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Five Year Retrospective Study on Keloid Management

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Authors' contributions

This work was carried out in collaboration between all authors. Author PDA designed the study, wrote the protocol and wrote the first and final drafts of the manuscript. Authors PDA, NCA, ARV, EA, AAJ and DD did literature searches and managed the analyses of the study. All authors read and approved the final manuscript.

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ABSTRACT

Aim: Keloid morbidity is mostly associated with the psychosocial effects of the cosmetically unsightly scars. The study was carried out to highlight the availability of different treatment modalities and the effectiveness of our treatment strategies.
Materials and Methods: A 5 year retrospective study of all patients treated with keloid from March 2012 to February 2017. In this study all patients with keloids attending the plastic surgery clinic at Federal Medical Centre Makurdi and Benue State University Teaching Hospital Makurdi and receiving any form of treatment were included.
Results: Thirty one patients were included in our study. Keloids represented 7.2% of benign skin lesions. Keloids were twice more common in females than males. Young patients particularly belonging to the 21 – 30 year old group were mostly affected. Head and neck area was the

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predominantly affected anatomic site. All patients received some form of treatment and most (90.3%) were treated with the combination of surgery and intralesional triamcinolone acetonide with excellent results. Recurrence was noted in 25.8% of patients.

Conclusion: Our study highlights the excellent results of the combination of surgery. With intralesional triamcinolone acetonide, even in patients with difficult keloids like patients from African descent.

Keywords: Aetiology; anatomical location; recurrence; steroid injection; surgical excision.

1. INTRODUCTION

Keloid is a benign, firm tumour-like fibrous swelling of skin arising from a scar [1]. It is characterized by overgrowth during wound healing which continues to grow beyond the border of the original wound. It was first described in 1806 and called “Cheloide” from the Greek word “Chele” meaning crab’s claw because of the sideways growth of the scar into normal skin [2].

Keloid morbidity is related to the cosmetically unsightly nature of the lesions, bothersome symptoms of itching and pain [2,3].

Keloids may develop from a spectrum of mild injury like immunization of the skin and ear piercing to more severe injuries like burns, car/motor bike accidents, and following surgeries for instance caesarean section [2,4,5].

The predilection sites for keloids are sternum, shoulders, earlobes, cheek, neck, upper back, lower abdomen and so on [2,4,5]. They can however occur on any site of the body. It’s a condition seen more in the younger age group less than 30 years [1,6]. Keloids begin to form 3 months to 1 year after skin trauma and grow beyond the borders of the original wound as opposed to hypertrophic scars which stay within the wound borders [1].

The aetiology of keloids is unknown but it is thought to be genetic as it is increasingly being seen in patients with a positive family history. Delta Np63 overexpression and p53 under expression in fibroblasts have been implicated [1,5,7]. Genome-wide association Study (GWAS) started since 2005 has led to the identification of single-nucleotide polymorphism and Gene chips that are associated with development of many diseases including keloid. GWAS have found association between the nucleotide genotypes rs1800255 (exon 30 G/A) and COL3A1 rs1801184 (exon 32 T/C) polymorphisms and incidence of scars [8]. Genome scans provide evidence for keloid susceptibility loci on chromosome 2q23 and 7p11 [9]. In Caucasians, HLA-DRB1*15 and HLA-DRB5 are associated with the risk of developing keloid disease [10,11]. It is also thought to be due to a disordered immune system response or hormonal. Another risk factor is dark skin as keloids are more commonly seen in Africans (Six to sixteen percent of Africans develop keloids), African-Americans and Hispanics [1,5].

The geographical distribution of keloids shows variability all over the world. Great Britain [12] has a keloid occurrence of 0.09% which is low as compared to 16% in other Africans. People of African descent show more familial tendency while this is rare in Indians [12]. Keloid is not common in Asians, and a study done in Taiwan [13] showed an annual keloid incidence rate of 0.15%. Keloids show parallelism in identical twins and change of gene expression. Keloid is a fibroproliferative disease and is seen in association with patients who have other fibrosis-related diseases [13]. Histology of keloids under light microscopy reveals randomly organized collagen fibres in a dense connective tissue matrix [5]. In normal scars, collagen fibres are arranged parallel to the skin surface and have abundant myofibroblasts.

Keloids have a high recurrence rate and therefore patients may benefit from combination of different treatment modalities. Surgical excision of the keloid may be combined with intralesional injection of triamcinolone acetonide. Excision may be complete (core keloid excision) or intralesional [1,5,6]. The triamcinolone acetonide may be given intraoperatively or 2 weeks after the wound has healed and repeated every 2-4 weeks for up to eight doses [5].

The intralesional concentration of triamcinolone acetonide may be 10 mg/ml-40 mg/ml depending on the size of the lesion [5]. Different regimen exist and the triamcinolone acetonide can be given over an interval of 3-6 months [6]. Triple therapy comprising surgery, steroids

(triamcinolone) and silicone sheeting has been found to be effective in reducing recurrence rate [6].

Triple therapy may also involve excision, radiotherapy within 24 hours and triamcinolone acetonide injections. Other combination therapies are cryotherapy using liquid nitrogen and interferon alfa [2,6]. Cortisone injection is another steroid that can be used in place of triamcinolone. Cytotoxic drugs like 5-Florouracil, bleomycin and interferon alfa can be injected intralesionally.

Imiquimod 5% cream has been used with good results to prevent keloid recurrence. It works by modifying the immune response and accelerating wound healing [2,6]. Laser treatment using pulse dye lasers, carbon dioxide, argon and neodymium yttrium aluminum garnet are also effective by reducing vascularity [2,6,14]. Pressure dressings are also effective [2,6].

Keloid prevention should be encouraged in predisposed patients by avoiding unnecessary trauma/Surgery like tattooing, ear piercing and cosmetic surgery. If the trauma or surgery cannot be avoided, preventive measures like immediate postoperative application of silicone elastomer sheeting, polyurethane self-adhesive patches, silicone gel, compression earrings and intralesional injection of triamcinolone acetonide should be implemented [2,14].

2. MATERIALS AND METHODS

Federal Medical Center Makurdi and Benue State University Teaching Hospital are tertiary healthcare centers catering for the treatment of patients in Benue State. The Teaching Hospital is only five years old while the Federal Medical Centre is more than fifty years old. The study period was chosen to synchronize the five years of the Teaching Hospital with five years of the same period chosen from the Federal Medical Centre. The study was a retrospective one from March 2012- February 2017 (5 years) involving all patients attending for keloids in the plastic surgery unit either treated surgically or with conservative methods. Data collected from patients files included age, sex, location, treatment modality of the keloids and outcomes. The study was approved by the Institutional Review Board of both Federal Medical Center Makurdi and Benue State University Teaching Hospital and permission to use patients' files was obtained.

2.1 Data Analysis

Statistical Package for Social Sciences (SPSS) version 23.0 was used for the data analysis. Independent variables considered were age, sex, location of keloid and the treatment modality carried out. Outcome measures were success of the treatment. In this case those without complication were considered to have successful outcome while those with complications were considered to have unsuccessful outcome. The relationship between the independent and outcome variables were tested with Chi-Square (x^2) with level of significance set at 0.05.

3. RESULTS

Thirty one patients were identified with histologically confirmed keloid diagnosis, representing 7.2% of a total of 433 patients with a benign skin tumour histology. There were 10 (32.3%) males and 21 (67.7%) females (male/female ratio 1:2). Age ranged from $2^1/_2$ to 51 years (mean 26.9+/- 9.9). The year group 21–30 was mostly affected representing 54.8%of patients (Table 1).

Keloids involved predominantly the head and neck area in 16 patients (51.6%). Eight of these had earlobe keloids (Table 2).

Table 1. Age group distribution of keloids

Age (years)	Frequency	Percentage
0 – 10	1	3.2
11 – 20	4	12.9
21 – 30	17	54.8
31 – 40	7	22.6
41 – 50	1	3.2
≥51	1	3.2
Total	**31**	**100**

Table 2. Anatomical distribution of keloids

Location	Frequency	Percentage
Head/Neck	16	51.6
Upper limbs	4	12.9
Trunk	7	22.6
Perineum	2	6.5
Lower limbs	2	6.5
Total	**31**	**100**

No keloids could be found only on the lower limbs, however, two (6.5%) of our patients with extensive and multiple keloids had lower limb involvement, affecting the skin around the knees.

Twenty eight patients (90.3%) were treated with surgery and intralesional triamcinolone acetonide. Surgery done was 50% complete keloid excision and 50% intralesional keloid excision. The wound in either procedure was closed with 4/0 nylon as a continuous intradermal suture. The sutured wound was infiltrated on table with triamcinolone acetonide 10-40 mg/ml depending on its sizes. After wound healing, one to two weeks postoperatively depending on the anatomical site, a second dose of triamcinolone was given. This was repeated fortnightly for 12-16 doses spanning over six to eight months. Only three patients (9.7%) were treated only with intralesional triamcinolone acetonide. Patients were followed up for a period of six months during which complications were looked out for. (Fig. 1) Assessment of satisfaction with surgical outcome was done at six months postoperatively. Recurrence was noted in 8 patients (25.8%) who had undergone surgery. There was no mortality from keloids. The relationship between the ages of patient, the location of keloid and the outcome of both treatment modalities were not statistically significant. However, in the steroid/excision treatment group the difference in the overall treatment outcome successful/not successful between those with and those without complications was statistically significant *P*=0.000.

For rating score and patients satisfaction in the steroid/excision treatment group the overall treatment outcome appeared better in those with satisfactory rating score, but not statistically significant (*P*=0.611).

For steroid alone and the overall treatment outcome, test statistic cannot be applied here because in all the three patients, the outcome for them was unsuccessful and so there was no second variable for any comparison (Table 3).

Table 3. Relationship between treatment outcome and patient's characteristics

Variables		Successful	Unsuccessful	Total	Statistical value
Age (years)					
≤10		0(0.0)	1(3.2)	1(3.2)	Likelihood Ratio= 6.671
11-20		1(3.2)	3(9.7)	4(12.9)	df= 5
21-30		6(19.4)	11(35.5)	17(54.8)	p-value= 0.318
31-40		1(3.2)	6(19.4)	7(22.6)	
41-60		1(3.2)	0(0.00	1(3.2)	
≥51		1(3.2)	0(0.0)	1(3.2)	
Total		10(32.3)	21(67.7)	31(100.0)	
Location					
Head/neck		3(9.7)	13(41.9)	16(51.6)	X^2 = 5.136
Upper limb		2(6.5)	2(6.5)	4 (12.9)	df= 4
Trunk		4(12.9)	3(9.7)	7(22.6)	p-value= 0.274
Perineum		1(3.2)	1(3.2)	2(6.5)	
Lower limb		0(0.0)	2(6.5)	2(6.5)	
Total		10(32.3)	21(67.7)	31(100.0)	
Procedure					
Steroid and excision		10(32.3)	18(58.1)	28(90.3)	X^2 =1.582
Steroid alone		0(0.0)	3(9.7)	3(9.7)	df= 1
Total		10(32.3)	21(67.7)	31(100.0)	p-value= 0.209
Steroid and excision					
Complication		2(11.1)	16(88.9)	18(100.0)	X^2 =20.741
No Complication		10(100.0)	0(0.0)	10(100.0)	df= 1
Total		12(42.9)	16(57.1)	28(100.0)	p-value= 0.000
Steroid and excision					
Rating score	Satisfactory	11(91.7)	14(87.5)	25(89.3)	X^2 =0.124
	Not Satisfactory	1(8.3)	2(12.5)	3(10.7)	df= 1
					p-value= 0.611
Total		12(100.0)	16(100.0)	28(100.0)	

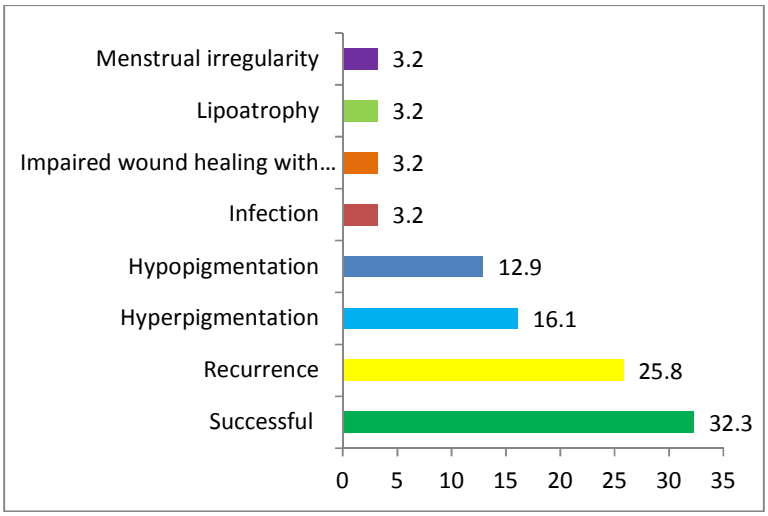

Fig. 1. Bar chart showing outcome of treatment of keloids

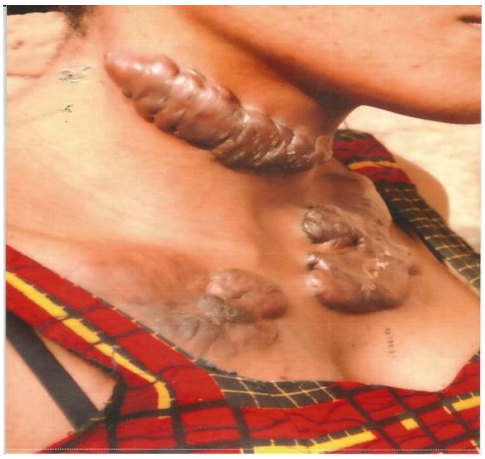

Fig. 2. A female with multiple keloids and cosmetically unsightly lesions in the neck, anterior chest wall and other parts of the body that are not shown in the picture

4. DISCUSSION

In our study, we found that keloids are affecting predominantly the younger age groups, particularly patients aged 21–30 years old. Our results are consistent with those reported in the literature in patients of African descent [15,16]. Udo-Affah et al. [15] similarly to our results, found a higher percentage of occurrence of keloids at the 20-29 year old group, with a mean age 25.6 years in Nigeria. Keloid occurrence in children was rare in our study and is consistent with pathogenesis of the disease. Keloid tissue is abundant in type I and VI collagens [12]. However, wound healing in children is characterized by production of type III collagen mainly in the early phase while type I collagen in the later phase after nine days of wounding [17]. This relatively low quantitative levels of type I collagen protects children from developing keloid. A study done in Taiwan [18] showed a low prevalence of keloid among dermatological diseases in the children collaborating the rarity of the disease in this group. In our study head and neck area and earlobe keloids predominated. This comes in contrast with Olaitan et al. [3] observations that keloids in Africans are predominantly affecting the chest wall. Ear lobe reconstruction was necessary in a few patients (two out of eight) to give a better cosmetic result. Interestingly, all patients with ear lobe keloids declined consent for publication of their photos before and after surgery.

Isolated keloid involvement of the lower limbs was not seen in our study. Only patients having keloids affecting more than four anatomical sites had lower limb involvement. Other authors [3] have documented a large number of keloids on the lower limbs in Africans. Keloid is not common in Europeans but when present can involve the lower limbs [19].

At the Federal Medical Centre and Benue State University Teaching Hospital Makurdi, we combined surgical excision of the keloids and intralesional triamcinolone acetonide for surgically resectable ones with good results. Our recurrence rate 25.8% is better than 50% reported in the literature [5]. Our better recurrence rate could be explained by patient selection for surgery, as patients with too extensive keloids occupying a whole anatomical

site such as the anterior chest wall or the abdomen, making excision impossible, were treated only with intralesional triamcinolone acetonide. These patients had also excellent results as their keloids flattened and became less itchy.

Fig. 3. A male with multiple cosmetically unsightly keloids in the upper limbs and lower limbs

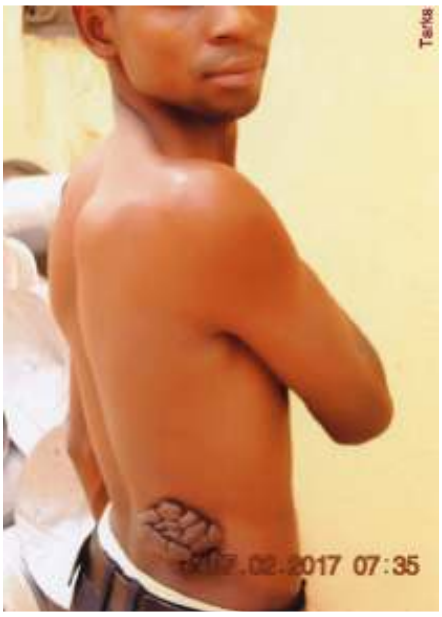

Fig. 4. Keloid in the right lower back with unusual skin indentations

Patents were also treated for pruritus with antihistamines like promethazine and chlorphenyramine. A great percentage of our patients (thirteen in number constituting 41.9%) complained of pruritus and pain because of their keloids and many had psychosocial problems due to the unsightly scars. All patients wanted treatment to improve their appearance.

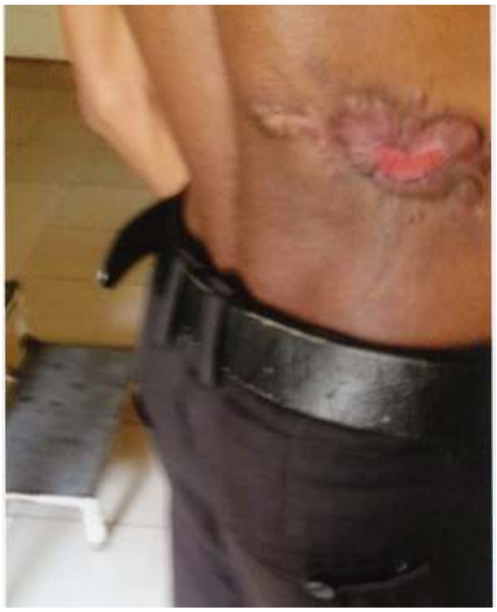

Fig. 5. A male with recurrent keloid right lower back and skin excoriation from intralesional triamcinolone injection

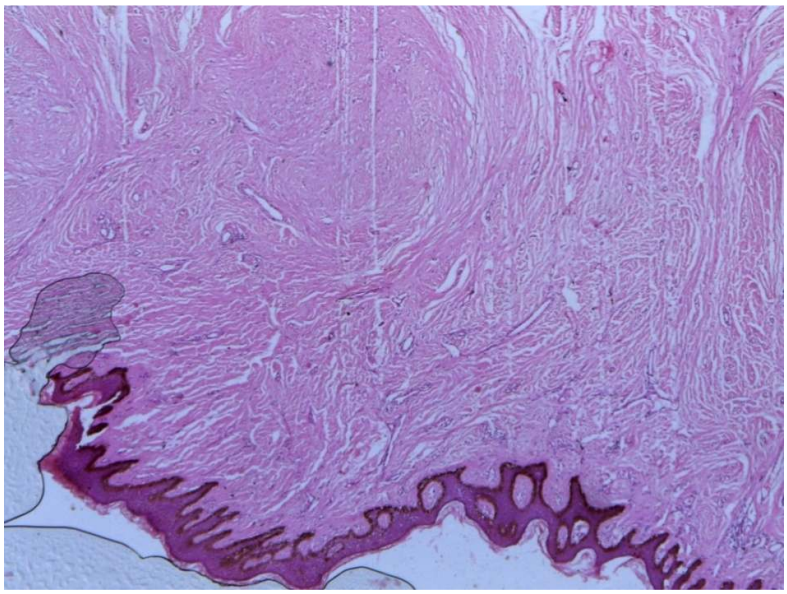

Fig. 6. Photomicrograph of keloid shows a keratinized stratified squamous epithelium on the surface. Below are broad bands of haphazardly disposed collagen bundles interspersed with fibroblasts with spindled nuclei. X 4 objective magnification

5. CONCLUSION

All patients in our study had a satisfactory cosmetic result with the combination of surgery and intralesional triamcinolone acetonide or with intralesional triamcinolone acetonide alone, modalities that can be used in the majority of patients with keloids.

6. LIMITATIONS OF THE STUDY

The data is small and this may affect the prevalence of keloid in this environment.

CONSENT

Consent to participate in the research and publication of clinical photos was given by the three patients whose pictures are in the manuscript. Consent for the publication of the histology slid was given by the patient with the neck keloid.

ETHICAL APROVAL

Ethical clearance was given by the Institutional Review Board of both Federal Medical Center Makurdi and Benue State University Teaching Hospital.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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