependency Unit (HDU). For the following 7 days, intravenous (IV) Epival was initiated as seizure prophylaxis on neurological consult, injectable steroids were administered to relieve the facial edema, along with tracheostomy care. Time for Electroencephalography (EEG) and Computerized Tomography (CT) Scan Brain Plain was also taken as advised. Dressing protocol was followed and edema settled, showing impressive patient health status improvement overall. On the 8th day, following wound wash under general anesthesia (GA) a post-operative episode of basal atelectasis & a transient dip in Oxygen saturation was seen and dealt with. On the evening of the same day, patient faced two episodes of haematemesis with rectal bleeding (fresh blood without clots) in copious amounts. Resuscitation done with a combination of IV fluids, Fresh Frozen Plasma (FFP), Blood Transfusions and High flow Oxygen. Continuous Risek Infusion also started as consulted by internal

Table 1:

| Parameters/ Dates | On ER | 01 | 02 | 03 | 05 | 06 | 07 | 10 | 11 | 12 (Days) |
|--------------------------------|------------------------|---------|---------|----------|----------|----------|----------|-----------|----------|------------|
| | Admission (7/10/23) | 8/10/23 | 9/10/23 | 10/10/23 | 12/10/23 | 13/10/23 | 14/10/23 | 17/10/23 | 18/10/23 | 19/10/23 |
| Haemoglobin | 14.8 | - | - | - | 7.5 | - | - | 9.5 | 9.4 | 2 |
| Total Leukocyte Count (TLC) | 12 | - | - | - | 13 | - | - | 15 | 9.7 | 9 |
| Platelets | 236 | - | - | - | 94 | - | - | 128 | 135 | 138 |
| PT | - | 12.5 | - | - | - | - | 13 | 12 | - | 13 |
| aPTT | - | 32 | - | - | - | - | 33 | 29 | - | 32 |
| INR | - | 0.92 | - | - | - | - | 1 | 1.1 | - | 1 |
| ALT | - | - | - | - | - | 18 | 17 | - | 18 | 17 |
| AST | - | - | 32 | 28 | - | 32 | 26 | - | 31 | 25 |
| Urea | 29.49 | - | 23.11 | 44.73 | - | 32.66 | 20.09 | 22.92 | 18 | 20 |
| Creatinine | 0.78 | - | 0.39 | 0.72 | - | 0.40 | 0.31 | 0.36 | 0.3 | 0.77 |
| Serum Albumin | - | - | 3.2 | 3.1 | - | 3.0 | 2.6 | 2.9 | 2.7 | 1.5 |
| Dengue ELISA | - | - | - | - | - | - | - | - | - | IgM, IgG, |
| D-dimers | | | | | | | | 544 ng/mL | | NS1 - None |
| Fibrinogen | | | | | | | | 298 mg/dl | | |

medicine. Investigations were started initially in suspicion of excessive menstrual bleeding, but later proved to be per rectal on clinical evaluation. Suspicion of Disseminated IV Coagulation (DIC) was raised that was quickly ruled out. Patient condition was stabilized and further bleeding episodes halted till the next day. Meanwhile all efforts for urgent upper gastrointestinal tract (GIT) endoscopy were being made. Call to neurology was attended to reevaluate the dosage of the anti-seizure drug being given, & shift to oral medications. On the 19th of October, 2023 a massive per rectal bleeding & haematemesis episode occurred, that left the patient in a critical state, with haemodynamic instability not responding to the continuous resuscitation attempts & mortality was announced at 11:05 A.M. by the Surgeon on duty.



Figure 1: Photographs of the Burn victim taken during hospital stay in Burn HDU, Plastic Surgery Dept., Mayo Hospital.

The Laboratory values over the course of these 10 days from arrival in the ER till the date of death in the burn ICU showed the following trends:

Discussion

Our patient had a history of afebrile generalized tonic seizures since early childhood – occurring at a frequency of 2-3 times every year for 3 years. At about 6 years of age, she remained seizure free for the next 10 years till the day of the burn incident. No medications were ever prescribed during this entire period. On neurological consult, Intravenous Valproate (Epival) was the first seizure prophylaxis initiated that successfully kept the patient symptom free during hospital stay.

Upon retrograde analysis, it was noticed that it is highly unlikely that the scald burn itself was the major contributing factor in causing the drastic upset of the body's haemostatic system that eventually resulted in the mortality of the patient. Stress ulceration of the gastric & duodenal lining is often a common cause of haematemesis seen in burn victims, however in our case it became less likely owing to the complete absence of prior epigastric pain, presence of independent lower GI bleed,

less than 20% of TBSA and the simple fact of it being a scald burn.¹³ Even though an upper GI endoscopy could not be performed in a timely manner to definitively rule it out.

Also considering the fact that the patient had normal menstrual cycles since puberty & no prior history of abnormal bleeding, all hereditary forms of coagulation & platelet disorders seemed highly unlikely as well. Acquired haemostatic disturbances due to Dengue Fever were ruled out on serology. Both previous & current drug history was devoid of anticoagulants, NSAIDs, aspirin or steroids. Liver Function tests were within normal range, with an abdominal ultrasound showing unremarkable findings, ruling out coagulation factor deficiency due to liver disease. Disseminated Intravascular Coagulation (DIC) due to sepsis / burn-induced coagulopathy appeared to be ruled out on the basis of absence of fever, normal coagulation profile & fibrinogen levels. A normal peripheral blood smear ruled out many forms of hemolytic anemia as well. Normal APTT levels made Hemophilia A or B unlikely diagnoses.

Relevant Investigation Details Summarized

- ✓ All three cell lines showed a decreasing trend.
- ✓ Coagulation Profile - PT, APTT, INR were normal throughout
- ✓ Fibrinogen levels normal.
- ✓ Dengue serology was negative for NS1, IgM, IgG
- ✓ Liver Function Tests showed no derangements
- ✓ D-dimers were raised.
- ✓ Albumin also showed a decreasing trend (Significant for Free Serum Valproate levels)
- ✓ NORMOCYTIC NOROCHROMIC picture on Peripheral Blood Smear (PBS) Film.

Given that the patient was receiving normal therapeutic dosages of 10 mg/kg per day, side effects of this severity were entirely unanticipated. The Reticulocyte count, one of the few laboratory readings we weren't able to acquire in time, left us to conclude, through a process of exclusion, that bone marrow suppression was likely the pathway through which VPA led to the ultimately fatal outcome. Additionally, an objective elevation in bleeding time was noted, indicating a simultaneous platelet function disorder resulting from Valproate usage. Coupled with von Willebrand factor (vWF) assay and Factor 8 levels – these two may have helped

in narrowing down the diagnoses even more, but the necessity of all these laboratory tests could only be elucidated retrospectively. Additionally, there was no facility to measure VPA drug levels in the blood. Important to also recall in this discussion that reduced serum albumin levels below the normal range increases levels of unbound serum VPA12, resulting in overdose states even if given within therapeutic range – which may have been a factor contributing to the dire consequences of the drug.

Conclusion

In conclusion, this case report offers a comprehensive review of the complexities involved in managing patients on Valproic acid, particularly in the context of burn injuries. It underscores the importance for medical professionals to be meticulous and vigilant, closely monitoring any blood-related factors and altering the treatment course promptly when necessary.

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Editorial

To Earn or to Learn....That is the Question

Muhammad Mustehsan Bashir, Saadia Nosheen Jan

Introduction

In the current era of inflation, the prevailing rat race is to earn rather than to learn. Consequently, the zest for training and excellence in healthcare has nosedived to suboptimal standards. An ominous nebula of uncertainty prevails over residents regarding their financial prospects during and after training. With higher posts after post-graduation already saturated and quacks with quid dominating the private practice sector, the future seems a relentlessly bleak and eerie journey into inevitable penury and the ignominy of failure. Societal standards set affluence as synonymous with fame and success, rather than the number of degrees or academic laurels attached to names lost among hundreds of others on CPSP and UHS records.

The PMDC has barred simple MBBS doctors from carrying out aesthetic procedures, but will anyone ever bell this "Cheshire cat" with enough clout to mayhap overshadow and overrule the lawmakers? An unlikely pipe dreams.

Additionally, can supervisors stop their yet in-training residents from running aesthetic clinics, when across the road a pharmacist is successfully running an aesthetic clinic?

Instead of constantly lamenting the heavily invested in medical talent "defecting" the country, the government needs to retain these funds spent by providing interest free loans to young fellows for setting up private clinics and for the CPSP and UHS to run short courses in medical business development. The public should be educated in the perils of being hoodwinked and out pocketed by untrained "aestheticians." through social media and campaigns. The mantra should be to learn then earn, and not the inverse for safety and morality's sake. Relying solely on yet invisible, latent entities to crackdown on unethical and now hopefully illegal clinics would be a Holy Grail, never to be found.

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(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). A separate 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, including 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 software 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 findings, 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. Information 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 corresponding 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 illustrations 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

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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 red.