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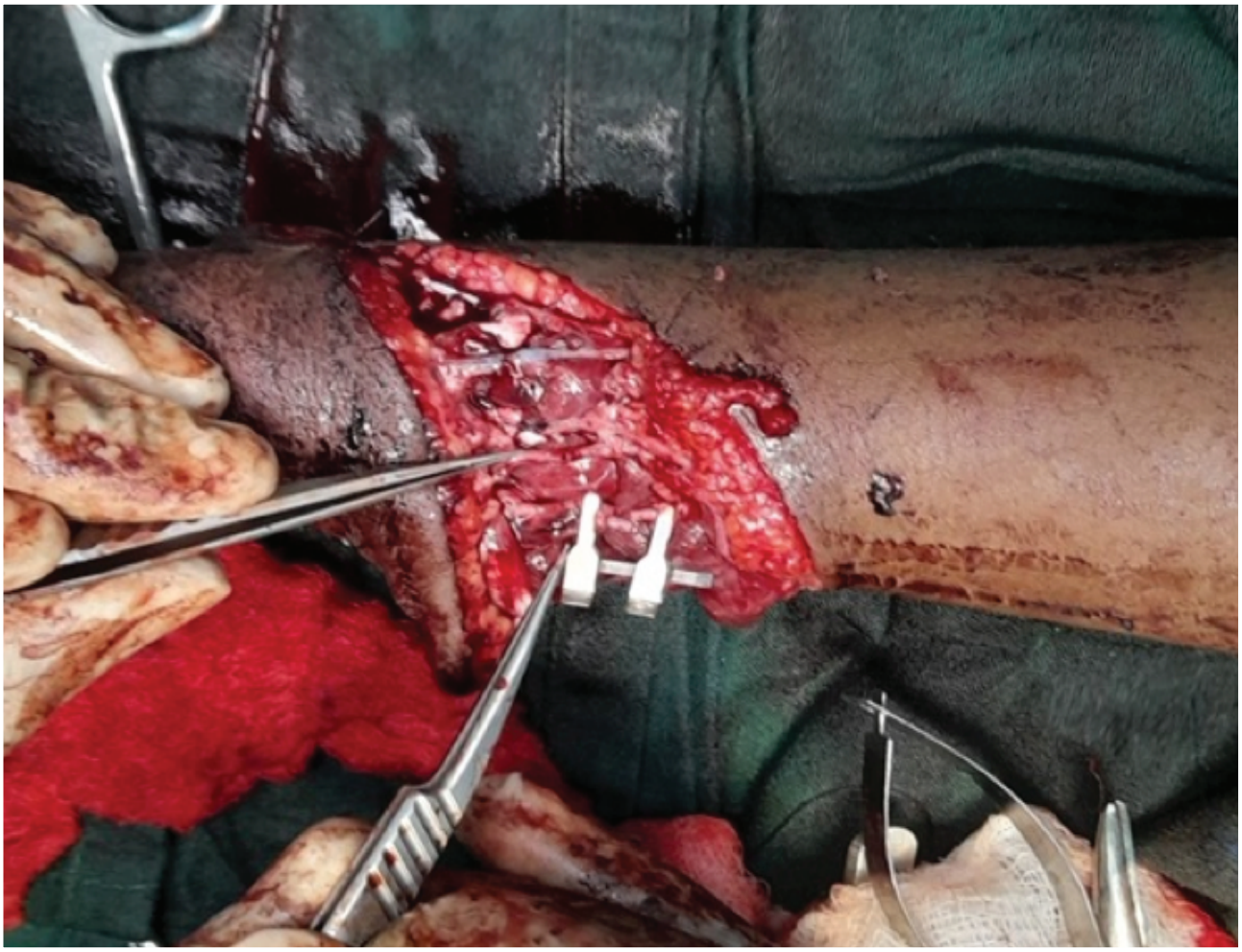
PAN-AFRICAN JOURNAL OF

Plastic Reconstructive and Aesthetic Surgery



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Pan African Journal of Plastic and Reconstructive and Aesthetic Surgery is a quarterly journal published by the Kenya Society of plastic and reconstructive surgery.

ABOUT THE JOURNAL

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PEER REVIEW

All manuscripts submitted to the Journal are first scrutinized by the editorial Panel for suitability of publication within the scope of the journal and for manuscript preparation in line with the journal's guidelines. Successful manuscripts are then sent to a minimum of two independent assessors for peer review in a blinded manner. Assessors reports must concur for the panel to make a decision concerning acceptance or rejection of a manuscript. The review process takes between three to six weeks.

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SMILE TRAIN PROGRAMS IN AFRICA

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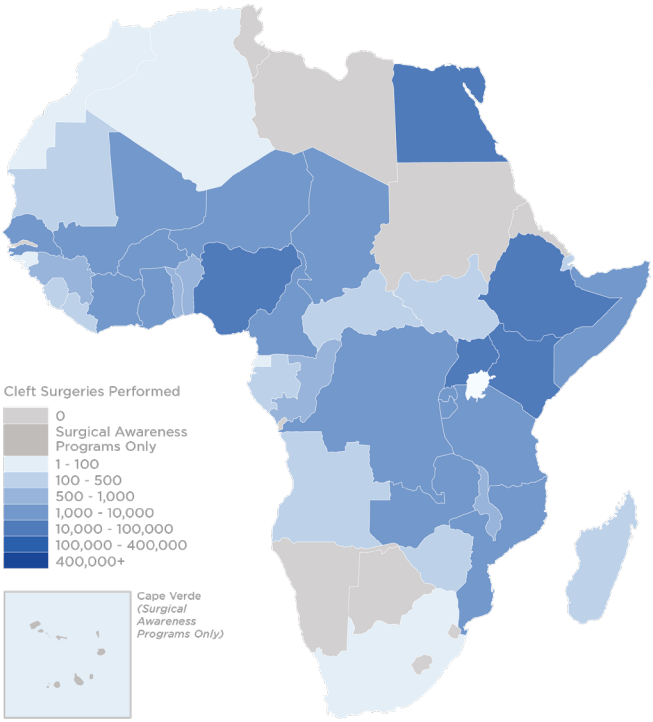

IN AFRICA

- Two-year-old Zena, from Mozambique, was our milestone 100,000th patient in 2018.
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  - Lifebox, for distributing pulse oximeters and capnography devices.
  - Haleon Nigeria, for activating the Cleft Helpline in Nigeria (toll free line +2348007645364).
  - Nigeria's Federal Ministry of Health, for helping us implement a National Surgical Obstetric Anesthesia Nursing Plan (NSOANP) and establish the country's first Cleft Registry.
  - Ghana's Ministry of Health, for partnering with us to establish a first-of-its-kind Cleft Leadership Center in Africa.

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LETTER TO THE EDITOR- IN- CHIEF, PAN AFRICAN JOURNAL OF PLASTIC RECONSTRUCTIVE AND AESTHETIC SURGERY (PAJPRAS)

We would like to take this opportunity to express our sincere congratulations on the launch of PAJPRAS journal. We are thrilled to hear about the maiden of this new scientific journal and the potential it offers to further research in our field of plastics, reconstruction and aesthetic surgery (PAJPRAS), as committed scholars and members of the academic community. We applaud you and your assemblage for taking on this project, and we're excited to see what the PAJPRAS journal will bring to our field.

We ruminate that it's indispensable to underscore the significance of 'letter to the editor' as a fundamental part of scholarly discourse as PAJPRAS journal sets out on its journey(1,2). 'Letter to the editor' provides a requisite platform on which readers can interact with published articles via asking questions, asserting criticisms, as well as offering further insights or viewpoints on the research that is being presented. Additionally, 'letters to the editor' emboldens critical thinking and open discussion, which in turn advances knowledge in the academic community in addition to fostering debate (3) to elicit how well this form of communication is being utilized. All letters to the editor published in; Clinical Otolaryngology, The Laryngoscope, The European Archives of Otorhinolarygnology and The Journal of Laryngology and Otology, for the year 2012, were examined and the individual journal guidelines for submission of letters were noted. Seventeen different countries produced a total of 92 letters for the year 2012. The majority of letters originated from Otolaryngology / Head and Neck departments (78 %. It is exceedingly recommended that you proactively seek out and accept letters to the editor, as they significantly contribute to the scholarly conversation within PAJPRAS journal.

As we delight in the inauguration of the PAJPRAS Journal, we must also be mindful of the teething glitches that might crop up in the early going. Predatory journals are a captain threat to the integrity of scholarly publishing, and their proliferation is one such challenge(4,5). A number of unethical practices are frequently used by predatory journals, comprising the publication of meagre or plagiarized content, disingenuous marketing strategies, as well as lack of peer review. Furthermore, such journals take advantage of the publish-or-perish mentality that permeates academia and prey on researchers who want to publish their work fast and without adequate review(5,6). To safeguard the integrity of scholarly publishing and the credibility of our research, it is our prime responsibility as responsible scholars to be on the lookout for and steer clear of predatory journals.

Apart from journals that engage in predatory behavior, the phenomenon of perished articles poses a challenge to the academic community. The term "perished articles" describes works that have been withdrawn or amended as a result of wrongdoing, mistakes, or other problems that jeopardize their reliability or validity(7). Because they damage the credibility of scientific publications and the public's faith in research findings, retractions and corrections can have detrimental effects on researchers. To stop the spread of outdated articles and preserve the credibility of academic publishing, editors, reviewers, and writers must all abide by strict guidelines for research conduct and publication ethics.

We suggest several strategies that the PAJPRAS Journal can put into practice to decline the impact of predatory journals as well as perished articles. To guarantee the caliber and integrity of published research, austere peer review procedures ought to be established(2,8). This includes assessing the work's scientific merit, carefully vetting submitted manuscripts for originality, validity, ethical compliance as well as asking competent reviewers for their input. Secondly, in order to foster trust and accountability among scholars, open editorial policies and practices need be instituted. This take account of clearly outlining the journal's peer review process, publication criteria, and conflict of interest policies, as well as providing guidance on identifying and avoiding predatory journals(6). Thirdly, it is imperative to carry out continuous education and awareness campaigns to empower scholars, writers, and readers to successfully negotiate the intricate world of scholarly publishing. This involves offering materials, seminars, and training courses on research integrity, publication ethics, and responsible research practices.

Finally, we would like to register that you and your team have our complete untiring support and encouragement, even as you work through the opportunities and difficulties that come with PAJPRAS Journal. Through preferment of ethical publishing practices, exacting adherence to academic standards, as well as open discourse, PAJPRAS Journal has the potential to emerge as a leader in our field. We are eager to observe how PAJPRAS Journal will contribute to knowledge advancement and intellectual dialogue in our community and Africa at large.

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REFERENCES

1. Letters to the editor: time for more scholarly debate, *British Journal of Dermatology* Oxford Academic [cited 2024 Apr 8]. Available from: https://academic.oup.com/bjd/article/171/1/1/6615624
2. Anstey A. Letters to the editor: time for more scholarly debate. *Br J Dermatol* . 2014 Jul 1 [cited 2024 Apr 8];171(1):1–2. Available from: https://dx.doi.org/10.1111/bjd.13134
3. Tierney E, O'Rourke C, Fenton JE. What is the role of 'the letter to the editor'? *Eur Arch Oto-Rhino-Laryngology*. 2015 Sep 7 [cited 2024 Apr 8];272(9):2089–93. Available from: https://link.springer.com/article/10.1007/s00405-014-3289-7
4. Narimani M, Dadkhah M. Predatory Journals and Perished Articles; a Letter to Editor. Emergency. 2017 [cited 2024 Apr 8];5(1):258–60. Available from: /pmc/articles/PMC5325920/
5. Predatory Journals and Perished Articles; a Letter to Editor - PMC [cited 2024 Apr 8]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5325920/
6. Spodick DH. The peer review system and the editor's correspondence. *Arch Intern Med*. 1981;141(9):1121.
7. Leong SCL. Publish or perish. Clin Otolaryngol Off J ENT-UK *Off J Netherlands Soc Oto Rhino Laryngol Cervico Facial Surg*. 2006 Aug;31(4):350–2.
8. Spodick DH. Evidence-based medicine. Letters pages are essential for peer review. *BMJ Clin Res ed*. 1996;312(7046):1611.

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BLOOD GROUP AND HUMAN LEUCOCYTE ANTIGEN SUB-TYPE AS DETERMINANTS TO KELOID FORMATION AND RECURRENCE IN KELOID PATIENTS
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BLOOD GROUP AND HUMAN LEUCOCYTE ANTIGEN SUB-TYPE AS DETERMINANTS TO KELOID FORMATION AND RECURRENCE IN KELOID PATIENTS

F. W. NANGOLE, J. OGENG'O, G. AGAK, K. OUYANG and A. OMU

ABSTRACT

Background: **The role of genetic factors in keloid is affirmed by the fact that keloids have been shown to occur among members of the same family.**

Objective: **To determine whether there is any association between patients' blood group and HLA sub-types to keloids and keloid recurrence.**

Design: **A prospective longitudinal study**

Setting: **The Kenyatta National Hospital between August 2018 and July 2020.**

Subjects/Participants: **Patients with keloids and a control of patients managed for other surgical conditions with no keloids. Blood was taken from each patient and analyzed for blood group and HLA sub-types using the sequence specific primer geno-typing. Data captured were summarized and analyzed using students T-test and Bonferroni correction. Probability values significance was at 0.05.**

Results: **A total of 90 patients with keloids and 59 in a control group were followed up in the study. The male to female ratio of the patients was 1:2. The most common blood group for both groups was blood group O at 51.3% and 49.2%, followed by blood group A and B respectively. Patients with keloids had a significantly higher positive alleles of HLADQA1*01 and HLADQB1*06. There was also an association between blood group A and keloid recurrence.**

Conclusion: **This study demonstrates that there is significant difference in some HLA sub-types and blood groups among patients who form keloids and non-keloid forming patients an indication of the possible role patient's genetics and immune could play in keloid pathogenesis and severity.**

Key words: **Blood group, Human Leucocyte Antigen, keloid, Recurrence**

INTRODUCTION

Pathogenesis of keloid disease is still not well established. Keloid occurrence has generally been classified as sporadic, in individuals with no known members of the family with keloids or familial where members of a given family have positive history of the disease. Familial keloids have been shown to contribute to about 50 per cent of keloids indicating a strong inheritance pattern (1).

A number of pedigree studies have demonstrated keloids to either have an autosomal dominant or recessive mode of inheritance (2-3). Other studies have suggested X linked mode of inheritance (4). HLA studies have demonstrated association between sub-types such as HLA DRB*16 and keloid formation (5). Majority of these studies have however been done in populations with low keloid prevalence with non in Africa, a keloid endemic zone.An association between ABO blood grouping and keloids have also been documented by a number of authors (6).

Keloids have high recurrence rates irrespective of the treatment modalities provided (7-8). Whether patients' genetic factors influence keloid recurrence has not been demonstrated. We undertook this study to demonstrate any significant differences between

various blood groups and HLA sub-types in patients with keloids and those without and to determine whether they could influence keloid recurrence.

MATERIALS AND METHODS

Study Design: A prospective longitudinal study

Study Setting: The Study was carried out at the Kenyatta National Hospital between August 2018 and July 2020.

Study Subject/Participants: Patients with keloids attending plastic surgical clinic were systematic randomly sampled into the study. A control group of healthy patients seeking aesthetic services with no keloids nor family history of keloids were also recruited for the study.

Data Collection and Sampling procedures: Patients with keloids in the study had history and physical examination taken. The mean surface area of keloids was measured by the grid iron technique. Pain and pruritus scores were determined using their respective visual analogue scores. Surgical excision of the keloids was done by a senior plastic surgeon followed by post excision superficial radiotherapy within 24 hours of surgery. Peri-operative management of the patients was similar for all patients. Recurrence was determined as either keloid regrowth or worsening pain and or pruritus at one year of follow up.

From each patient and the control group blood was taken and analyzed for blood groups and HLA sub-types. HLA typing was done using sequence specific primer geno-typing (SSP). DNA extraction was done using Qiapen extraction kitTM. PCR master mix preparation was done by adding commercial kit from OlerrupTM. PCR master Mix was aliquoted into 96 well plates containing Primer Mixes. PCR amplification was done using QiaxelTM automated machine which uses a commercial cartridge. Interpretation was done by SSP-typing HLA allele software.

Data Analysis: Data captured were summarized and analysed using students T-test and Bonferrini correction to compare means. Probability values significance was at 0.05.

ETHICAL CONSIDERATION

This study was approved by the local ethics and research committee; KNH/UON/ERC (P611/07/2018). Informed consent was sort from all patients to participate in the study. For the minors informed consent was taken from the parents or legally acceptable representatives.

RESULTS

A total of 90 patients with 104 keloids and a control group of 59 patients were followed up during the study. The male to female ratio was 1:2 with 60 females and 30 male patients.For the control group the male to female ratio was 1:2 with 39 female and 20 male patients.The age range was 15 to 65 years with a mean age of 29.5 and a median age of 20 -25 years. The age range for control patients was 15.5 to 64 years with mean age of 29.7 years and a median age of 20-25 years. There was no statistical significance difference between the keloids group and the control group (Table 1). The anatomical location of the keloids were as follows; ears (n=47), abdomen (n=10), cheek (n=15), upper limb (n=5), back (n=13), chest and neck (n=13) and scalp (n=1).

Table 1*: Age of patients with keloids and the control group*

Age of presentation (years)	Keloid group	Control group
10-15	3	2
15-20	19	10
20-25	18	14
25-30	15	12
30-35	12	8
35-40	10	6
40-45	7	4
45-50	4	3
> 50	2	2
Total	90	59

All 90 patients and 59 controls had their blood taken for blood groups while 80 of the 90 patients had their blood taken for HLA studies. Eighteen patients of the 80 had keloid recurrence (KR) while 62 did not have any form of recurrence (NKR).

The most common blood group for patients with Keloids and the control group was blood group O at 51.3% and 49.2% (*P*-value 0.552), followed by blood group A and B respectively. There was no statistical significance difference in the blood groups of patients who formed keloids and the control group (Table2).

Table 2: *Blood group types for patients with keloids and those without*

Blood group	Total Count	Keloids N = 90	Control N = 59	
		%	%	P-Value
O	75	51.3	49.2	0.552
A	45	31.3	28.8	0.480
B	23	13.7	18.6	0.175
AB	6	3.7	3.4	0.932

Comparison between blood groups in patients with KR and NKR patients demonstrated that keloid patients with blood group A were more prone to recurrence compared to the other blood groups (p-value <0.011) while patient with blood group B were least likely to have keloid recurrence (p-value <0.001) (Table 3).

Table 3: *Comparison of blood groups in patients with keloids recurrence (KR) and those without (NKR).*

Blood group	Total Count	Non Recurrent N = 71	Recurrent N = 19	P-Value
		%	%	
O	45	50.0	55.6	0.124
A	28	29.0	38.9	0.011
B	13	17.7	0	<0.001
AB	4	3.3	5.50	0.516

Out of 90 patients with keloids who were followed up in the study 80 patients had their blood analysed for HLA. Of the 80 patients 18 had keloid recurrence (KR)and 62 had no recurrence (NKR).Comparison of the HLA sub-types between the control group and patients who had keloids showed significance differences in the alleles of HLA DQA1*01, DQB1*05, DQB1*06, and DRB1*15 all in favour of patients who had keloids (P Value <0.05)(Table 4).

Table 4: *HLA sub-types comparison between patients with keloids and normal controls*

Allele	Keloids N = 80		Control N = 59		P-Value	Bonferroni correction P-value
	Allele +ve (%)	Allele –ve N (%)	Allele +ve N (%)	Allele –ve N (%)		
DQA1*01	83.8	16.2	44.1	55.9	<0.0001	0.0004
DQA1*02	5.0	95.0	13.6	91.5	0.129	
DQA1*03	8.8	91.3	13.6	86.4	0.415	
DQA1*04	7.5	92.5	5.1	94.9	0.733	
DQA1*05	51.3	48.7	47.5	52.5	0.732	
DQA1*06	6.3	93.7	6.8	93.2	1	
DQB1*01	3.8	96.2	1.7	98.3	0.637	
DQB1*02	10.0	90.0	8.5	91.5	1	
DQB1*03	22.5	77.5	23.7	76.3	1	
DQB1*04	20.0	80.0	20.3	79.7	1	
DQB1*05	55.0	45.0	30.5	69.5	0.006	
DQB1*06	55	45	0	100	<0.0001	
DQB1*07	1.3	98.7	0	100	1	
DRB1*01	20.0	80.0	27.1	72.9	0.415	
DRB1*02	2.5	97.5	5.1	94.9	0.650	
DRB1*03	23.8	76.2	25.4	74.6	0.844	
DRB1*04	11.3	88.7	6.8	93.2	0.557	
DRB1*05	6.3	93.7	5.1	94.9	1	
DRB1*06	3.8	96.2	0	100	0.086	
DRB1*07	6.3	93.7	13.6	86.4	0.155	
DRB1*08	7.5	92.5	6.8	93.2	1	
DRB1*09	1.3	98.7	3.4	96.6	0.574	
DRB1*10	2.5	97.5	0	100	0.508	
DRB1*11	16.3	83.7	15.3	84.7	1	
DRB1*12	3.8	96.3	3.4	96.4	1	
DRB1*13	12.5	87.5	13.6	86.4	1	
DRB1*14	6.3	93.7	6.8	93.2	1	
DRB1*15	52.5	47.5	22.	78.0	0.004	
DRB1*16	1.3	98.7	3.4	96.6	0.574	

Bonferreni correction revealed HLA DQA1*01 and HLADQB1*06 to be significantly different from the control. Analysis of HLA sub-types between patients who had keloids recurrence (KR) and those without (NKR), revealed DQBI*06 to be elevated in the keloid recurrent group. (P value <0.05) Bonferreni correction however revealed that the difference was not of statistical significance. (Table 5).

Table5: *HLA sub-types analysis between patients with keloid recurrence (KR) and those without (NKR) revealed statistical significance difference with HLA allele DQB1*06*

	Non Recurrent Keloids (NKR) N = 62		Keloid recurrent (KR) N = 18		P-Value	Bonferroni correction P-value
	Allele +ve	Allele –ve	Allele +ve	Allele –ve		
Allele	N (%)	N (%)	N (%)	N (%)		
DQA1*01	80.6	19.4	94.4	5.6	0.278	0.0006
DQA1*02	4.8	95.2	5.6	94.4	1	
DQA1*03	11.3	88.7	0	100	0.340	
DQA1*04	8.1	91.9	5.6	94.4	1	
DQA1*05	48.4	51.6	61.1	38.9	0.426	
DQA1*06	4.8	95.2	11.1	88.9	0.313	
DQB1*01	4.8	95.2	0	100	1	
DQB1*02	8.1	91.9	16.7	83.3	0.370	
DQB1*03	22.6	77.4	22.2	77.8	1	
DQB1*04	17.7	82.3	27.8	72.2	0.338	
DQB1*05	58.1	41.9	44.4	55.6	0.421	
DQB1*06	48.4	51.6	77.8	22.2	0.033	
DQB1*07	0	100	5.6	94.4	0.225	
DRB1*01	21.0	79.0	16.7	83.3	1	
DRB1*02	1.6	98.4	5.6	94.4	0.402	
DRB1*03	22.6	77.4	27.8	72.2	0.754	
DRB1*04	9.7	90.3	16.7	83.3	0.413	
DRB1*05	6.5	93.5	5.6	94.4	1	
DRB1*06	4.8	95.2	0	100	1	
DRB1*07	6.5	93.5	5.6	94.4	1	
DRB1*08	6.5	93.5	11.1	88.9	0.612	
DRB1*09	0	100	5.6	94.4	0.225	
DRB1*10	1.6	98.4	5.6	94.4	0.402	
DRB1*11	14.5	85.5	22.2	77.8	0.475	
DRB1*12	4.8	95.2	0	100	1	
DRB1*13	14.5	85.5	5.6	94.4	0.442	
DRB1*14	6.5	93.5	5.6	94.4	1	
DRB1*15	58.8	45.2	44.4	55.6	0.593	
DRB1*16	1.6	98.4	0	100	1	

DISCUSSION

The influence of genetic factors in keloid formation could be extrapolated from the facts that keloids seem to portray a distinct pattern of inheritance and a strong familial tendency (1-3). Though not unique to keloids, genetic factor has been shown to have an influence on various disease processes whether infective, benign or malignant in origin. Most studied and easily applied genetic variants have been the ABO and the HLA systems probably due to the fact that they are routinely used during blood transfusions as well as tissue typing and organ transplants. Our study noted some significant associations between these two genetic systems of the body and keloid patients.

The role and influence of ABO blood groups in the pathogenesis and outcome of keloid management has been established before. Ramma kishnan *et al* in India found blood group A to be significantly higher in patients with keloids than in the normal population (9).These findings were similar to those of Shaheen *et al*. in a Syrian study who found blood group A to be significantly more common in patients with keloids than in the normal cohort (6). However, Abbas Moure Toure in Togo, like in our study demonstrated no

statistical significance difference with blood groups in patents with keloids and a control population of patients who presented with other dermatological conditions (10). Our study on the other hand found keloid patients with blood group A to be more prone to keloid recurrence compared to the other blood group with blood group B being less prone to recurrence.

Human leucocyte Antigen (HLA), key genes responsible for the development of the cellular immune system, have been shown to play a critical role in not only autoimmune conditions but also in benign and malignant conditions. Mutations on some of the alleles are thought to be responsible for the development of a number of autoimmunedisorders such as celiac disease, ankylosing, spondylisthesis and rheumatoid arthritis (11-12). Even closer to keloids sclerotic skin conditions such as sarcoidosis and systemic sclerosis have also been shown to have associations with particular alleles (13).Though keloids disease are not classified as autoimmune disease several studies have shown an association between some alleles and the disease bringing to the fore possibilities that the immune system could play a critical role in keloid formation.Wen-Sheng Lu found DQB1*0501, B*07-DRB1*15, DQB1*0503-DRB1*15 ($P<0.05$) to be associated with keloid formation among Chinese Ham patients cohorts (14). Another study by Brown et al found an association between HLA DRB1*15 and keloid formation in a patient cohort of Caucasians (15). However, in a study in the Caribbean with Brown et al no association was demonstrated between HLA DRB*15 alleles and keloid patients of African descent (16). In our study we demonstrated HLA alleles DQA*01, DQB1*05, DQB1*06 and DRB1*15 to be significantly associated with keloid patients (P value <0.05).After Bonferroni corrections alleles DQA1*01 and DQB1*06 were still significantly associated with keloid formation. Even further Allele DQB1*06 were found to be significantly associated with keloid recurrence (P value <0.05). This was however found to be insignificant after Bonferroni correction.

CONCLUSION

Keloid patho-physiology from our study findings seem to be influenced by the genetic composition of the patients. Patients with blood group A are more prone to keloid recurrence a possible indication of the disease severity in this group of patients. While a number of HLA sub-types were identified to be significantly associated with keloid disease in our cohort, HLA DQA1*01 and DQB1*06 seem to be more associated with the disease. The association between several type 2 alleles and keloid formation in our study and other studies strongly suggest an immunological aspect in keloid formation akin to auto inflammatory diseases.

REFERENCES

1. Kouotou, E.A.,Nansseu .J.R., Guissana E.O., Menye C.R., AkpadjanF.A (2019).Epidemiology and clinical features of keloids in Black Africans: a nested case-control study from Yaounde, Cameroon.*Int J Dermatol*, 58(10): p. 1135-1140.
2. Clark . J.A., Maria. L. T., Howard .L, Horia.S., Robert .K. and Jeffrey B K (2009) Description of familial keloids in five pedigrees: evidence for autosomal dominant inheritance and phenotypic heterogeneity. *BMC Dermatol*, **9**: p. 8-12
3. Glass, D.A.,(2017) Current Understanding of the Genetic Causes of Keloid Formation. *J Investig Dermatol Symp Proc,* 18(2): p. S50-S53.
4. Marneros .A.G.,James E.C., Norris.M.D.;Bjorn R. O.l.,(2001) Clinical genetics of familial keloids.*Arch Dermatol*, **137**(11): 1429-34.
5. Brown. J.J., Ollier. W.E., Thomson. W., Bayat. A. (2008) Positive association of HLA-DRB1*15 with keloid disease in Caucasians. *Int J Immunogenet*, 35(4-5):303-7. doi: 10.1111/j.1744-313X.2008.00780.x. PMID: 18976433
6. Shaheen, A., J. Khaddam, and F. Kesh,(2016) Risk factors of keloids in Syrians.*BMC Dermatol,* **16**(1): p. 13.
7. Chuma J.C, Patrick D.C.,(2009) Keloids Pathogenesis, clinical features and management, *Plastic Surgery; 8:34-40*
8. BrissettA., Sherris D.A.(2001) Scar contractures, hypertrophic scars, and keloids. *Facial Plast. Surg, 17:263–272.*
9. Ramakrishnan K.M., Thomas K.P., Sundararajan C.R.(1974), Study of1000 patients with keloids in South India. *Plast.Reconstr.Surg., 53:276–280*
10. Abas Mouhari-Toure, BayakiSaka, Koussaké Kombaté, SefakoAkakpo, PalakiyemEgbohou, KissemTchangaï-Walla, PalokinamPitche, (2012)"Is There an Association between Keloids and Blood Groups?" *International Scholarly ResearchNotices*, ArticleID 750908, 4 pages, 2012. https://doi.org/10.5402/2012/750908
11. GergelyBodis, Victoria Toth and Andreas Schwarting,(2018) Role of Human Leukocyte Antigens (HLA) in Autoimmune Diseases *Rheumatology and Therapy* vol 5, pages5–20
12. SantosoCornain(1995), The Significance of HLA-antigens in dermatology*Medical Journal of Indonesia*, 4(1):44 ,DOI: 10.13181/mji.v4i1.905
13. McCarty SM, Syed F, Bayat A.(2010) Influence of the human leukocyte antigen complex on the development of cutaneous fibrosis: an immune-genetic perspective. *ActaDermVenereol.*, 90(6):563-74. doi: 10.2340/00015555-0975. PMID: 21057738.
14. Wen-Sheng Lu , Xian-Bo Zuo, Zai-Xing Wang, Li-QiongCai, Fei Zhu, Yang Li, *et al* (2011) Association of HLA haplotype with keloids in Chinese Hans. Burns.. 2011 Aug;37(5):794-9.
15. J J Brown W. E. R Ollier W Thomson,(2008) Positive association of HLA-DRB1*15 with keloid disease in Caucasians, *International Journal of Immuno-genetics*.,35(4-5):303-7
16. J. J. Brown W. E. R. Ollier G. Arscott A. Bayat(2010) Association of HLA□DRB1* and keloid disease in

an Afro-Caribbean population, *Clin Exp Dermatol*., 35(3):305-10. doi: 10.1111/j.1365-2230.2009.03506.x. Epub 2009 Oct 23.

17. Robert L McCauley, Vimlerani Chopra,(1992) Altered cytokines production in Black patients with keloids *Journal of clinical Immunology*, 12;300-308
18. Qunzhou Zhang, Takayoshi Yamaza, A. Paul Kelly,(2009)Tumor-Like Stem Cells Derived from Human Keloid Are Governed by the Inflammatory Niche Driven by IL-17/IL-6 Axis PLOS 4(11): e7798.
19. Xue, H., McCauley, R. L., and Zhang, W,(2000) Elevated interleukin-6 expression in keloid fibroblasts. *Journal of Surgical Research*., *89*(1), 74-77
20. M.M. Ali, F.W. Karanja, F.W. Nang'ole, E.O.N. Opot, K.O. Mulehane,D.Z.Mbithi(2019)Determination of the prevalence, clinical characteristics and histo-pathological features of keloids in patients managed at the Kenyatta National Hospital. *East Afri. Med. J*, 2019; 96(1); 2220-2229
21. Mohammed Ghazizadeh, MamikoTosa(2007) Functional implications of IL-6 signalling pathways in keloid pathogenesis *Journal of investigative dermatology*, 127;1:98-105

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HEALTHCARE WORKERS' KNOWLEDGE AND SATISFACTION REGARDING WOUND CARE SERVICES AND PRACTICES IN SELECTED HOSPITALS ACROSS KENYA
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HEALTHCARE WORKERS' KNOWLEDGE AND SATISFACTION REGARDING WOUND CARE SERVICES AND PRACTICES IN SELECTED HOSPITALS ACROSS KENYA

D. M. NYAIRO, C. NYABUTO, K. F. MAROA and F. W NANGOLE

ABSTRACT

Background: **Wounds are a significant burden in Kenya, with limited knowledge on their prevalence and management. Timely care for acute wounds, including debridement and dressing, is essential, to prevent their development into chronic wounds. Managing chronic wounds is more expensive but follows a similar approach, guided by the DIME principle.**

Objective: **To assess knowledge of healthcare workers engaged in wound management regarding various wound care options and to gauge their satisfaction levels with the existing wound care services offered across different facilities.**

Design: **A multicenter cross-sectional survey was carried out over a period of 2 weeks.**

Setting: **Selected regional hospitals in Kenya. Healthcare providers across the select hospitals completed a wound care study questionnaire.**

Subjects/Participants: **Healthcare practitioners involved in wound care in all cadres from nursing students, nurses, clinical officers, medical officers, surgical residents and others.**

Results: **One hundred and twenty three (123) healthcare practitioners, mainly nurses (82.2%), participated. Most were aged 20-30 and 31-40 (41% and 39% respectively). Females represented 67% of respondents. A significant majority lacked familiarity with modern wound care practices like maggot therapy (88.3%) and vacuum-assisted closure (VAC) dressings (60.4%). Overall, high satisfaction was reported with the multidisciplinary team (73.8%), wound care supplies (59.4%), and preventive practices (62.4% for complications and 66.4% for infections).**

Conclusion: **Our study revealed deficiencies in wound care training, with over half lacking specialized training, also reflected in even more healthcare workers lacking knowledge on modern wound care practices. However, most practitioners display above-average basic understanding, which can be built on with provision of specialized training.**

*Key words: A***cute wounds, Chronic wounds, Wound care**

INTRODUCTION

Wounds impose a significant and often underappreciated burden to the healthcare system and the society as a whole (1). The wound burden in Kenya is heavy, and the epidemiological pattern points to majority of the wounds being acute, caused by trauma (38.6%), most of which were being managed as inpatients (68%) (2), which translates to a higher economic burden. To the individual, living with a wound can have a detrimental multifaceted effect on psychological, social, and overall well-being (3). In their treatment, knowledge on the prevalence, common types and management strategies is

necessary. There is however a dearth of knowledge on the same in our setting.

Wound care is a common procedure in Kenyan healthcare facilities, and timely management of acute wounds is crucial for proper healing. Poor management of acute wounds often leads to them becoming chronic wounds. Managing chronic wounds effectively is intricate, and to optimize patient outcomes, it's advised that individuals engaged in their care possess the requisite knowledge and expertise. The approach to managing chronic wounds is somewhat similar to that of acute wounds, with a focus on identifying the underlying cause in addition to use of advanced and modern wound care strategies. The DIME principle (Debridement, Infection and Inflammation control, Moisture balance, and Edge preparation) guides their management (4).

Various factors, including healthcare workers' knowledge and practices, hospital management systems, and patient factors like BMI, metabolic health, and financial situations, can influence wound healing(5,6). Data on these factors is limited in our context, but it's crucial for policy and planning, given the increasing elderly population and the prevalence of lifestyle diseases, which suggest a growing healthcare burden (7). The satisfaction of healthcare workers on wound care is crucial as they are the point people managing these conditions. A satisfied workforce will translate in better outcomes for both acute and chronic wounds(7). This study therefore aimed to find out knowledge on advanced wound care management among various healthcare providers.

MATERIALS AND METHODS

Study Design: A multicenter, cross sectional survey was carried out over a period of 2 weeks.

Study Setting: Six regional referral hospitals across the Republic of Kenya.

Study Subjects/Participants: A questionnaire was administered to healthcare practitioners involved in wound care in all cadres from nursing students, nurses, clinical officers, medical officers, surgical residents and others.

Data Sampling: For each of the 7 assessment questions, 1 point was assigned for a correct response and no point for an incorrect response. The maximum possible score was 7 points and the minimum score was 0 points; the total score for each practitioner was expressed as a percentage.

Data Collection: To reduce bias and inter-examiner variability, 2 groups of research volunteers, each comprising 2 medical students were sought for the study. Prior to data collection, they were supervised by an official of the Wound Care Society of Kenya; WCSK for a day, before commencement of the data collection.

Data Analysis: Data from the questionnaires was coded and input into SPSS (IBM version 21). Means, modes and medians were calculated. Student T test was used to analyze gender differences on the prevalence, types of wounds as well as management. Further, one way ANOVA was used to analyze hospital differences on the same variables. Analyzed data were presented in figures and tables.

ETHICAL CONSIDERATION

Ethical approval was obtained from the Kenyatta National Hospital /University of Nairobi Ethics and Research committee. An informed consent was also sought from all participants. Information obtained from the study was treated with confidentiality and only for purposes related to the study.

RESULTS

A total of 123 healthcare practitioners participated, with the majority being nurses (82.2%) and smaller percentages represented by surgical residents (7.9%), nursing students (5%), clinical officers (5%), and medical officers (2%). The average age of the participants was 34.76, with most falling into the 20-30 years and 31-40 years age groups (41% and 39% respectively). Females comprised 67% of the respondents, and males made up 31%.

Table 1: Demographic characteristics of practitioners

Variables		Count (n=143)	%
Cadre	Nurse	83	82.2%
	Resident	8	7.9%
	Nursing student	5	5.0%
	Clinical officer	3	3.0%
	Medical officer	2	2.0%

Age groups	20-30 years	41	41.0%
	31-40 years	39	39.0%
	41-50 years	10	10.0%
	Above 50 years	9	9.0%
	Below 20 years	1	1.0%
Gender	Female	69	67.0%
	Male	32	31.1%
	Prefer not to say	2	1.9%

Table 2: Knowledge of modern wound care techniques

Technique			%
Maggot Therapy	Has experience	11	11.7%
	No experience	83	88.3%
VAC Dressing	Has experience	38	39.6%
	No experience	58	60.4%
Compression Dressings	Has experience	61	62.9%
	No experience	36	37.1%

Practitioners had varying experiences with wound dressing techniques: 62.9% were skilled in compression dressings, but lacked experience in maggot therapy (88.3%) and vacuum-assisted closure (VAC) dressings (60.4%). Basic hygiene satisfaction varied: 48.6% were satisfied, 15.9% dissatisfied, and 35.6% neutral.

A detailed overview of specific wound care services provided in facilities is outlined in table 4 below.

Satisfaction with wound care services provided in facilities

Practitioners generally expressed satisfaction with wound care services: 73.8% were satisfied with the multidisciplinary team, 59.4% with supplies, 52.5% with mobility aids, 62% with equipment, 73% with competencies, 62.4% with practices to prevent complications, and 66.4% with practices to prevent infections.

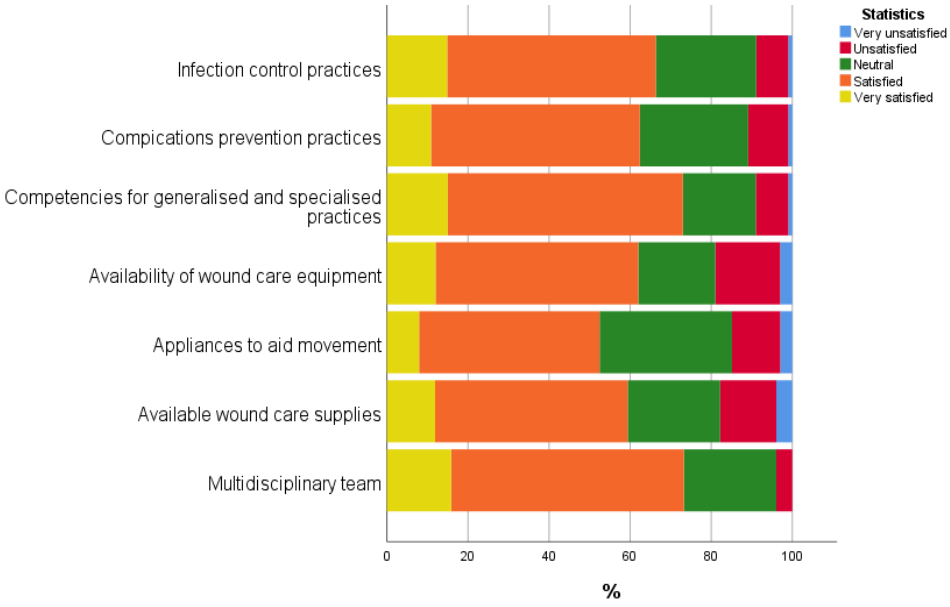

Figure 1: Practitioners' Satisfaction with Wound Care Services

DISCUSSION

The state of wound care practices, knowledge and the perspectives of healthcare practitioners towards wound care in Kenya have largely been unstudied. This study was conducted to evaluate the healthcare practitioners' understanding of wound care practices and their satisfaction with the same. A semi-systematic review conducted by Welsh et al 2018 looking at wound care evidence, knowledge and education amongst nurses found a clear deficit in knowledge in a number of areas pertaining to wound care (e.g. pressure ulcer grading, awareness of clinical guidelines/protocols, dressing selection etc.)(8).

Similarly, a study in Lagos Nigeria by Oseni *et al* found that majority of the participants in their study were deficient in knowledge and practice of wound assessment tools and documentation (9). Our study demonstrated similar findings, with a majority of the respondents having little to no experience/knowledge of some of the modern wound care practices such as maggot therapy (88.3%), vacuum assisted closure VAC (60.4%) .

More than half of the practitioners had no specialized training in offering wound care beyond the training received in the course of the medical curriculum training.

The centers selected for the study were also involved in training of these healthcare providers and these findings highlight the need to incorporate specialized training programs in the curriculums(10). McCluskey et al found that a large number of nurses rated their competence in relation to wound assessment on the lower end of the scale but they noted significant enhancement once they updated their knowledge(11). Tegegne et al in a study in Ethiopia found that knowledge and practice on wound care were determined by education and training, among other factors(12), these findings were also demonstrated by Ferreira *et al* in their study, citing that training was needed to improve of nurses' knowledge(10)

The knowledge scores varied between cadres with medical officers and residents demonstrating a better understanding of wound care than nurses. This observation may be attributed to the different levels of training; most nurses sampled cited a diploma as their highest level of training while residents are at the post-graduate level.

Overall, the health practitioners reported facilities across the country provided a favorable environment for provision of wound care services and practitioners were satisfied with the wound care services provided in their facilities of practice. The practitioners affirmed the availability of wound care supplies and appliances to aid in movement; their availability was satisfactory to aid efficient delivery of services.

CONCLUSION

In conclusion, the study demonstrated that there was a knowledge gap in healthcare providers regarding advanced and modern wound management practices, which can be attributed in part to the lack of specialized wound care training.

However, despite the absence of specific wound care training, most practitioners exhibited above-average basic knowledge of wound care procedures, which could serve as a starting point for enhancing their wound care skills. The majority of practitioners expressed satisfaction with the available wound care services. However, this satisfaction can be further improved by equipping healthcare workers with the necessary specialized knowledge.

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REFERENCES

1. Julian F Guest, Nadia Ayoub, Tracey McIlwraith, *et al.* Health economic burden that wounds impose on the National Health Service in the UK. *BMJ Open.* 2015 Dec 1; **5(12):** e009283.
2. Kiriga F, Maroa M, Esiru J, *et al.* Epidemiological patterns of wounds in Kenya. A cross sectional study. 2024 Feb 1; 41–4. https://www.researchgate.net/publication/378297673
3. Augustin M, Carville K, Clark M, *et al.* International consensus. Optimising wellbeing in people living with a wound. An expert working group review. 2012.
4. Werdin F, Tennenhaus M, Schaller HE, HO R. Evidence-based management strategies for treatment of chronic wounds. *Eplasty.* 2009; 9.
5. Oien RF, Hakansson A, Ovhed I, Hansen BU. Wound management for 287 patients with chronic leg ulcers demands 12 full-time nurses. Leg ulcer epidemiology and care in a well-defined population in southern Sweden. *Scandinavian journal of primary health care.* 2001; 18. 220-5. 10.1080/028134300448788.
6. Gottrup FA. specialized wound-healing center concept: importance of a multidisciplinary department structure and surgical treatment facilities in the treatment of chronic wounds. *Am J Surg.* 2004; 187:5?
7. Posnett J, PJ F. The burden of chronic wounds in the UK. *Nurs Times.* 2008;**104:**3.
8. Wiley Online Library; Wound care evidence, knowledge and education amongst nurses: a semi□systematic literature review - Welsh - 2018 - *International Wound Journal* -. [cited 2024 Apr 6]. Available from: https://onlinelibrary.wiley.com/doi/10.1111/iwj.12822
9. Oseni OM, Adejumo PO. Nurses' reported practice and knowledge of wound assessment, assessment tools and documentation in a selected hospital in Lagos, Nigeria. *Afr J Med Med Sci.* 2014 Jun; **43(2):** 149–57.
10. Ferreira AM, Rigotti MA, da Silva Barcelos L, *et al.* Knowledge and practice of nurses about care for patients with wounds. *Revista de Pesquisa Cuidado é Fundamental Online.* 2014 3; **6(3):** 1178-90.
11. https://www.researchgate.net/profile/Pat-Mccluskey/publication/288752995_Nurses%27_knowledge_and_competence_in_wound_management/links/5a12e19f0f7e9b1e572c1cd5/Nurses-knowledge-and-competence-in-wound-management.pdf.
12. Tegegne B, Yimam F, Mengesha Yalew Z, *et al;* Knowledge and Practice of Wound Care and Associated Factors among Nurses Working in South Wollo Zone Government Hospitals, Ethiopia. *Chronic Wound Care Management and Research.* 2022; **9:**1-11 https://doi.org/10.2147/CWCMR.S366322.

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PSYCHOSOCIAL IMPACT OF WOUNDS IN KENYA
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PSYCHOSOCIAL IMPACT OF WOUNDS IN KENYA

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ABSTRACT

Background: **Wounds have a psychological and social impact on patients, often affecting their quality of life. The psychological effects of wounds include increased levels of anxiety, low self-esteem, frustration, depression, fatigue, and sleep deprivation due to associated pain. Social well being is undermined by physical limitations that deprives social interactions and a negative self-image associated with wounds. Psychosocial stress harms the patient's overall well being and delays wound healing.**

Objective: **The aim of this study was to determine the psychosocial impact wounds impose on patients in Kenya.**

Design: **A cross-sectional study**

Setting: **The study was conducted across six hospitals in Kenya over a period of two weeks.**

Subjects/participants: **The study included patients of all ages who presented to the hospitals with wounds, and who gave informed consent; and excluded patients who declined to participate or could not give informed consent. The participants completed a comprehensive questionnaire capturing the wound details: Focusing on Etiology, Duration, Wound Care Experience, and Psychosocial Implications.**

Results: **The study recruited 500 patients; 55.8% were male, 44% were female, and 0.2% preferred not to disclose their gender. The mean age of the patients was 35.0 years, ranging from 0 to 94 years. More than 50% of the participants expressed anxiety, fears related to the wound never healing, limb amputation, loss of income, and inability to perform daily activities. Participants reported limitations in their ability to perform daily activities, including nutrition (21.1%), bathing (45.6%), dressing (38.7%), and use of the toilet (30.8%), sleep (37.8%), and recreation (51.9%). Socially, 30.7% of participants experienced stigma due to wounds.**

Pain during dressing sessions was a source of stress, as 71.6% of the participants reported moderate to severe pain. In 71.7% of cases, no analgesia was administered before dressing.

Conclusion: **Wounds can have a significant impact on the overall well being of patients, affecting their psychological and social health. In addition to attending to the physical aspects of care, effective wound management should encompass strategies to address these psychosocial effects. This may involve providing counseling services and integrating supportive social networks into the patient's care plan.**

INTRODUCTION

Wounds impose a considerable physical, psychological, economic, and social burden on patients and society at large. While standard clinical care practices often seek to address the physical aspects of wound care, the psychosocial impact of wounds is often overlooked, to the detriment of the patient's quality of life (1). McKenzie highlighted the shortcomings of the term "wound care" which often reduces wound management to a mechanical process focused on the defect instead of the patient (2). While both acute and chronic wounds impose a burden on patients, chronic wounds, because of prolonged duration, pose a heavier burden and have been the subject of most studies investigating the psychosocial impact of

wounds (1). The psychosocial well being of individuals with wounds often stems from impairments in their physical health and sub-optimal clinical outcomes (3). Notably, pain associated with wounds causes distress while compounding psychological distress by causing sleep disturbance and limiting movement. Lack of sleep is common among patients with chronic wounds due to pain and anxiety; sleep deprivation, in turn, leads to fatigue and reduced productivity (4). Additionally, psychological well being is affected by an individual's loss of economic independence due to a wound. Wounds are generally associated with limitations in physical activities, which often affect an individual's productivity. The consequent loss of a source of income not only creates psychological distress through anxiety and depression but also affects their ability to access wound care services (4).

Individuals with wounds experience social isolation. One of the major causes of social isolation is limitations in physical movement. Wound dressings and pain often limit an individual's mobility, thus prohibiting them from attending social engagements (5). Secondly, wounds represent a defect in an individual and hurt their self-esteem. The foul odor of certain wounds can discourage individuals from engaging in social interactions. Additionally, wounds affect the social well being of patients by limiting their independence, forcing them to depend on other individuals to perform activities of daily living and financial support for those without a source of income. Increased dependence on others not only heightens the feelings of being a burden to others but also lowers their self-esteem, precipitates a sense of frustration, and increases anxiety levels (6).

Addressing the psychological well being of patients is essential to wound healing. Psychological stress can hinder wound healing through various pathways. One mechanism involves the activation of the immune system and subsequent release of pro-inflammatory cytokines during the initial phases of wound repair (7). Additional pathways include sustained elevation of glucocorticoids, heightened catecholamine production, and reduced levels of oxytocin. (8). Social support is an equally important pillar of wound management. This premise is supported by evidence from a review by Parkler et al., where patients living alone were observed to be at a higher risk of developing leg ulcers (9). Furthermore, a group of patients who received a social model of care had significantly better improvement in pain and ulcer healing compared to patients who received individual care at home (9). Postulated mechanism by which social well-being promotes wound healing is by buffering against stress. Experimental animal studies attributed better wound healing outcomes among social individuals to high oxytocin levels and subsequent reductions in cortisol levels (10). The importance of psychosocial factors in comprehensive wound management informed the need to study the psychosocial impact of wounds in the Kenyan context. This study on the psychosocial impact of wounds is part of a more extensive study on the prevalence of wounds and their management in Kenyan hospitals.

MATERIALS AND METHODS

Study Design: Cross-sectional descriptive study

Study Setting: The study was conducted across six hospitals in Kenya.

Study Subjects/Participants: The study participants included patients with wounds in outpatient and outpatient settings.

Sampling procedure: Purposive sampling was used, and all patients who presented to the hospital with a wound were included irrespective of gender or age.

SELECTION CRITERIA

Inclusion Criteria

All patients, irrespective of age or gender, who gave consent to participate were included in the study.

Exclusion Criteria

Patients who declined to participate in the study or could not provide consent were excluded.

Data Collection: Data was gathered using questionnaires.

Data Analysis: Data was entered into and analyzed using *Statistical Package for Social Sciences (SPSS Version 25, IBM, US).*

Ethical Consideration

Ethical approval was granted the Kenyatta National Hospital / University of Nairobi Ethics and Standards Committee. Prior to data collection, approval was received from the respective hospital administration. A written informed consent was signed by all participants. Information obtained from the study was treated with confidentiality and used only for purposes related to the study.

RESULTS

Demographics

The study was conducted across six hospitals in Kenya. 500 patients were evaluated; 55.8% were male, 44% were female, and 0.2% preferred not to disclose their gender.

The mean age of the patients was 35.0 years, with a range from 0 to 94 years. The age categories were

≤5 years (8.5%), 6 to 18 years (9.3%), 19 to 60 years (72.1%), and above 60 years (10%). The majority of patients were inpatients (68%), while 32% were outpatient clinic attendees.

Fears about the wound

The data revealed that a significant percentage of patients had concerns and fears regarding their wounds. Approximately 57.5% of patients expressed fear that their wounds may never heal, while 43.4% were concerned about their inability to perform daily duties due to the wound. In addition, 52.4% of patients expressed fears of losing their job or income as a result of the wound, and 69.5% had concerns about the possibility of amputation.

Social and Lifestyle Effects

Socially, stigma was reported by 30.7% of patients, indicating that they felt stigmatized due to their wounds.

A variable number of participants reported limitations in their ability to perform daily activities, including nutrition (21.1%), bathing (45.6%), dressing (38.7%), and use of the toilet (30.8%), sleep (37.8%), and recreation (51.9%).

Wound Pain

Wound pain was assessed in three categories: dressing pain, interval pain, and background pain. The results are summarized in Table 1 below.

Table 1: Pain Severity

		Count	%
Dressing Pain	Milds	140	28.5%
	Moderate	212	43.1%
	Severe	140	28.5%
Interval Pain	Mild	274	55.6%
	Moderate	142	28.8%
	Severe	77	15.6%
Background Pain	Mild	300	60.9%
	Moderate	133	27.0%
	Severe	60	12.2%

Among the patients, 43.9% reported receiving regular or ongoing analgesia for pain management, while 56.1% did not receive such treatment. In terms of pre-dressing analgesia, 28.3% of patients received it specifically before wound dressing, while the majority (71.7%) did not receive pre-dressing analgesia. These findings indicate that a significant portion of patients were not receiving regular or ongoing analgesia, and a substantial number did not receive pre-dressing analgesia specifically.

DISCUSSION

The study affirmed that wounds hurt the patients' psychosocial well-being. Psychologically, patients admitted to anxiety regarding their prognosis and the impact of the wounds on their lives. The study participants acknowledged experiencing pain, which was often undertreated, and their ability to perform activities of daily living was limited. Socially, some participants were stigmatized on account of having wounds, while others did not. More than half of the study participants experienced anxiety over the impact of their wounds on their daily lives. In particular, they worried about their prognosis, the possibility of the wounds never healing or limb amputation, as well as the impact the wounds would have on their independence, such as their ability to perform daily duties and maintain a source of income. The findings are comparable to observations made by Olsson & Friman; their review of nursing documentation revealed that patients were anxious over the possibility of limb amputation or wounds never healing (11). To varying degrees, the study participants acknowledged that wounds limit their ability to perform daily activities such as nutrition, recreation, and personal hygiene practices such as bathing and using a toilet. Similar observations were made by Ebbeskog and Ekman, who attributed the limitations to the exacerbation of pain. Furthermore, the need to keep wound dressings clean and dry and protect the wound from damage limits the ease of performing daily activities (12). Pain was a cause of concern to the psychosocial well-being of this study's participants. While more than half of the participants reported experiencing moderate to severe interval pain and dressing pain, no form of analgesia was administered in more than 50% of cases before dressing sessions or as an ongoing form. Overall, pain management was inadequate and may have contributed to psychological distress. In a study that involved patients with chronic wounds, Upton et al. observed that acute pain during dressing sessions contributed to a state of chronic stress that delayed wound healing (13)with a mean age of 71.7 ± 14.6 years. The sample included 18 male (42%. Although pain is a common feature of wounds, adequate management is essential for psychological well-being to alleviate stress and anxiety and for timely wound healing.

CONCLUSION

Wounds hurt the psychosocial well-being of patients. In addition to addressing the patient's physical needs, comprehensive wound care should acknowledge the psychosocial consequences of wounds and address them. Wound care providers should offer

patient education and counseling to alleviate anxiety. Furthermore, comprehensive assessment and management of pain should be practiced to further minimize stress. The social well-being of wound patients should be promoted through measures such as integrating family members into the wound care process.

REFERENCES

1. Alexander, S. J. (). Time to get serious about assessing – and managing – psychosocial issues associated with chronic wounds. *Current Opinion in Supportive and Palliative Care*, 2013; *7*(1), 95. https://doi.org/10.1097/SPC.0b013e32835bf2a3
2. McKENZIE, H. Wound Care Is Not Holistic Patient Care. *Home Healthcare Now*, 2011; 29(4), 259. https://doi.org/10.1097/NHH.0b013e318211981b
3. Danwang, C., Tochie, J. N., Mazou, T. N., Nzalie, R. N. T., & Bigna, J. J. Contemporary occurrence and etiology of chronic leg ulcers in Africa: A systematic review and meta-analysis protocol. *BMJ Open*, 2019; *9*(5), e026868. https://doi.org/10.1136/bmjopen-2018-026868
4. Simka, M., and Majewski, E. The Social and Economic Burden of Venous Leg Ulcers: Focus on the Role of Micronized Purified Flavonoid Fraction Adjuvant Therapy. *American Journal of Clinical Dermatology,* 2003; 4(8), 573–581. https://doi.org/10.2165/00128071-200304080-00007
5. Farivar, B. S., Toursavadkohi, S., Monahan, T. S., et al. Prospective study of cryopreserved placental tissue wound matrix in the management of chronic venous leg ulcers. *Journal of Vascular Surgery: Venous and Lymphatic Disorders,* 2019; 7(2), 228–233. https://doi.org/10.1016/j.jvsv.2018.09.016
6. Platsidaki, E., Kouris, A. and Christodoulou, C. (2017). Psychosocial Aspects in Patients with Chronic Leg Ulcers. *WOUNDS: A Compendium of Clinical Research and Practice,* 2017; 29(10). https://doi.org/10.25270/WNDS/2017.10.306310
7. Glaser, R., Kiecolt-Glaser, J. K., Marucha, P. T., et al. Stress-related changes in pro-inflammatory cytokine production in wounds. *Archives of General Psychiatry*, 1999; 56(5), 450–456. https://doi.org/10.1001/archpsyc.56.5.450
8. Gouin, J.-P. and Kiecolt-Glaser, J. K. The Impact of Psychological Stress on Wound Healing: Methods and Mechanisms. *Immunology and Allergy Clinics of North America,* 2011; 31(1), 81–93. https://doi.org/10.1016/j.iac.2010.09.010
9. Parker, C. N., Finlayson, K. J., Shuter, P., and Edwards, H. E. Risk factors for delayed healing in venous leg ulcers: A review of the literature. *International Journal of Clinical Practice,* 2015; 69(9), 967–977. https://doi.org/10.1111/ijcp.12635
10. Detillion, C. E., Craft, T. K. S., Glasper, E. R. *et al*. Social facilitation of wound healing. *Psychoneuroendocrinology*, 2004; *29*(8), 1004–1011. https://doi.org/10.1016/j.psyneuen.2003.10.003
11. Olsson, M. and Friman, A. Quality of life of patients with hard-to-heal leg ulcers: A review of nursing documentation. *British Journal of Community Nursing,* 2020; 25(Sup12), S13–S19. https://doi.org/10.12968/bjcn.2020.25.Sup12.S12
12. Ebbeskog, B., & Ekman, S.-L. (2001). Elderly persons' experiences of living with venous leg ulcer: Living in a dialectal relationship between freedom and imprisonment. *Scandinavian Journal of Caring Sciences*, *15*(3), 235–243. https://doi.org/10.1046/j.1471-6712.2001.00018.x
13. Upton, D., Solowiej, K., Hender, C., & Woo, K. y. (2012). Stress and pain associated with dressing change in patients with chronic wounds. *Journal of Wound Care*, *21*(2), 53–61. https://doi.org/10.12968/jowc.2012.21.2.53

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WOUND BURDEN IN A RESOURCE CONSTRAINED SETTING
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WOUND BURDEN IN A RESOURCE CONSTRAINED SETTING

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ABSTRACT

Background: **Wounds pose a significant yet often underappreciated burden to an individual, the healthcare system and society. There is dearth of data on wound disease burden in many resources constrained countries which greatly impact management strategy.**

Objective: **To assess clinical presentation, wound characteristics and wound disease burden in Kenya.**

Design: **A multi-center cross-sectional study**

Setting: **Eight selected hospital each in one county per province in Kenya selected by convenient sampling and purposive sampling for respondents.**

Subjects/Participants: **Patient history and physical examination was recorded by pre-trained wound assessment health provider for those who presented with wounds and questionnaires for patients and healthcare professionals to assess cause, types, wound profile and age of patients.**

Results: **Trauma was the leading cause of wounds contributing to 55 % of wounds with post-surgical wound sepsis up to 10 %. The Mean age of presentation was 35 years. The most common site of wounds were the lower limbs. The majority of wounds presented with features of inflammation.**

Conclusion: **Trauma is a leading cause of wounds in our environment with the majority progressing to chronic wounds probably as a consequence of improper management. We recommend multi-sectorial interventions to reduce trauma injuries and to train wound care professionals.**

Key Words: **Wounds, epidemiology, Constrained, Chronic**

INTRODUCTION

A wound is defined as a breach in the epithelium or integrity of tissue causing loss of the protective lining, thus predisposing to infection. Wounds pose a significant, yet underappreciated burden to an individual, healthcare system and the society at large. Knowledge on wound prevalence, common wounds and patient characteristics is vital in setting up strategies for management in healthcare systems.

Traditionally, wounds have been classified as acute or chronic. Acute wounds being either traumatic or surgical and can further be classified as either tidy or untidy or as lacerations, puncture wounds, abrasions, bruises or contusions (1). Surgical wounds on the other hand are those resulting from surgical intervention in management of surgical conditions. They are further classified as clean, clean contaminated, contaminated and dirty (2, 3). Chronic wound defined as that has failed to proceed through an orderly and timely reparative process to produce anatomic and functional integrity within a period of three months or that has proceeded through the repair process without establishing a sustained, anatomic and functional result, a wound that has failed to reduce in size by 30 to 40% in a month is likely to be chronic (4, 5). The common types of chronic wounds traditionally include diabetic wounds, vascular ulcers, pressure ulcers as well as malignant wounds and sickle cell ulcers.

In the developed world, chronic wounds are mostly due to traditional causes and are mainly seen in

the elderly population. In the United States for example, 3% of the population over 65 years of age have chronic wounds and overall, 2% of the total population are estimated to be affected by chronic wounds (1). A 2016 report from Wales estimated a 6% prevalence of chronic wounds (1). There is no prevalence study in Kenya and still very few in the sub-Saharan Africa. Studies done in South Africa and Nigeria have shown wounds to constitute to up to 30-42% of hospital admissions every year (7, 8). Our preliminary literature search suggests no reliable estimates at present on the total prevalence and categories of in our setting. There is also a lack of knowledge on wound disease spectrum as well as management strategies.

Knowledge about prevalence and incidence of chronic wounds in relation to population characteristics is important for informing healthcare planning and resource allocation (9).

MATERIALS AND METHODS

Study Design: This was a descriptive cross-sectional multi-center study.

Study Setting: The research was conducted in a total of eight hospitals with at least one hospital in each of the former provinces of Kenya.

Sampling Procedure: In each hospital, purposive sampling was used and all patients with a wound, who gave consent were recruited.

Data Collection: Data on the number of patients with wounds visiting the hospital was taken over 24 hours to get the point prevalence. History and physical examination was conducted on each patient recruited and further information gathered from the health care providers. Information captured included wound aetiology, duration, anatomical location and clinical characteristics.: Excluded from the study were patients in critical conditions.

Data Analysis: Data was coded and entered into SPSS (IBM version 21). Means, modes and medians were analyzed using Student T test.

Ethical Consideration

Ethical approval was received from Kenyatta National Hospital/ University of Nairobi ethics and review board.

RESULTS

The majority of patients were in an inpatient setting (68%), while 32% were reviewed in outpatients. 55.8% of the patients were male, 44% female and 0.2% preferred not to disclose their gender.

The age range was between 0 to 90 years with a mean of 35.0 years. Most patients, (72.1%) were between 19 to 60 years, those below the age of 5 years (8.5%), 6 to 18 years (9.3%) and above 60 years (10%).

About one third of patients had co-morbidities, hypertension (12.2%), diabetes mellitus (10.4%), HIV (3.3%) and cancer (6.1%) as the most common co-morbidities. Trauma was a major contributor to wound disease, responsible for 54.8%, of which 16.2% was due to burns trauma and 9.8% due to post-surgical wound sepsis.

The most affected sites were the lower limbs (63%), (Figure 1, 2). Other frequently reported wound sites included the upper limbs (12.3%), abdomen (9.1%), face (7.7%), chest (4.9%) and other parts.

Wounds dimensions assessed in terms of length, width, and depth showed great variation, with majority of the wounds on the lower limbs having a length of 1-10 cm (70.9%) and a width of 1-10 cm (87.4%) (Figure 1). In terms of depth, the most common category was 1-5 cm (59.6%), followed by depth of less than 1 cm (35.0%).

In our assessment of wounds, we also found 62.5% were clean, as per the CDC classification.

A sizable portion of 22.7% were categorized as dirty, indicating presence of debris or other contaminants, while a smaller percentage (7.1%) were found to be smelly, suggesting potential presence of infection.

Our analysis of tissue types found in the wound bed as well as type of exudate in the wounds, revealed results summarized in (Table 1)

Table 1: Tissue types.

Tissue Type	Proportion (%)
Granulation (red color)	42.1
Slough (Yellow-Green)	24.6
Epithelializing (pink color)	15.2
Necrotic (black)	9.6
Hyper granulation	5.3

Table 1-1: Common tissue types proportions, the most common tissue type represented was granulation tissue, 42% and the least was hype granulation, 5.3%

Table 2: Exudate types

Exudate Type	Proportion (%)
Non-exudative (Dry)	59.7
Purulent (green, brown or yellow)	38.9
Hemoserous (Red or straw color)	31.3
Serous (Straw colored)	23.1
Serosanguinous	6.7

Table 2: Showing exudate types, most wounds were non-exudating (59.7%), the rest had variable nature of exudate, most of which were purulent, 38.9%

ASSESSMENT FOR SIGNS OF INFLAMMATION

Analysis of wounds for signs of inflammation showed that 57% of all wounds had features of inflammation, (Table 2); tenderness being the most common feature, The remaining 43% of wounds did not show any sign of inflammation. A considerable number, 14.4% of wounds were identified as infected, indicated by the presence of microbial colonization, additionally, a subset of wounds was described as non-healing wounds (5.3%).

Table 3: Signs of Inflammation

Sign of inflammation	Proportion (%)
Tenderness	35.2
Edema	26.8
Purulent exudate	25.7
Foul smell	25.4
Erythema	18.3
Biofilm	14.8
Local warmth	12.0
Friable granulation tissue	10.2

Table 3: Distribution of features suggestive of inflammation, the common reported sign of inflammation was tenderness, 35.2%, Edema was seen in 26.8%, and the least reported sign of inflammation was friability of granulation tissue.

Assessment of wound edges and the peri-wound skin also revealed findings as seen in Table 3

Table 4: Wound edges and Peri Wound Skin:

WOUND EDGES	PROPORTION (%)
Contracted	40.4
Sloping	31.3
Everted	11.0
Punched out	7.5
Undermined	6.2
Rolled	3.7
PERI-WOUND CHARACTERISTICS	
Intact – healthy	47.3
Edematous	16.3
Erythematous	11.4
Dry/Scaly	11.0
Fragile	5.3
Macerated	5.3
Excoriated	2.9

DISCUSSION

Estimates from various sources demonstrate that the magnitude of wounds as a healthcare problem has considerably increased. The consequence of chronic wounds to the healthcare system due to increasing prevalence and cost implication is significant. In developed countries, common types of wounds include pressure ulcers, diabetic foot ulcers, venous leg ulcers, and ischemic wounds which are the traditional cause of chronic wounds. In the United States for example, it is estimated that 6.5 million people are managed with chronic wounds (10). In the United Kingdom it is estimated that about 700,000 patients present with chronic leg ulcers (11). The spectrum of wounds in many developing countries remains unknown. In Kenya, Nang'ole *et al* demonstrated pressure ulcer prevalence in patients admitted at KNH to be about 11% (12).

In this cross-sectional study, trauma stands the most common cause of wounds at 54.8%, a similar trend as that observed by Toppino *et al* (13) in Cote d'Ivoire, with mechanical trauma contributing 85.3% with burns 2.9%. The contribution of the traditional causes of chronic wounds to the wound burden in our setting is considerably low, with majority of chronic wounds seen in our setting being a consequence of progression of acute traumatic wounds to chronic wounds, likely as a sequel of poor intervention leading to wound infection.

This fact underscores the importance of appropriate management of acute wounds to avert the progression to chronic wounds, it further illuminates the deficiencies in wound care experience, practices and wound care materials experienced in most resource constrained settings.

We reviewed a large number of acute wounds, 62.5% of which fit the CDC classification as clean wounds. This finding would suggest easy progression of most of these wounds to healing, which is not necessarily the trend observed. A number of these clean wounds when poorly managed tend to run a chronic course.

The main stay of management of acute wounds is appropriate surgical toilet. When delayed or done inappropriately. persistence of necrotic tissue, could account for the high infection and inflammation rates encountered in our settings. Compounded with poor and limited options of dressing materials and wound care practices, this could explain why more than half; (57%) of the wounds exhibit features of inflammation, with purulent exudate . All these are pointers of local wound infection. Chronic inflammation plays a pivotal role in transition of acute wounds to chronic wounds, a common finding we encountered, and which underscores the benefits of

appropriate care of acute wounds to curtail transition to chronicity. One third of wounds reviewed had wound edge characteristics, unfavorable for healing and suggestive of infection.

In the same vein, our assessment of peri wound skin revealed some unfavorable changes including peri-wound edema, scaling, excoriation, maceration, erythema and fragility in more than half of the wounds.

Age stratification in most studies reported rather similar mean / median ages of patients with wounds (70–80 years), except for one study from Egypt on prevalence of diabetic foot ulcers that reported a mean age of 50 years (14). Our findings, on the contrary reveal that 72.1% of patients with wounds were younger, between 19 and 60 years of age with the mean age of 35years, signifying a great age difference with the United states where Chronic wounds are the common type and mostly seen in elderly population with 3% of the population above 65 years having open wounds(3)the continued threat of diabetes and obesity worldwide, and the persistent problem of infection, it is expected that chronic wounds will continue to be a substantial clinical, social, and economic challenge. In 2020, the coronavirus disease (COVID.

CONCLUSION

With most wounds being attributed to trauma the significant incidence of chronic wounds in our setting, with relatively low contribution from traditional causes of chronic wounds (i.e. Diabetic foot ulcers, Vascular and pressure ulcers), suggests mostly progression of acute to chronic wounds in most resource constrained settings. This is a different spectrum from that observed in the developed world. We recommend specialized training in wound care to build competent wound care knowledge base and multi-sectorial intervention to reduce trauma related causes including burns. With common site of wounds being the lower limbs, this finding highlights the importance of targeted wound care and prevention strategies, particularly for lower limbs, to address specific challenges associated with wound management. We recommend further research to assess hindrances to early surgical wound coverage in resource constrained settings.

REFERENCES

1. Dirk T. Ubbink,1,Fleur E. Brölmann Evidence-Based Care of Acute Wounds: A Perspective Adv Wound Care (New Rochelle). 2015 May 1; 4(5): 286–294
2. Barbul A, *et al.* Wound Healing. In: Brunicardi FC, Andersen DK, Billiar TR, et al., editors. Schwartz's Principles of Surgery. Eighth. Columbus: The McGraw-Hill Companies, Inc; 2005. pp. 165–182
3. Gillespie BM, Chaboyer W, Kang E, Hewitt J, Nieuwenhoven P, Morley N. Postsurgery wound assessment and management practices: a chart audit. *J. ClinNurs* 2014. [Epub ahead of print]; DOI:
4. Werdin F, Tennenhaus M, Schaller HE, Rennekampff HO. Evidence-based management strategies for treatment of chronic wounds. *Eplasty*. 2009;9, e19.
5. Wound Healing Society. Guidelines for the best care of chronic wounds. *Wound Repair Regen*. 2006; **14:**647–710.
6. Sen CK, Gordillo GM, Roy S, Kirsner R, Lambert L, Hunt TK, et al. Human skin wounds: a major and snowballing threat to public health and the economy. *Wound Repair Regen*. 2009
7. Gottrup F. A specialized wound-healing center concept: importance of a multidisciplinary department structure and surgical treatment facilities in the treatment of chronic wounds. *Am J Surg*. 2004;**187(5):**S38–S43. doi: 10.1016/S0002-9610(03)00303-9.
8. Wicke C, Bachinger A, Coerper S, Beckert S, Witte MB, Königsrainer A. Aging influences wound healing in patients with chronic lower extremity wounds treated in a specialized Wound Care Center. *Wound Repair Regen*. 2009
9. Järbrink, K, Gao N, Henrik S, Artur S. Prevalence and incidence of chronic wounds and related complications: a protocol for a systematic review. *Systematic reviews* 2016;**5;** 152-6
10. Y. Jiang, S. Huang, X. Fu, H. Liu, X. Ran, S. Lu, et al.Epidemiology of chronic cutaneous wounds in China. *Wound Repair Regen*, **19 (2)** (2011), pp. 181-188
11. R.F. Oien, A. Hakansson, I. Ovhed, B.U. HansenWound management for 287 patients with chronic leg ulcers demands 12 full time nurses. Leg ulcer epidemiology and care in a well-defined population in southern Sweden. *Scand J Prim Health Care,* **18 (4)** (2000), pp. 220-225
12. Nangole F. W., Khainga S. O., Kiboi J. Pressure ulcers presentation and management at KNH *EAMJ* 2009; **14;** 69- 76.
13. Skin wounds in a rural setting of Coˆte d'Ivoire: Population-based assessment of the burden and clinical epidemiology Simone ToppinoID1*, Raymond T.A. S. N'Krumah2,3,Bognan Valentin Kone2,Didier Yao Koffi2,4,5,Ismaë lDognimin Coulibaly2,3,Frank Tobian1,Gerd Pluschke6,7, Marija Stojkovic1,Bassirou Bonfoh4,Thomas Junghanss
14. Wound Healing Society. Guidelines for the best care of chronic wounds. *Wound Repair Regen*. 2006; **14:**647–710.

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TREATMENT OUTCOMES OF EXTRALESIONAL AND INTRALESIONAL OF KELOID EXCISION FOLLOWED BY POSTEXCISION SUPERFICIAL RADIOTHERAPY: A COMPARATIVE STUDY
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TREATMENT OUTCOMES OF EXTRALESIONAL AND INTRALESIONAL OF KELOID EXCISION FOLLOWED BY POSTEXCISION SUPERFICIAL RADIOTHERAPY: A COMPARATIVE STUDY

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ABSTRACT

***Background*: Keloids are dermato-fibroproliferative skin disorders that extend beyond the original wound and are often characterized by benign overgrowth in response to skin injury. Surgical management of keloids has been performed by either intralesional or extralesional excision. There has been no consensus regarding the optimal treatment for reducing recurrence and complications.**

***Objective*: To determine the outcome of keloids managed with intralesional or extralesional excision followed by post-excision superficial radiotherapy.**

Design: This was a comparative study

Setting: Department of Surgery, Kenyatta National Hospital, University of Nairobi, Kenya.

Subjects/Participants: Patients with keloids managed in the Department of Surgery, Kenyatta National Hospital, from April 2018 to April 2020.

***Results:* A total of 90 patients with 104 keloids were managed during a two-year prospective study, with 56 keloids operated on in the intralesional group (IL) and 58 keloids operated on in the extra-lesional (EL) group. The post-surgery pruritus score after one year of follow-up was 1.98 in the IL group and 1.86 in the EL group. The recurrence rate was 21% in the IL group and 18.9% in the EL group. Overall, patient satisfaction was high.**

Conclusion: There was no difference in the outcome of keloid excision between the two treatment modalities. We concluded that both modalities can be utilized in managing keloids. Further research should be done to compare both treatment methods with other adjunct therapies, such as steroids and cytotoxic agents.

Key words: Keloids excision intralesional extralesional recurrence

INTRODUCTION

Keloids are dermato-fibroproliferative skin disorders characterized by excessive deposition of collagen in the dermal layer of the skin, most commonly found on the head, neck, upper back and chest areas of the body (1-4). They are more common in dark skinned individuals although recent studies have also shown them to occur in albinos with the same prevalence as non-albino populations (2, 5-7).

Keloid management has been performed by a multimodal approach with both surgical and nonsurgical treatment options. All options have, however, been associated with high recurrence rates often reaching 50 percent (1-5). Most studies performed on the surgical approaches to keloid management as a determinant of recurrence have either been retrospective or laboratory-based with few prospective studies (9-11). Despite the fact that the main symptoms for keloid presentation are pain,

pruritus and disfigurement, most of these studies have only focused on recurrence in terms of keloid regrowth with no emphasis on pain and pruritus, which are also of concern to patients.

Keloids can be surgically excised in an extralesional (EL) or intralesional (IL) manner (Figure 1, 2). However, EL excisions can cause trauma to the normal skin and may lead to an increased likelihood of recurrence and stimulation of new keloid formation (12). In practice, however, situations may be encountered where either surgical option may be required, such as treating keloids in an esthetically demanding location of the face, which may require extralesional excision for better cosmetic outcome. On the other hand, treating extensive keloids may be impractical for closing the wound primarily if extralesional excision is performed; thus, intralesional excision may enable one to use part of the remaining keloidal skin to close the defect. Whether either of these factors could influence recurrence is not known.

We undertook this study to determine the treatment outcomes of patients managed with both IL and EL modalities in our unit at Kenyatta National Hospital, a tertiary teaching and referral facility in Kenya.

MATERIALS AND METHODS

Study design: This study was a prospective longitudinal comparative study

Study Setting: Department of Surgery, Kenyatta National Hospital, from April 2018 to April 2020.

Study Subjects/Participants: Patients with keloids amenable to surgery who met the inclusion criteria.

Sampling Procedure: Patients were systematically randomly sampled into two groups: group 1 patients were managed by intralesional surgical excision (IL group) with excision margins of at least three millimeters (mm) from the edges of the keloid, and group 2 were managed by extralesional excision with an excision margin of at least 3 mm in the surrounding normal tissue (EL group) (figures 1-5).

SELECTION CRITERIA

Inclusion criteria: Patients of more than 18 years of age with keloids amenable to surgical excision and primary closure of the wounds.

Exclusion Criteria: Patients less than 18 years of age, those who had infected keloids or those who had undergone a prior surgery with recurrence.

Surgery was performed by the same surgical team for all patients. The local anesthetic used was 2% lidocaine with a 1:1000 adrenaline solution. Electrical cautery was utilized to control bleeding, and wounds were closed in two layers with 3/0 polyglycolic sutures for dermal closing and 3/0 nylon sutures for transcutaneous stitching for all patients. The prophylactic antibiotic given was cefuroxime at the start of the surgery. Postoperative pain management for all patients involved a combination of acetaminophen and diclofenac for one week. Prior to surgical excision, pain and pruritus scores were determined using a visual analog scoring system. This was repeated during periodical follow-up, assessed at each appointment held three, six and twelve months postsurgery. After surgical excision, all patients had one session of 15 gray (Gy) superficial radiotherapy within 24 hours of surgery, and the excised keloid tissue was retrieved for histology to confirm whether the margins were involved. Independent variables in the study were patient age, anatomical location of the keloids, and surface area of the keloids. Dependent variables were postoperative complications, postsurgical pain, pruritus and keloid recurrence after one year of surgery. Recurrence was defined as keloid regrowth beyond the margins of the scar or pain and/or pruritus that exceeded the pre-surgical status that required further medical intervention in the course of follow-up. Postoperative follow-up occurred one week, one month, three months, six months and one year postsurgery. All data captured were analyzed using SPSS computer software version 2010 and compared using Student's t-test and the Chi-square test for variations.

RESULTS

A total of 96 patients with 112 keloids were enrolled in the study. Six patients with eight keloids did not complete their participation in the study, leaving a total of 90 patients with 104 keloids giving an average of 1.16 keloids per patient Of the 90 patients, 45 with 56 keloids were in the IL group, and the remaining 45 had 58 keloids and were designated to the EL group. The mean age for the IL and EL groups was 28.6 and 27.5 years, respectively (p-value 0.853). The male: female ratios were 1:2 for the IL group and 1:2.5 for the EL group. (The difference was not statistically significant; p-value 0.723). The anatomical locations of the keloids were the ears (42.8% IL, 39.6% EL), cheek (16% IL, 15.5% EL), abdomen (10.7% IL, 13.7% EL) and chest (12.5% IL 13.7% EL) Pearson correlation to determine the relationship between anatomic location and Intralesional Vs Extralesional showed a strong positive relation of, r = 0.9793.

The differences in the proportions of keloid locations between groups were not statistically significant. The surface areas of the keloids excised in the two groups were 8.95 cm^2 (IL) and 9.35 cm^2 (EL), and the

difference was not statistically significant (p-value 0.909). The preoperative pain score for the IL group was 2.47 compared to 2.14 for the EL group (p-value 0.925), while the preoperative pruritus score for the IL group was 4.25 compared to 4.75 for the EL group (p-value 0.887). Pearson correlation to determine the relationship between the above parameters in both groups showed a strong positive relations of r = 0.9998 Complications encountered in the IL group were wound dehiscence for 2 keloids.

Figure 1: Extra-lesional keloid excision, with incision line marking in approximately 3 mm of normal, non-keloid-tissue.

Figure 2: Intra-lesional keloid excision, with an incision line marking in at least 3mm of keloid-tissue.

While IL excisions of the keloid leaves a rim of keloid tissue behind that may sacrifice esthetic quality, EL excisions results in complete excision of the keloid tissues, leaving a wound that is fully devoid of keloid and thereby produces better esthetic results. (Figure 3, 4).

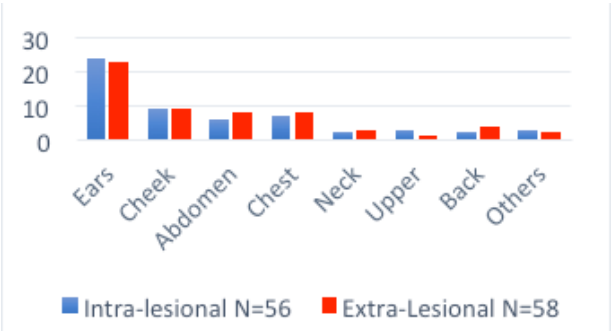

Figure 3: Anatomical locations of the keloids. There was no significant difference between the two groups for any anatomical site.

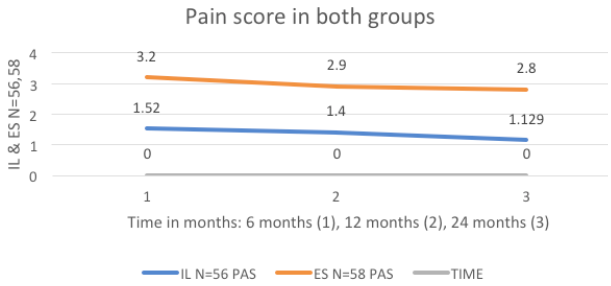

Figure 4: Summary of the pain score. The extra-lesional group had a higher pain score 3, 6 and 12 months post-surgery than the intra-lesional group, but the difference in the mean pain score was not statistically significant ($P > 0.05$).

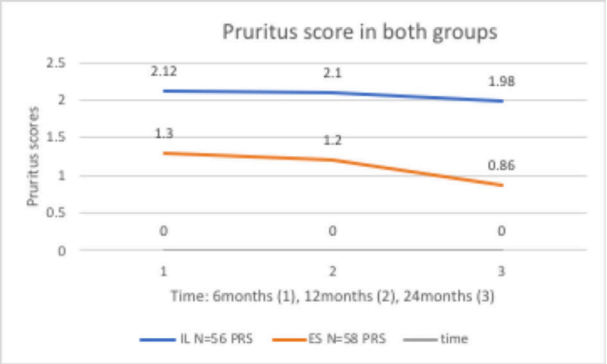

Figure 5: Pruritus score in both groups

These keloids were managed conservatively and had healed by the one-month follow-up. In the EL group, one keloid had wound dehiscence, and two had postsurgical wound sepsis. All healed fully by the second month of follow-up. There were no statistically significant differences in the complication rates of the two groups. Postoperative pain scores after 3, 6 and 12 months of follow-up were 1.52, 1.40 and 1.129 for the IL-group and 3.20, 2.9 and 2.8 for the EL-group, respectively. The postoperative pruritus scores after 3, 6 and 12 months of follow-up were 2.12, 2.10 and 1.98 for the IL-group and 1.30, 1, 20 and 0.86 for the EL-group, respectively. There was no significant difference between the IL and EL groups in terms of the pain and pruritus scores during the postoperative follow-up. Keloid recurrence after 12 months of follow-up was 12 keloids IL and 11 keloids EL group respectively. There was no statistically significant difference in the recurrence rate between the two groups.

DISCUSSION

Surgical management is one of the mainstays in the treatment of keloids. This modality of treatment has been associated with high recurrence rates,

especially when carried out as a monotherapy (1). It is recommended that surgery should be performed in combination with other modalities to reduce the recurrence rate (1, 4, 5). The excision can either be intralesional or extralesional. Although both modalities have been in practice for many years, controversy remains regarding whether they influence keloid recurrence and complications. The reasons why this has not been resolved could include the fact that keloid pathophysiology is still poorly understood; for example, it is not clear whether keloids are inflammatory or proliferative disorders (6). Another reason is the lack of well-executed level 1 or 2 studies comparing the two modalities of treatment. The majority of studies cited have either been case series or retrospective studies that have inherent weaknesses in addressing the merits and demerits of the various surgical options (9-11). Our study provides level 2 evidence in the management of keloids with either modality of treatment.

Proponents of intralesional excisions argue that keloid disease is stimulated by trauma to normal skin. Therefore, excising keloids out of their margins may stimulate normal skin into keloid formation, resulting in higher recurrence rates (12). The argument is supported by the fact that patients with keloids tend to form them anywhere on the body once stimulated by any form of trauma. They further argue that the histologically active part of the keloid is the central core, and removing it leaves a relatively inactive peripheral zone, reducing the chances of further keloid overgrowth (12). However, available evidence suggests otherwise. Syed F *et al* demonstrated that fibroblasts from the growing margins of keloids produced more collagen than fibroblasts from intralesional or extralesional sites (13). Luo *et al* in an *in vitro* study found that fibroblasts from different parts of keloids demonstrated similar doubling times and did not show central fibroblasts to be more active than those from other sites (14).

Extralesional excision of keloids is based on the assumption that keloids should be treated as a form of 'neoplasm' and should thus be managed with wide local excision based on the oncological principles of neoplasm management. The assumption in this school of thought is that keloid-forming tissue have a proliferating disease core, as suggested by Chong y *et al. that* transforms into the keloid and must thus be fully removed (15). This raises the fundamental question of whether keloid formation is an excessive reaction to body injury or a case of abnormal fibroblast proliferation. *In vitro* studies have demonstrated that normal fibroblasts may be stimulated into keloid formation by cytokines from keloid fibroblasts, putting doubt to the proliferating disease core concept (16). Clinical experience has also shown that keloid-forming patients have a tendency to form keloids virtually anywhere on the body after any form of trauma, suggesting that keloid disease is not a local but a regional or `systemic disease'.

Our study compared two subset populations with keloids with the same patient characteristics. The mean age, anatomical location, keloid surface area and clinical factors, such as pruritus and pain, were virtually similar in the two groups. All patients were operated on with the same surgical team using similar sutures. The wounds were all dressed with the same dressing materials, and postoperative pain management was similar in both groups. Postsurgery, all patients were subjected to the same dose of radiotherapy within 24 hours of surgery. Postoperative follow-up for the patients was also similar. The complication rates in the two groups were virtually the same. Although the pruritus score was higher in the IL group than in the EL group, the difference was not statistically significant. The pain score, though higher in the EL group, was also not significantly different from that of the IL group. The recurrence rate was slightly higher in the IL group than in the EL group. The recurrence in the IL group at 3, 6 and 12 months was 9, 11 and 12 respectively. For the EL group was 8, 10 and 11 at 3, 6 and 12 months respectively. However, the difference was not statistically significant.

The above findings suggest that the outcome of keloid management between the two modalities of management after one year of follow-up with postexcision superficial radiotherapy was virtually the same. Our finding differs from some previous studies that concluded that incomplete excision of keloid lesions is associated with higher recurrence rates than complete keloid excisions (15,17). Tan *et al*. found that keloids in patients who underwent incomplete excision had higher recurrence rates than those with completely excised margins (17). Their study was based on archived keloid specimens with clinical data captured retrospectively from records. The role of postsurgical adjuvant therapies and whether they could have influenced the outcomes were not well described. Further differences from our study are the fact that data on other symptoms, such as pain and pruritus, were not captured, making it difficult for one to decide whether these could have been affected by the type of excision. Another study by Chong Y *et al.* on auricular keloids demonstrated that patients with clear keloid margins had lower recurrence rates than those whose keloid specimens had involved margins (16). Their study was based on histological examinations of keloid specimens to determine whether margins were involved and correlated with keloid recurrence. The postexcision adjunct management of the patients was not disclosed in this study either. As in the Tan *et al* study, little was mentioned about other symptoms, such as pain and

pruritus, which are key complaints by the majority of patients in our population and should be considered part of the recurrence spectrum.

However, some studies have demonstrated good outcomes with intralesional excision of keloids. Donkor P, in a series of patients who had been operated on with intralesional excision followed by postexcision steroid injection, reported no keloid recurrence after two years of follow-up (18). Another study by Engrav LH *et al.* on the management of hypertrophic scars/keloids demonstrated better outcomes with intralesional excisions than with extralesional excision (19).

CONCLUSION

The outcomes of extralesional and intralesional keloid excision with postexcision superficial radiotherapy are similar. Both modalities of treatment have comparable complications and recurrence rates. Each modality of treatment has a role in the management of patients with keloids. Intralesional excision may be indicated for patients with extensive keloids for whom primary closure may be a problem if the whole keloid is excised. Extralesional excision, on the other hand, may be indicated in cases where complete excision of the keloid is possible with primary wound closure. It should further be considered in esthetically sensitive areas of the body such as the head and neck. We therefore advocate for both management strategies based on the extent and location of the keloid and the surgeon's preference.

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REFERENCES

1. Chuma. J.C.,Patrick., *et al*, Keloids; Pathogenesis, clinical features and management. *Articles in Plastic Surgery. August 2009; **16**; 112-118*
2 Brissett AE, Sherris DA. Scar contractures, hypertrophic. Scars and keloids., *Facial Plast Surg 2001; **17**: 26301; 001; 2-7*
3. Ramakrishnan KM, Thomas KP, Sundararajan CR. Study of 1,000 patients with keloids in South India. *Plast Reconstr Surg 1974; **53**: 27674; 97-103*
4. Hoang D, Reznik R, Orgel M, *et al,* Surgical Excision and Adjuvant Brachytherapy vs External Beam Radiation for the Effective Treatment of Keloids: 10-Year Institutional Retrospective Analysis. *Aesthet Surg J*. 2017; 37(2):212-225. doi: 10.1093/asj/sjw124. Epub 2016 Aug 23. PMID: 27553611.
5. Siotos C, Uzosike AC, Hong H, *et al.* Keloid Excision and Adjuvant Treatments: A Network Meta-analysis. *Ann Plast Surg*. 2019; 83(2):154-162. doi: 10.1097/SAP.0000000000001951. PMID: 31232819.
6. Ferdinand W. Nang'ole, George W. Agak Keloid pathophysiology: fibroblast or inflammatory disorders. Journal of plastic reconstructive surgery .2019.09.0048-54
7. Cooke, G.L., *et al.*, Incidence of hypertrophic scars among African Americans linked to vitamin D-3 metabolism*? J Natl Med Assoc,* 2005. **97**(7): p. 1004-9.
8. Kiprono, S.K., *et al.*, Epidemiology of keloids in normally pigmented Africans and African people with albinism: population-based cross-sectional survey. *Br J Dermatol,* 2015. **173**(3): p. 852-4.
9. Minkowitz F. Regression of massive keloid following partial excision and post-operative intra-lesional administration of triamcinolone. *Br J Plast Surg* 1967; **20**(4): 432–435.
10. Engrav LH, Gottlieb JR, Millard Sp *et al*. A comparison of intra-marginal and extra-marginal excision of hypertrophic burn scars. *Plast. Reconstr. Surg*. 1988**; 81**: 40–45.
11. Shin JU, Park J,Lee Jh *et al.* Extra- marginal excision is preferable for hypertrophic scars. *Int J Dermatol* 2014; **53:** 1138–1144.
12. Ioannis Goutos. Intra-lesional excision as a surgical strategy to manage keloid scars: what's the evidence? *Scars Burn Heal.* 2019; 5: 16-24,
13. Syed F, Ahmadi E, Iqbal SA *et al.* Fibroblasts form the growing margin of keloid scars produce higher levels of collagen I and III compared with intra-lesional and extra-lesional sites: clinical implications for lesional site-directed therapy. *Br. J. Dermatol* 2011; **162**: 83–96.
14. Luo, S, Benathan, M, Raffoul, W et al Abnormal balance between proliferation and apoptotic cell death in fibroblasts derived from keloid lesions. *Plast. Reconstr. Surg*. 2001; **107:** 87–96.
15. Chong Y, Kim CW, Kim YS *et al.* Complete excision of proliferating core in auricular keloids significantly reduces local recurrence: A prospective study. *J Dermatol* 2018**; 45**: 139–144.
16. Kevin J. Ashcroft, Farhatullah Syed and Ardeshir Bayat Site-Specific Keloid Fibroblasts Alter the Behaviour of Normal Skin and Normal Scar Fibroblasts through Paracrine Signalling PLoS One2013 Dec 9;8(12):e75600. doi: 10.1371/journal.pone.0075600. eCollection 2013
17. Tan KT, Shah N, Pritchard SA, McGrouther DA, Bayat A. The influence of surgical excision margins on keloid prognosis. *Ann Plast Surg* 2010; **64**: 55–58.
18. Donkor, P., Head and neck keloid: treatment by core excision and delayed intralesional injection of steroid. *J Oral Maxillofac Surg,* 2007. **65**(7): p. 1292-6.
19. Engrav, L.H., *et al.*, A comparison of intramarginal and extramarginal excision of hypertrophic burn scars. *Plast Reconstr Surg,* 1988. **81**(1): p. 40-5

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COMPLEX ABDOMINAL WALL RECONSTRUCTION USING MESH AND FREE FLAP: A RARE CASE REPORT & LITERATURE REVIEW
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COMPLEX ABDOMINAL WALL RECONSTRUCTION USING MESH AND FREE FLAP: A RARE CASE REPORT & LITERATURE REVIEW

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ABSTRACT

Introduction: **Managing complex defects of the abdominal wall has been a challenge for general and reconstructive surgeons since the year 2000. Fewer studies have been carried out on anterior abdominal wall reconstruction following excision of peripheral primitive neuroectodermal tumor, and there is currently a dearth of information in a systematic review.**

Materials and methods: **A 26-year-old female of African descent was received in one the largest faith based hospital on Kenya with a four-year history of anterior abdominal wall swelling. She underwent wide local excision and reconstruction of the defect using a mesh and ALT fasciocutaneous free flap**

Results: **The patient responded positively to the surgical intervention and tolerated well the surgical procedures. 100% of the flap survived and had the post excision margins were all free of tumor.**

Conclusion: **Abdominal wall reconstruction is a complex surgical procedure aimed at restoring the structural integrity and functional capacity of the abdominal wall following trauma, surgery, or disease. The use of free ALT fasciocutaneous flap as well as mesh in abdominal wall reconstruction provides durable reinforcement and reducing the risk of hernia recurrence.**

Keywords: **Abdominal wall, primitive neuroectodermal tumor, histology, free flap**

INTRODUCTION

Since the turn of the century, managing complicated defects of the abdominal wall has presented a challenge to both general and reconstructive surgeons. Plastic surgeons' expertise has been utilized in the development of techniques for manipulating and mobilizing muscle and myocutaneous flaps due to the complexity of abdominal wall defects, which was previously the domain of general surgeons(1) . Reconstructive surgeons aim to provide stable and long-lasting wound coverage while restoring the structural and functional continuity of the musculofascial system in the management of complex abdominal wall defects, regardless of their training. The authors present a case of a complex anterior abdominal wall reconstruction following excision of peripheral primitive neuroectodermal tumor in a young otherwise healthy African woman of Congolese descent, without obvious risk factors. This is one of a series of infrequent articles highlighting conditions that may be more widespread than many doctors realize or that may go unnoticed at first. The series advisers are Dr. Adegu William Jacob, Department of Plastics Reconstructive & aesthetic surgery in the University of Nairobi; Prof. Stanley Ominde Khainga, Chairman Kenya Medical practitioners & Dentists Council (KMPDC), Dr. Benjamin Wasiche Wabwire, Chairman department of Plastic Surgery, Kenyatta

National Hospital (K.N.H) and Prof. Ferdinand Wanjala Nang'ole (PhD), Chairman Department of Plastics Reconstructive & Aesthetic Surgery, University of Nairobi (UoN). To suggest a topic for this series, please email the corresponding author at jacobadegu@yahoo.com

MATERIALS AND METHODS

A 26-year-old female of African descent was received in one the largest faith based hospital on Kenya with a four-year history of anterior abdominal wall swelling. She reported that the mas had been slowly increasing in size over the years, but had lately become ulcerated and shortly started bleeding as well as exhibiting purulent discharge. She intimated that the bleeding had started 6 months earlier, and it was initially mild and could stop with application of pressure, but had recently increased and was associated with dizziness. There was no associated fevers or pain. She also affirmed that the mass had initially been debulked 2 years ago and she was under treatment for non-Hodgkin's lymphoma. Other history was unremarkable.

On general examination, she was cachexic, wasted and malnourished. She was tachypnea, with a heart rate of 139 beats per minute, she had a fever of 38.9 degrees Celsius, respiratory rate of 19 and a blood pressure of 96/58. She had mild parlor, grade 3 finger clubbing as well as generalized lymphadenopathy (this included both groin axillary lymph nodes). On physical examination, there was a large fun gating mass located on the anterior lower abdominal wall, measuring about 12cm by 15 cms. The mass was ulcerative and bleeding on light touch. It also had a malodor. There was another chronic wound on the left lateral abdominal wall, that was due to previous debunking and radiotherapy. This had been excised 2 years prior to her presentation at the facility. The wound bed had necrotic tissues and the edges were contracting.

The patient was taken to theatre for wide local excision with a margin of 4cm and wound cover.

The tumor was excised en-mass by the general surgery team. The tumor had infiltrated on the rectus sheath, and thus had to be removed. After removal of the tumor, Polypropylene synthetic mesh measuring 15 cm by 20 cm was used to reinforce the rectus via sublay technique. ALT fasciocutaneous flap was designed along an axis between the ASIS and lateral border of the patella. The flap was centered at the junction between the upper third and lower two thirds, and harvested by the plastic surgery team from the left thigh. The size of the flap was 15cm by 20 cm. This was raised as a free flap with the pedicle being the descending branch of the lateral femoral circumflex artery with its commitantes. The recipient vessel was the inferior epigastric vessels. The flap was held in situ in layers using vicryl 2.o and skin sutured using staples. No pressure was allowed on the recipient site. Donor site was closed primarily.

Both wounds were dressed using bactigrass and opsite dressings. The change of dressing was done on day 3 post op. The WLE specimen was availed for histological analysis.

RESULTS

She tolerated well the procedure. The flap was monitored 2hrly for the first 24 hours for temperature, color and turgidity. Wound dressing change was done every 3 days. She was also put on empiric antibiotic therapy.

The flap take was 100%. The patient remained stable throughout the procedure as well as post operatively. This patient was being handled using a multidisciplinary approach. Both general surgeons and plastic surgeons were all onboard. The histology biopsy which was taken after the WLE demonstrated primitive neuroectodermal tumor with negative margins.

Figure 1 showing the large fungating anterior abdominal wall mass, with a previous chronic wound that was due to debulking 2 years ago.

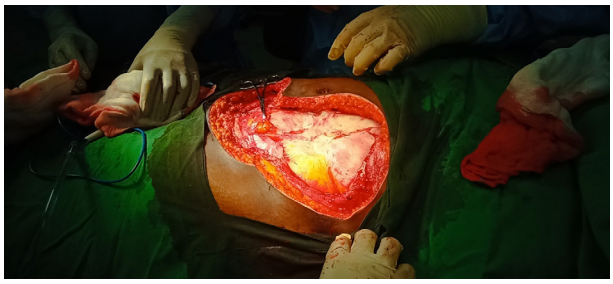

Figure 2 showing the defect created after WLE of the tumor with 4 cms margin. The peritoneum has been breached at the midline.

Figure 3 showing laying of the ALT fasciocutaneous flap on the mesh with the aim of closing the anterior abdominal wall defect.

Figure 4: Picture showing the final closed defect and primary closure of the donor site. Drain left in situ.

DISCUSSION

The principles of abdominal wall reconstruction include restoration of normal anatomy, tension free repair, primary closure of fascial defects, mesh reinforcement, biological consideration as well as a multidisciplinary approach.

While reconstructing the abdominal wall, a carefull analysis of the defect needs to be done. This will have a bearing on which options to use. Careful preoperative planning, accurate flap design, and precise surgical technique are necessary for the successful reconstruction of abdominal wall defects using the ALT free flap. The vascular pedicle for the ALT flap is the perforators of the descending branch of the lateral circumflex femoral artery (LCFA), which can be accurately identified with preoperative imaging studies like computed tomography angiography (CTA) or Doppler ultrasonography(12,13)it is necessary to use reconstructive surgery techniques. The authors present an original case of reconstruction of the abdominal wall, using an anterolateral thigh flap (ALT. Careful dissection and preservation of the pedicle and perforators during the surgical procedure are necessary to guarantee flap viability and reduce the possibility of vascular compromise. Depending on the needs of the reconstruction, the ALT flap can be harvested as a musculocutaneous, adipocutaneous, or fasciocutaneous flap. Close observation of flap perfusion, wound healing, and donor site morbidity is required postoperatively in order to detect and promptly manage any possible complications. The ALT free flap provides a dependable and adaptable option for the reconstruction of abdominal wall defects, improving functional outcomes and improving patients' quality of life with careful patient selection and precise surgical technique(10,14).

CONCLUSION

The etiology of pPNETs remains poorly understood, but genetic alterations involving chromosomal translocations or gene fusions have been implicated in their pathogenesis.

Abdominal wall reconstruction (AWR) is a complex surgical procedure aimed at restoring the structural integrity and functional capacity of the abdominal wall following trauma, surgery, or disease.

The use of synthetic meshes in AWR has revolutionized the management of abdominal wall defects, providing durable reinforcement and reducing the risk of hernia recurrence. Synthetic meshes are typically composed of non-biological materials such as polypropylene, polyester, or polytetrafluoroethylene (PTFE), which offer high tensile strength, flexibility, and biocompatibility. These meshes can be placed in various configurations, including on lay, inlay, or underlay techniques, depending on the location and characteristics of the defect. Synthetic meshes promote tissue ingrowth and remodeling, ultimately incorporating into the abdominal wall and providing long-term support. However, the use of synthetic meshes may be associated with complications such as infection, seroma formation, mesh migration, or adhesion formation. Surgeons must carefully weigh the benefits and risks of mesh placement in each patient and consider alternative reconstruction techniques in cases of contamination, infection, or complex abdominal wall anatomy. Ongoing research efforts aim to refine mesh materials, design, and surgical techniques to further improve outcomes and reduce complications in AWR.

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Ethical approval: The current study being a case report, did not require ethical approval

REFERENCES

1. Abdominal Wall Reconstruction: Background, Indications, Relevant Anatomy [Internet]. [cited 2024 Apr 3]. Available from: https://emedicine.medscape.com/article/1297226-overview#a8
2. Hellinger A, Roth I, Biber FC, Frenken M, Witzleb S, Lammers BJ. [Surgical anatomy of the abdominal wall]. Chirurg [Internet]. 2016 Sep 1 [cited 2024 Apr 3];87(9):724–30. Available from: https://pubmed.ncbi.nlm.nih.gov/27495165/
3. Matsukubo M, Muto M, Yamada K, Nishida N, Kedoin C, Matsui M, et al. Abdominal wall defect repair with component separation technique for giant omphalocele with previous relaxing incisions on the abdominal skin. Surg case reports [Internet]. 2023 Jun 7 [cited 2024 Apr 3];9(1):99. Available from: http://www.ncbi.nlm.nih.gov/pubmed/37284984
4. Luijendijk RW, Hop WCJ, van den Tol MP, de Lange DCD, Braaksma MMJ, IJzermans JNM, et al. A Comparison of Suture Repair with Mesh Repair for Incisional Hernia. N Engl J Med. 2000 Aug 10;343(6):392–8.
5. Parikh KR, Al-Hawary M, Millet JD, Burney R, Finks J, Maturen K. Incisional hernia repair: What the radiologist needs to know. Am J Roentgenol. 2017 Dec 1;209(6):1239–46.
6. [Surgical anatomy of the abdominal wall] - PubMed [Internet]. [cited 2024 Apr 3]. Available from: https://pubmed.ncbi.nlm.nih.gov/27495165/
7. Guilbaud T, Berdah S, Bege T. Component separation in the management of abdominal wall defect after laparostomy: Clinical and anatomical videos (with video). J Visc Surg. 2017 Sep 1;154(4):301–2.
8. Leber GE, Garb JL, Alexander AI, Reed WP. Long-term complications associated with prosthetic repair of incisional hernias. Arch Surg. 1998 Apr;133(4):378–82.
9. Vijayasekaran A, Gibreel W, Carlsen BT, Moran SL, Saint-Cyr M, Bakri K, et al. Maximizing the Utility of the Pedicled Anterolateral Thigh Flap for Locoregional Reconstruction: Technical Pearls and Pitfalls. Clin Plast Surg. 2020 Oct 1;47(4):621–34.
10. Muntean M V., Orădan A V., Corpodean AA, Acatrinei ES, Virag TH, Bonci EA, et al. Anterolateral thigh flap for abdominal wall reconstruction. A case report. Med Pharm reports [Internet]. 2023 [cited 2024 Apr 5];96(1):101–5. Available from: https://pubmed.ncbi.nlm.nih.gov/36818314/
11. Song D, Li Z, Zhou X, Zhang Y, Peng X, Zhou B, et al. Application of pedicled anterolateral thigh myocutaneous flap for full-thickness abdominal wall reconstruction after tumor resection. Zhongguo Xiu Fu Chong Jian Wai Ke Za Zhi. 2019 Jun 15;33(6):712–6.
12. Moullot P, Philandrianos C, Gonnelli D, Casanova D. Hypogastric abdominal wall reconstruction with a pedicled anterolateral thigh flap. Ann Chir Plast Esthet. 2014 Oct 1;59(5):364–7.
13. Srinivas JS, Panagatla P, Damalacheru MR. Reconstruction of Type II abdominal wall defects: Anterolateral thigh or tensor fascia lata myocutaneous flaps? Indian J Plast Surg [Internet]. 2018 Jan 1 [cited 2024 Apr 5];51(1):33–9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/29928077
14. Iagudin MK. Role of staged reconstruction of anterior abdominal wall in large and gigantic postoperative hernias. Khirurgiia. 2005;(9):69–72.
15. Parikh M, Samujh R, Kanojia RP, Mishra AK, Sodhi KS, Bal A. Peripheral primitive neuroectodermal tumor of the chest wall in childhood: Clinico-pathological significance, management and literature review. Chang Gung Med J. 2011 Mar;34(2):213–7.
16. Kumar V, Singh A, Sharma V, Kumar M. Primary intracranial dural-based Ewing sarcoma/peripheral primitive neuroectodermal tumor mimicking a meningioma: A rare tumor with review of literature. Asian J Neurosurg [Internet]. 2017 Sep [cited 2024 Apr 5];12(3):351–7. Available from: http://www.ncbi.nlm.nih.gov/pubmed/28761507
17. Chen J, Yuan T, Liu X, Hua B, Dong C, Liu Y, et al. Ewing's Sarcoma/Peripheral Primitive Neuroectodermal Tumors in Bronchus. Am J Med Sci [Internet]. 2019 Jan 1 [cited 2024 Apr 5];357(1):75–80. Available from: https://pubmed.ncbi.nlm.nih.gov/30314832/
18. Fan YH, Ma HX, Guo SP, Chen Y, Zhang SP. Application of Anlotinib Combined With Neoadjuvant Chemotherapy in Primary EWS/PNET of Lung: A Case Report. Front Oncol [Internet]. 2022 Apr 21 [cited 2024 Apr 5];12:822469. Available from: http://www.ncbi.nlm.nih.gov/pubmed/35530342
19. Qi W, Deng X, Liu T, Hou Y, Yang C, Wu L, et al. Comparison of Primary Spinal Central and Peripheral Primitive Neuroectodermal Tumors in Clinical and Imaging Characteristics and Long-Term Outcome. World Neurosurg. 2016 Apr 1;88:359–69.
20. Hanson B, Ubert A, Dyer B, Richmond B. Adult soft tissue Ewing's sarcoma/primitive neuroectodermal tumor. Am Surg. 2013 Jul;79(7).

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LIMBERG FLAP FOR FOREHEAD RECONSTRUCTION: CASE REPORT
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LIMBERG FLAP FOR FOREHEAD RECONSTRUCTION: CASE REPORT

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SUMMARY

The Limberg flap, a versatile transposition flap defined by Professor Alexander Limberg, is used to cover adjacent defects. This case report presents the application of the Limberg flap for a forehead wound in a 3-month-old female bitten by an unknown animal. Initial wound care included irrigation, debridement, and antibiotic prophylaxis. The reconstruction, aimed at optimal cosmetic and functional outcomes, involved careful consideration of defect characteristics and patient factors.

INTRODUCTION

The Limberg flap is a simple yet effective transposition flap combining rotation and advancement to cover defects adjacent to its pedicle (1–4). This transposition flap relies on the skin's laxity near the defect. Adjacent tissues and facial anatomy can complicate flap placement. It is not ideal for patients with low body mass index or limited skin. A large defect is a relative contraindication.

The Limberg flap is used in areas like the eyelids, cheeks, nose, lips, and pilonidal disease. It is a random-pattern flap, with blood supply from the subdermal plexus (2,3).

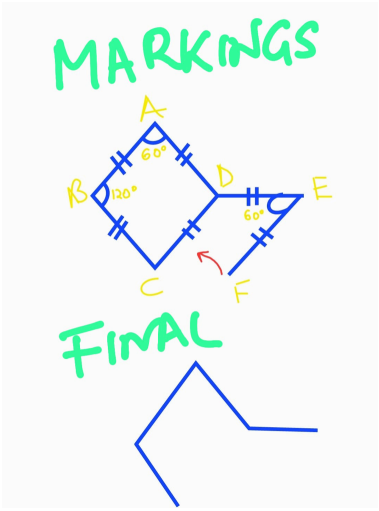

Figure 1: Markings.

The rhombus design comprises two equilateral triangles, with a line joining the two triangles extending out an equal length as the legs of the equilateral triangle; from extension at 60 degrees, we create another leg. The width of the flap is 60% of the length of the flap (Figure 1).

Curved lines allow closure with less tension; the Duformental and Webster are other modifications that use fewer tissues (2,3,5). We present a case of a non-cancerous forehead wound covered by the Limberg flap.

CASE PRESENTATION

We describe a 3-month-old female presenting with a forehead and nose bite from an unknown animal, arriving 4 hours post-incident. She had no significant medical history and was up to date on vaccinations per the Kenya Expanded Programme Immunisation (KEPI) guidelines. Her parents, a stay-at-home mother and a mechanic without formal health insurance, were absent during the incident.

On examination, a full-thickness forehead avulsion superior to the left eyebrow was noted, measuring about two by 3 cm with exposed bone but no necrotic tissues. The wound had well-defined edges that were not attached to the wound base, no peripheral tissue oedema or induration, and no associated fractures. The wound was cleansed and dressed daily with

mupirocin and hydrogel. Anti-rabies vaccination was initiated.

Haematological tests showed leucocytosis, neutrophilia, lymphocytosis, monocytosis, and anaemia. Treatment included IV flucloxacillin 150 mg QID, metronidazole 45 mg TDS, ceftriaxone 300 mg OD, and a 70 mLs of packed red blood cells transfusion, aiming for a haemoglobin level of 12 g/dL.

After resolving leucocytosis and anaemia, a transpositional flap for the forehead defect was planned. The wound measured two by one cm at surgery with granulation tissue and exposed bone (Figure 2).

Figure 2: Forehead wound.

Figure 3: Rhomboid-shaped defect.

We marked a rhombic skin area over the defect; the incisions extend through the full thickness of the skin and subcutaneous tissue (Figure 3). The flap is elevated in the loose areolar plane and transposed to cover the midline rhomboid defect. Deep absorbable sutures secured the flap over the defect, and then the skin was closed by interrupted non-absorbable sutures (Figure 4). We dressed the wound with paraffin tulles.

Figure 4: Skin closed in layers

Figure 5:Healed with sutures

The patient was discharged for follow-up in the plastic surgery clinic, with plans for possible nasal reconstruction at six months (Figure 5).

DISCUSSION

In Kenya, young adults are most at risk for maxillofacial soft tissue injuries, with domestic abuse being a significant cause. Animal bites, particularly from dogs, are less common but still notable (6). The median age of animal bite patients is 22 years, with a slight male predominance. Dogs were the biggest offenders, and most were stray. Most patients present after 48 hours (7).

Early wound management principles include irrigation, debridement, antibiotic prophylaxis, and appropriate closure timing (8). In this case, primary closure was delayed, reducing the infection risk.

Factors such as defect size, location, patient health, and surrounding tissue condition guided the reconstruction approach.

In children, dog bites account for most animal bites, with the craniofacial region being particularly vulnerable due to children's low stature, the propensity to crawl/play on the ground and exploratory behaviour, with most sequelae infections caused by Pasteurella multocida. Prevention strategies include vigilant oversight of interactions between children and animals, public education on responsible pet ownership, stricter animal control regulations, and improved reporting of bite incidents (8,9).

The defect's features (size, location, and depth) and patient factors (such as overall health and parental preferences) are crucial in guiding reconstruction. For this case, healing by secondary intention was not considered due to the introduction of bacteria by the bite. The surrounding tissues also influenced the reconstruction approach. With the eyebrow in proximity, the intention was to "hide" the scar along the suprabrow and avoid disrupting fixed aesthetic structures. Additionally, it was essential to avoid disruption of the facial nerve's frontal branch and ensure that sutures did not constrict blood flow to hair follicles.

The loss of pericranial tissue meant that a skin graft could not be supported by bone, necessitating a local flap. Local flaps provide a great colour and texture match, making them an excellent choice for facial defects (10). We aimed for excellent results with a Worthen, hatchet, or rhomboid flap. Due to the patient's young age and lack of rhytids, we avoided an advancement H flap and bilobed flaps to prevent noticeable scarring. Pedicled or free flaps were not considered due to the defect's small size.

The Limberg flap, known for its use in pilonidal sinus disease (3,4) and facial skin cancer excision wound coverage, is an ideal option for full-thickness defects.

The Limberg is known for pilonidal sinus disease (3,4) and facial skin cancer excision wound coverage (2,5). The flap places the longitudinal axis of the rhomboid parallel to the line of minimal skin tension. For full-thickness defects, it is a great option. Its simplicity, reliability, and versatility make it an essential tool in the armamentarium of reconstructive surgeons (2).

Given the limited literature on Limberg flap coverage for forehead reconstruction, this case offers evidence suggesting its potential application. We hope this serves as a nidus for large-scale randomized controlled trials and long-term follow-up studies to delineate efficacy and improve the Limberg flap forehead reconstructive surgery techniques as has been done for pilonidal disease (4). More importantly, the clinical epidemiological management and outcome patterns of animal bites in African children remain relatively unexplored.

CONCLUSION

The Limberg flap proves to be a valuable option for forehead reconstruction, as demonstrated by its successful use in this case. Early wound management, including irrigation, debridement, and antibiotic prophylaxis, is crucial, especially for animal bites. The flap's potential for forehead reconstruction warrants further investigation to enhance its utility in reconstructive surgery

REFERENCES

1. Limberg AA. Modern trends in plastic surgery. Design of local flaps. Mod Trends Plast Surg. 1966;2:38–61.
2. Kang AS, Kang KS. Rhomboid flap: Indications, applications, techniques and results. A comprehensive review. Ann Med Surg. 2021 Jul 7;68:102544.
3. Aithal SK, Rajan CS, Reddy N. Limberg Flap for Sacrococcygeal Pilonidal Sinus a Safe and Sound Procedure. Indian J Surg. 2013 Aug;75(4):298–301.
4. Khan PS, Hayat H, Hayat G. Limberg Flap Versus Primary Closure in the Treatment of Primary Sacrococcygeal Pilonidal Disease; A Randomised Clinical Trial. Indian J Surg. 2013 Jun;75(3):192–4.
5. Chasmar LR. The versatile rhomboid (Limberg) flap. Can J Plast Surg. 2007;15(2):67–71.
6. Bernard EK, Akama MK, Odhiambo WA, Chindia ML, Mua B. Maxillofacial Soft Tissue Injuries in Nairobi, Kenya. East Afr Med J. 2012 Sep;89(9):306–11.
7. Ngugi JN, Maza AK, Omolo OJ, Obonyo M. Epidemiology and surveillance of human animal-bite injuries and rabies post-exposure prophylaxis, in selected counties in Kenya, 2011–2016. BMC Public Health. 2018 Aug 9;18(1):996.
8. Trott AT. Bite Wounds. In: Trott AT, editor. Wounds and Lacerations (Fourth Edition). 4th ed. Philadelphia: W.B. Saunders; 2012. p. 206–19.
9. Cavalcanti AL, Porto E, Dos Santos BF, Cavalcanti CL, Cavalcanti AFC. Facial dog bite injuries in children: A case report. Int J Surg Case Rep. 2017;41:57–60.
10. Wound Society of Kenya. Wound Management: An Illustrated Textbook. 1st ed. Nairobi: Royallite Academic; 2023.

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1. *Internal Committee of Medical Journal Editors.* Uniform requirements for manuscripts submitted to biomedical journals, PA: ICMJE, 1963.

2. Haynes, R.B., Mulrow, C.D., Huth, E.J., Attman, D.G. and Gardner, M.J. More informative abstracts revisited. *Ann. Intern. Med.* 1990; 113:69-76.

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