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Contents

Original Articles

Mast Cell Profile and IL-4 Levels in Borderline Spectrum of Leprosy **5**
Singh Jasmeet, Gautam R.K., Khurana Ananta, Bhardwaj Minakshi, Meena Neha, Bajaj Sonali

Epidemiological Study of Various Dermatological Conditions in Tribal Area of Valsad, India **11**
Bhuvnesh Shah, Keya Sheth Shah

RF Assisted Management of Keloids **15**
Chittoria R.K., Elankumar S., Kumaran M.S., Sudhanva H.K., Preethitha B., Friji M.T., Mohapatra D.P., Dineshkumar S.

A Clinical Study of Vitiligo at a Tertiary Care Centre of East India **17**
Rajesh Sinha, Abhijeet Kumar Jha, Smita Prasad, Shweta Dipti

Application of Low Level Laser in Managament of Biofilm **23**
Vinayak C., Chittoria R.K., Sudhanva H.K., Preethitha B., Kumaran M.S., Elankumar S., Sireesha K.R.

Case Reports

Non Responder of Alopecia Totalis to Diphencyprone Responding to Addition of Betamethasone Pulse **27**
Dhurat R., Pund P., Sukesh M.S., Dandale A., Ghate S., Bhandari K.

Anaesthetic Management of a Patient with Known Latex Allergy and Hypersensitivity to Multiple Drugs **31**
Talib Khan, Rayees Najib, Arvin Preet, Zulfikar Ali, Syed Amer Zahoor, Shaqul Qamar Wani, Iram Ali

Radiofrequency Assisted Management of Trap Door Scar **37**
Babu P., Chittoria R.K., Kumaran M.S., Sudhanva H.K., Kumar E., Reddy K.S., Chavan V., Friji M.T., Mohapatra D.P., Dineshkumar S.

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Original Article

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Mast Cell Profile and IL-4 Levels in Borderline Spectrum of Leprosy

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Abstract

Introduction: Mast cells are responsible for secreting cytokines and other chemical mediators, involved in immuno-inflammatory responses. However, their role has not been clearly defined in the immunopathogenesis of leprosy. *Aims and Objectives:* To count the number of mast cells in leprosy granulomas and to correlate their numbers with the serum levels of IL-4 in borderline spectrum of leprosy. *Materials and Methods:* Thirty cases of newly diagnosed, untreated patients of borderline tuberculoid (BT), borderline borderline (BB) and borderline lepromatous (BL) leprosy were included in the study. Skin biopsies were taken from the margins of the skin lesion of leprosy and stained with toluidine blue for quantification of mast cells. An average number of mast cells per granuloma was calculated after examining the granulomas in each skin biopsy. Concentration of serum IL-4 was measured quantitatively in the collected venous blood samples by ELISA method. *Results:* The mean of average number of mast cells increased from BT towards BL leprosy. Statistically significant difference was seen between BL and BT/BB leprosy. However, no significant difference was found between BB and BT Hansen's. A positive correlation was found between mast cell numbers and serum levels of IL-4 since both showed an increasing trend from BT through BL leprosy. *Conclusion:* We found a progressive rise in mast cell count and serum levels of IL-4 across the borderline spectrum of leprosy. This indicates that mast cells play a role in progression and dissemination of leprosy by proliferating at the site of inflammation and secreting an array of chemical mediators especially IL-4.

Keywords: Borderline Leprosy; Mast Cells; Granuloma; Interleukin 4; Tuberculoid; Lepromatous.

Introduction

Leprosy is a chronic inflammatory disease caused by Mycobacterium leprae, an obligate intracellular pathogen principally affecting peripheral nerves and skin [1].

It is diagnosed by the presence of one or more of the three cardinal signs of leprosy which include; definite loss of sensation in a hypopigmented or reddish skin patch, a thickened peripheral nerve, with loss of sensation and/ or weakness of the muscles supplied by that nerve and presence of acid-fast bacilli in slit skin smear [2]. T- lymphocytes are a major source of cytokines which play a key role in immunologic, inflammatory and reparative host responses in leprosy. Further, few previous studies suggest role of mast cells in the pathogenesis and progression of leprosy [3-8].

Mast cells are derived from the myeloid stem cells and are extensively distributed in the skin, gastrointestinal tract, upper and lower respiratory tracts. They are involved in allergic inflammation and immuno-inflammatory responses [9]. Mast cells are seen in small numbers in the granulomas of leprosy and are responsible for secreting cytokines, mainly tumour necrosis factor- α (TNF-α) and interleukin-4 (IL-4), and other mediators (tryptase, histamine, thromboxane, prostaglandin D2 etc) [10]. The close proximity of mast cells to the peripheral nerve fibres in the tissues alongwith the shortening of the distance between mast cells and nerve fibres during inflammatory events, suggest a functional interaction between these two components [11,12]. In the present study, we attempted to count the number of mast cells in the leprosy granulomas in borderline spectrum of leprosy and correlate it with serum levels of IL-4.

Materials and Methods

Thirty newly diagnosed, untreated patients of borderline leprosy including tuberculoid (BT), mid-borderline (BB) and borderline lepromatous (BL) as per the classification of Ridley and Jopling [13], attending the urban leprosy centre of our institute from November 2013 to February 2015 were included in the study. The study was approved by institutional ethics committee. Patients in lepra reactions, pregnant and lactating women, and patients already receiving or those who had received specific treatment for leprosy in the past were excluded. Equal number of consenting healthy, age and sex-matched volunteers were taken as controls. Informed and bilingual consent was taken from the patients and controls before inclusion in the study. A skin biopsy was taken from the margin of a representative skin lesion from the patients. The specimens were placed in 10% formalin solution and sent to the pathology department for haemotoxylin and eosin (H & E) staining for diagnosis of leprosy and toluidine blue staining for quantification of mast cells. Mast cells were visualized as violet to reddish purple cells against a blue background [Figure 1]. Mast cells were counted under 400 × magnification in ten sequentially observed granulomas, and an average number of mast cells per granuloma was calculated for each case. The mean of these values for subset cases of BT, BB and BL leprosy were also determined.

Ten ml venous blood samples of patients and controls were collected in plain vacutainer tubes and allowed to stand for 30 minutes at room temperature and then centrifuged at 300 g for 5 minutes. Sera were immediately separated and stored at -20^{0}C until the time of analysis for the cytokine levels. Concentration of serum IL-4 was measured quantitatively in the collected serum samples by the sandwich enzyme-linked immunosorbent assay (ELISA) method (Human IL-4 ELISA kit from Krishgen BioSystems).

Statistical Analysis

Quantitative data were presented as mean ± SD or median and interquartile range, as appropriate. Normality of data was checked by measures of Kolmogorov Smirnov tests of normality. For normally distributed data means of 3 groups were compared using One-Way ANOVA followed by Post Hoc Multiple Comparisons test. For skewed data Kruskal-Wallis test followed by Mann-Whitney test for two groups was applied. For categorical variables; number & percentages were calculated. Chi-square test or Fisher's exact (whichever appropriate) test was applied for categorical data. Spearman's correlation coefficient was applied to see relationship between different variables. All calculations were two-sided & were performed using SPSS version 17 (Statistical Packages for the Social Sciences, Chicago, IL). A "p" value of <0.05 was considered to indicate statistical significance.

Results

The study group comprised of 12 patients of BT, 8 patients of BB and 10 patients of BL leprosy. There were 21 (70%) males and 9 (30%) females. The mean age was 32.51±1.78 years among cases and 31.17±11.74 years among the controls. The highest number of mast cells was found in BL leprosy (mean of 9.45±2.26 cells per granuloma), intermediate in BB (3.50±1.07 cells per granuloma) and lowest in BT patients (mean of 2.81±0.94 cells per granuloma) [Figure 2].

On statistical evaluation [Table 1], significant difference was seen when the mean of average number of mast cells in BL was compared with those in BT and BB; however, the difference between BB and BT leprosy was statistically insignificant.

The mean serum levels of IL-4 were highest in patients with BL (76.29 ± 37.25 pg/ml) leprosy with intermediate levels in BB patients (22.99 ± 12.93 pg/ml) and lowest in patients with BT disease (4.12 ± 2.05 pg/ml), as shown in Table 2. On comparing mean serum levels of IL-4 of the three subsets of patients, a statistically significant difference was seen across the entire borderline spectrum (BT vs. BB, p = 0.001; BB vs. BL, p = 0.003; and BL vs. BT, p =0.000). Further, statistically significant difference was seen

Table 1: Comparison of mean of average number of mast cells between different groups of leprosy

Group	Mean ± SD	p value
BT vs. BB	2.81±0.94 vs. 3.50±1.07	**0.634**
BL vs. BB	9.45±2.26 vs. 3.50±1.07	**0.038**
BL vs. BT	9.45±2.26 vs. 2.81±0.94	**0.007**

BB – mid-borderline; BL – borderline lepromatous; BT – borderline tuberculoid; SD – standard deviation

Table 2: Comparison of serum levels of IL-4 between different groups of leprosy and healthy controls

Group	Serum IL-4 levels: Mean ± SD (pg/ml)	P value
BT vs. BB	4.12 ± 2.05 vs. 22.99 ± 12.93	0.001
BL vs. BB	76.29 ± 37.25 vs. 22.99 ± 12.93	0.003
BL vs. BT	76.29 ± 37.25 vs. 4.12 ± 2.05	0.000
BT vs. healthy controls	4.12 ± 2.05 vs. 4.48 ± 2.82	0.889
BB vs. healthy controls	22.99 ± 12.93 vs. 4.48 ± 2.82	0.000
BL vs. healthy controls	76.29 ± 37.25 vs. 4.48 ± 2.82	0.000

BB – mid-borderline; BL – borderline lepromatous; BT – borderline tuberculoid; IL – interleukin; SD – standard deviation

Table 3: Comparison of the findings of different published studies on mast cell count in subsets of leprosy

Author(s)	Number of Patients (n), Controls, and profile of patients	Mast cell staining technique	Relative mast cell density
Current study	n=30 BT-12, BB-8, BL-10	Toluidine blue	Progressive increase along the spectrum from BT to BL
Rav *et al* [3]	n=250 TT-50, BT-22, BB-12, BL-20, LL-36, IL-110	Toluidine blue	Progressive rise from TT to LL
Aroni *et al* [4]	n=28 TT-2, BT-7, BL-4, LL-11, HL-4	Chloroacetate esterase	Lower in tuberculoid than lepromatous group
Mysorekar *et al* [5]	n=118; controls=20 IL-25, TT-21, BT-20, BB-14, BL-20, LL-18	Toluidine blue	Progressive increase from TT to LL
Bagwan *et al* [6]	n=53; controls=7 IL-6, TT-9, BT-24, BB-1, BL-6, LL-7	Toluidine blue	Progressive increase from TT to LL
Sherif ES [7]	n=60 IL-1, TT-22, BT-13, BB-13, BL-5, LL-6	Giemsa	Progressive increase from TT to LL
Magalhaes *et al* [8]	n=51 BT-17, BB-17, BL+LL-17	Anti-tryptase antibody	BB and BT had higher density than BL+LL
Naik *et al* [14]	n=60	Toluidine blue	Progressive increase from IL to both polar TT and LL
Chatura *et al* [18]	n=50 TT-5, BT-24, BB-3, BL-10, LL-8	Fite-Faraco	Highest counts in BT and BL vs. their polar counterparts
Joshi *et al* [19]	n=37 IL-6, TT-3, BT-18, BB-2, BL-3, LL-5	Toluidine blue	BT>BL

BB – mid-borderline; BL – borderline lepromatous; BT – borderline tuberculoid; HL – histoid leprosy; IL – indeterminate leprosy; LL – lepromatous leprosy; TT – polar tuberculoid (leprosy)

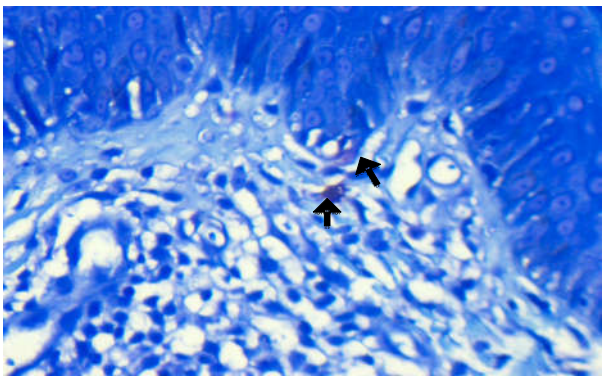

Fig. 1: Mast cells on toluidine blue staining, highlighted by black arrows (400 ×)

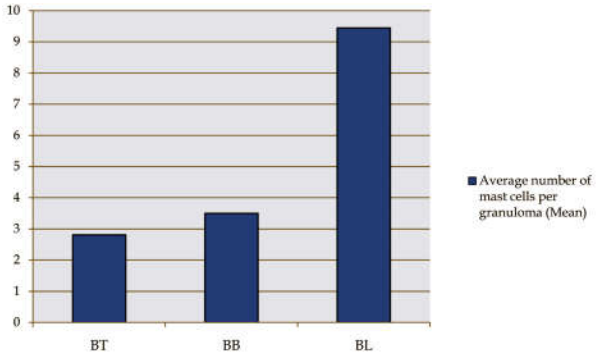

Fig. 2: Mean of average number of mast cells in each subset of leprosy

between mean serum levels of IL-4 of healthy controls and patients with BB and BL leprosy ($p<0.05$); but not with the BT patients ($p=0.889$). In our study, a trend of progressive increase in number of mast cells as well as serum levels of IL-4 was seen from BT to BL leprosy. On statistical evaluation, a positive correlation was found between mast cell count and mean serum levels of IL-4 ($r=0.664$, $p<0.05$).

Discussion

Mast cells are 'dynamic cells' with a central role

in allergic inflammation, protective immune response and other inflammatory responses. They are found at all strata of the skin including the dermis, around blood vessels, nerves, appendages, at dermoepidermal junction (DEJ) and also in subcutaneous tissue [9,14,15]. Mast cells can be stimulated to degranulate by direct injury, chemical agents like opioids and alcohol, certain antibiotics such as polymyxins or by cross-linking of immunoglobulin E (IgE) receptors and complement proteins [16]. Mast cells also produce IL-4, which induces naïve CD4+ T cells to differentiate into Th_2 cells while suppressing the development of Th_1 cells. They also suppress macrophage cytotoxic activity, parasite killing, and macrophage-derived nitric oxide production [17].

In this study, we found a difference in the number of mast cells in granulomas of different subsets of leprosy, with maximum number of mast cells in BL patients, lesser in BB cases and lowest in BT cases. Our findings are in agreement with findings of the study by Rav *et al* in 1990 who included 250 patients of leprosy and reported a decrease in mast cell density from lepromatous to the tuberculoid end of the spectrum [3]. They additionally reported mast cells in 100% cases of indeterminate leprosy, thereby suggesting the role of mast cells in evolution and progression of the disease [3]. Aroni *et al* in 1993 also reported a significantly lower mast cell count in tuberculoid group than the lepromatous group ($p<0.001$) [4]. They suggested that the larger number of mast cells in lepromatous group may be due to increased vascularity and changes in the endothelial cells. Mast cell mediators are also known to be mitogenic for fibroblasts and endothelial cells. Thus, mast cells may also have a role in fibroblast proliferation that occurs after a lepra reaction [4]. The above findings were corroborated by Mysorekar *et al* in 2001, Bagwan *et al* in 2004, and Sherif ES in 2008 [5-7].

However, many workers have reported contradictory findings. Magalhaes *et al* found maximum density of mast cells in BB patients (73.64/mm^2) followed by BT (65.06/mm^2) and BL (50.43/mm^2) [8]. Further, Naik *et al* in 2003 reported lower density of mast cells in BT (37/mm^2) and BL (46/mm^2) leprosy than their polar counterparts (TT-51/mm^2, LL-49/mm^2) [14]. They suggested that periodic follow up of indeterminate and borderline lesions for mast cells might help in predicting the stability of lesions [14]. Similarly, Chatura *et al* in 2012 reported a progressive decrease in mast cell density along the borderline spectrum of leprosy [18]. Recently, Joshi *et al* and reported higher number of mast cells in BT leprosy than in BL leprosy (BT-105.56/mm^2, BL-100/mm^2) [19]. The reason for contradictory findings of these studies and the current study may be explained on the basis of the assertion put forward by Magalhaes *et al*. They suggested that such discrepancies might stem from the difference in the mast cell staining methods and mast cell counting technique adopted in different studies [8]. A summary of these studies has been tabulated [Table 3].

We also found a progressive rise in IL-4 levels from BT to BL leprosy, suggesting the role of IL-4 in disease progression with Th_2 activation. In our study, a trend of progressive increase in number of mast cells as well as the serum levels of IL-4 was seen from BT to BL leprosy. On statistical evaluation, a positive correlation was found between mast cell numbers and IL-4 ($r=0.664$, $p<0.05$). A few previous studies have also reported progressive rise in serum levels of IL-4 along the borderline sprectum of leprosy [7,20,21].

It is known that high levels of IL-4 in a Th_2 predominant milieu promotes further mast cell proliferation, thereby resulting in positive feedback for further IL-4 secretion. To summarise the results from our study and the discussed literature, it seems certain that mast cells play a role in leprosy by proliferating at the site of inflammation and secreting cytokines like IL-4 leading to Th_2 response, cell damage, inflammation, fibrosis, culminating into progression and downgrading of the disease.

Conclusion

In the current study, a progressive rise in mast cell count across the borderline spectrum of leprosy with highest counts in BL leprosy was seen. This suggests a probable role of mast cells in downgrading of leprosy. The high levels of IL-4 down the spectrum of borderline leprosy suggest its role in dissemination of disease while promoting a Th2 response.

The correlation between IL-4 levels and mast cell numbers may suggest that mast cells are a major source of this cytokine in leprosy. Although the findings of this study suggest that mast cell stabilizers and anti-IL-4 therapy may have a therapeutic role in prevention of disease worsening, this hypothesis has not yet been studied. Further studies are mandated to understand the complex mechanisms involved in downgrading of leprosy and should take into account other immune cells and cytokine mediators.

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Original Article

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Epidemiological Study of Various Dermatological Conditions in Tribal Area of Valsad, India

Bhuvnesh Shah*, Keya Sheth Shah**

Abstract

Skin diseases and their complications are a significant burden on health system of many nations.Information on prevalence would be useful in planning an effective healthcare system. *Objective:* To identify the spectrum of dermatological disorders in the tribal area of Valsad(India). *Methods:* In this retrospective follow up, 4283 patients with skin disorders were randomly selected from dermatology outpatient department of a government centre between 1/11/2016 to 1/2/17. *Results:* A total of 4283 patient data collected which included males: 2718 (63.56 %) and females: 1565 (36.54%). The patients were divided into different age groups as 1-15(n = 259), 16-60 (n = 3685), 61and above(n = 339). Among infective dermatological disorder, Tinea was the most frequent diagnosis, comprising 40% (1718/4283), while scabies 6.5% (279/4283), and Hansens disease 1.9% (82/4283). The non infectious dermatological conditions largely included Urticaria 6.7%(291/4283), Eczema 6%(261/4283) and Acne Vulgaris 3.19%(137/4283). Under Infectious dermatological disorders, the male exhibited significantly higher cases of Tinea infection than females [male: (26.2%)1126/4283 vs. female:(13.8%) 592/4283]. Under non infectious disorders, Eczema was more commonly seen in males than females [male:161/4283 vs. female 100/4283]. *Conclusion:* Tinea happens to be the most prominent infection among the Indian population owing to the work, working condition and Climate.This is followed by scabies and Hansens. This study helps in creating awareness about the means of prevention and adopting certain life style. This study also helps in highlighting certain factors which can make a decisive role in planing of core health care system,prevent morbidity, mortality and also provide proper understanding of the nature and the course of disease

Keywords: Epidemiological Study; Valsad; Tribal Area.

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Introduction

The exact prevalence of various dermatological condition in tribal area of Valsad (Gujarat) is still not accurately known.

The information on prevalence would be useful for planning strategies to manage the disease. Also help in creating awareness about the disease in the tribal disease.

Material and Method

This was a retrospective study reviewing all out door patients of dermatology, at government hospital Valsad.The centre selected, was government hospital, as it was easily accessed by the patients.All new and old cases were included for the study.

Data Analysis

Proper analysis was done by the staff of the hospital. The help was also taken from Department of Preventive medicine.

Data

- Total number of patients- 4283
- Males- 2718 (63.5%).
- Females-1565 (36.54%)
- Patients enrolled belonged to the following age groups-

1. 1-15 years - n= 259
2. 16-60 years- n=3685
3. 60 years and above- n=339

Results

A total of 4283 patient data collected which included males: 2718 (63.56 %) and females: 1565 (36.54%). The patients were divided into different age groups as 1-15yrs (n = 259), 16-60yrs (n = 3685), 61yrs onwards (n = 339). Among infective dermatological disorder, T. corporis with Cruris was the most frequent diagnosis, comprising 40% (1718/4283), while scabies 6.5% (279/4283), and Hansens disease 1.9% (82/4283). The non infectious dermatological conditions largely included Urticaria 6.7%(291/4283), Eczema 6%(261/4283) and Acne Vulgaris 3.19%(137/4283). Under Infectious dermatological disorders, the male exhibited significantly higher cases of Tinea infection than females [male: (26.2%)1126/4283 vs. female:(13.8%) 592/4283]. Under non infectious disorders ,Eczema was more commonly seen in males than females[male:161/4283 vs. female 100/4283] of viral infection 9.2% (32/293) significantly higher than bacterial infection 3.8% (11/293) and fungal infection 3.4% (10/293).

Table 1: Non Infectious dermatosis

Condition	Male	Female	n=
Psoriasis	53	35	88
Acne vulgaris	43	94	137
Vitiligo	83	48	131
Urticaria	118	173	291
Alopecia areata	13	11	24
Eczema	161	100	261
Xerotic dermatitis	4	4	8
ICD	42	29	71
Lichenoid eczema	3	1	4
Melasma	49	24	73
PMLE	56	36	92
Seborrheic dermatitis	17	12	29

Table 2: Infectious dermatosis

Condition	Male	Female	n=
T. Corporis,cruris	1126	592	1718
T.faciei	66	35	101
T.mannum	34	10	44
T.pedis	17	10	27
T.capitis	15	17	32
Herpes	10	9	19
Verruca vulgaris	14	8	22
Hansens	60	22	82
Candidial intertrigo	28	24	52
Folliculitis	7	9	16
Onchomycosis	14	26	40
Scabies	173	106	279

Conclusion

Patient with dermatological complaints is like iceberg. Only 1/3rd of actual problem is evident, while 2/3rd is submerged.

And most of the times ignored and thus making it difficult to treat. We have to emphasize on the non medical part of treatment like in treatment of tinea, advise of keeping body dry, wearing loose clothes is equally important as taking medicines.

Acknowlegement

Dr. Harshida Shah and Dr. Bhavana Sheth.

Conflict of Interest

None

Statement

Manuscript has been read and approved by all

authors, that the requirement of authorship has been met, and each author believes that the manuscript represents honest work

Key Message

Epidemiological study helps in identifying various dermatological conditions in tribal area of Gujarat.there by helping in prevention and treatment of the conditions.

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Original Article

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RF Assisted Management of Keloids

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Abstract

Intraoperative bleeding can be cumbersome while operating on scars using a scalpel. Though skin incisions by a scalpel is of common practice, incisions done by electromagnetic radiation of high frequency in the form of radiofrequency are more precise, accurate, associated withless bleedingand in turn less time consuming giving more defined result. Intra-lesional Keloid scar excisions required good haemostasis and precision leaving behind only a thin rim of tissue.

Keywords: Keloid; Radiofrequency; Intra-Lesional Excision.

Introduction

Intraoperative bleeding obscures the operative field, and use of electrocautery can lead to charring of tissues. Achieving haemostasis during surgeries for keloid scars whose blood vessels have little or no contractile tissues is always a challenge to surgeons.Incision by Radiofrequency (RF) aids in a pressure less incision with no dragging or bunching of tissue with simultaneous cutting, coagulation, and precision of incision [1,2]. Radiofrequencyincision causes less lateral tissue damage compared to other heat-producing devices [3]. We present use of RF probe for intra-lesional keloid excision in a 55 year old male.

Material and Methods

A 55 year aged male presented tothe outpatient department of Plastic Surgery, JIPMER, Puducherry in July 2016 with6 years old post traumatic keloid over the presternal region with recurrent episodes of scar abscess lasting for 2years, which was not responding to conservative measures. Treatment plan for the patient was intra-lesionalexcisionof keloid including all of the infected sinuses and skin grafting followed by steroid injections. Patient was evaluated and underwent intra-lesional keloid excision under local anaesthesia. The scar tissue was excised using radiofrequency probe with a power of 1.7W, instead of using scalpel. It was noticed that the resistance while cutting the scar tissue was least, bleeding was minimal and procedure was completed in minimal operativetime. The skin incision had no adverseeffect on the skin and the graft take was also very good. On follow-up, skin graft is taken well and there are no post-operative complications

Fig. 1: Pre op

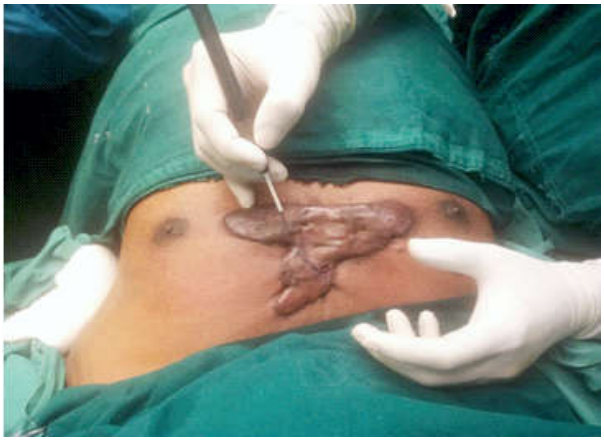

Fig. 2: Intra -op

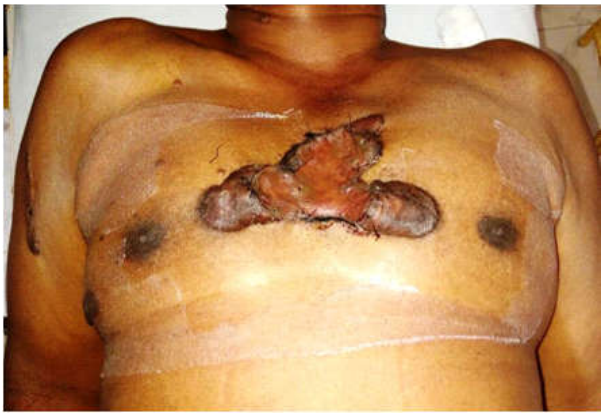

Fig. 3: Post op

Discussion

Recurrent keloid scars are unsightly, may produce persistent pain, itching and are susceptible to recurrent infections. Though line of management remains conservative for most keloid scars, occasionally an intra-lesional excision may need to be considered [4]. Intra-lesional excision requires a rim of scar tissue to be left in the periphery of the scar. Surgery in keloid scars is more prone to bleeding due to lack of contractile tissues. The use of radiofrequency probe in keloid scars gives a more precise, accurate, blood less field improving the result of surgery.

Radiosurgery has been used to facilitate incisions in diverse fields of plastic surgery including blepharoplasty, face lifting, hair restoration surgery, and abdominoplasty.

Ablation effect on tissues is caused by vaporizing their water content with the help of continuous heat application in tissues beneath the tip of the active electrode, causing cutting and the coagulation simultaneously.Radiofrequency ablation devices workby generating high frequency voltage of approximately 500 kHz. These devices causes flow of electrical currents through tissues when brought into close vicinity of tissues.The tissues provide the necessary impedance to produce heat as electrons overcome the resistance in the tissues. The patient's body functions as a part of the electrical circuit [4]. The electrical current may pass harmlessly through the patient's body without causing deleterious effects ifthe current alternates at the much higher frequency in the range of 330,000 cycles per second (330 kHz)

Radiofrequency has various advantages, such as ease of soft tissue ablation, hemostasis, and instant sterilization. There is minimal scar and operative time as well as post-operative pain is less in contrast to conventional scalpel incision.

Conclusion

We suggest thatradiofrequency assisted keloid excision is a better and safe alternative to scalpel/ electrocautery because of more precision, better coagulation with less bleeding, less operative time and noundesirable effects on graft take.

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Original Article

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A Clinical Study of Vitiligo at a Tertiary Care Centre of East India

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Abstract

Background: Vitiligo is a common skin problem affecting people globally. Though usually symptomless, it is associated with many taboos and social stigma in India. In this study, we analyzed the clinicoepidemiological profile of vitiligo patients visiting dermatology opd of a tertiary care centre of east India. *Aim:* A clinical study of vitiligo to know profile of patients suffering from vitiligo with associated cofactors. *Methods:* All patients of vitiligo visiting dermatology opd of All India Institute of Medical Sciences, Patna from March 2013 to February 2015, were included in the study. *Result:* Of 256 vitiligo patients included in the study, 51.5% (132) were males and 48.4% (124) were females. Most common morphological patterns noted were vitiligo vulgaris in 49.6% (127) patients. Most common site of onset was lower limbs in 26.56% (68) patients. Koebner phenomenon was present in 23.8% (61 cases). Leucotrichia was noted in 17.8% (46 patients). Most common associated condition noted was thyroid disorders in 6.6% (17) cases.

Keywords: Vitiligo; Bihar; Clinical Pattern.

Introduction

Vitiligo is an acquired pigmentary disorder of the skin caused by destruction or inactivation of melanocytes. It is characterised by milky white patches of different shapes and sizes. Though etiology of vitiligo has not been fully explained but significant role of genetic susceptibility, autoimmunity and oxidative stress has been implicated [1]. Prevalence of vitiligo varies from region to region and in different ethnic groups. In different studies worldwide, prevalence of vitiligo has been found to vary from 0.5 to 8% [2-5]. Different studies, carried out in different parts of India have reported prevalence rate of 0.25 to 2.5% [6-10]. Vitiligo lesions do not impair the capacity to work or expectancy of life but may cause significant influence on psychological and emotional well being of the patients. [11,12]. There are many prejudices and taboos associated with this disease that makes it a social embracement for the sufferers. In India, it is sometimes called as-sweth kusth (white leprosy) adding the stigma of leprosy to the disease. Bihar is a 3rd most populous state of India, located in the central part, with a population of 10.41 crores [13]. No study has been carried out to know the prevalence of vitiligo in this region of the country. The aim of our study was to know the prevalence, and clinical pattern of vitiligo that affects population of central part of India.

Material and Methods

This prospective and observational 2 year (24 months) study was done at All India Institute of Medical Sciences, Patna, Bihar, and a tertiary care health centre in central India. All patients of vitiligo visiting dermatology opd from March 2013 to February 2015 were included in the study. Aim of the study was to know clinical profile of patients suffering from vitiligo with associated cofactors. All new cases of vitiligo (diagnosed clinically or by Woods lamp) attending dermatology OPD were included in the study. Patients suffering from depigmented lesion secondary to burns, chemical injury, scarring, physical trauma and drug intake were excluded from study. Detailed history including socio-demographic profile of each patient was recorded in the performa prepared for this purpose. Specific emphasis was given on age of onset, duration of disease, site of onset, type of vitiligo, presence of

lecotrichia, presence of koebners phenomenon and clinical type of vitiligo and associated diseases. A complete history and physical examination was performed to note the characteristic of the disease and associated factors. The evolution of disease as evidenced by appearance of new lesions and the increased in the size of existing lesions, over past 3 months was noted. The clinical subtypes of vitiligo were classified as per Bordeaux classification given by vitiligo global issues consensus conference [13] into three groups, segmental, nonsegmental and unclassified vitiligo. Nonsegmental vitiligo was further classified as generalised, acrofacial, and mucosal and mixed vitiligo. Mucosal vitiligo was defined as involvement of the oral and/or genital mucosae. Acrofacial vitiligo referred to multiple, bilateral, symmetrical depigmented lesions involving acral parts of extremities and peri-orifical regions. Universal vitiligo corresponded to involvement of 80% or more body surface area. Focal vitiligo was defined as small, isolate depigmented non segmental lesion. Vitiligo vulgaris was defined as depigmented scattered lesions widely distributed and usually symmetrical. Segmental vitiligo corresponded to presence of one or more macules in a dermatomal distribution. Mixed vitiligo was defined as coexistence of segmental and non segmental vitiligo. Apart from routine blood examination, blood sugar and thyroid function test were done whenever necessary. Statistical package for social sciences SPSS version 14.0 was used to analyse the data.

Result

A total of 256 vitiligo patients were examined during the study. The accounted for 2.78 % of the total number new patients, who attended dermatology opd clinic during the study period. Among these, 51.5% (132) were males and 48.4% (124) were females. The male to female ratio was 1.06. Mean age at presentation was 24.5 year and age at presentation ranged from 3 months to 79 years. Most common morphological pattern noted was vitiligo vulgaris in 127 (49.6%) of cases followed by acrofacial 66 (25.8%), focal 29 (11.3%), segmental 27, (10.5%), mucosal 4 (1.6%), mixed 2 (0.8%) and universal 1 (0.4%) (Fig.-1). Most common site of onset was lower limbs in 26.56% (68) patients. This was followed by head and neck 24.60% (63), trunk 18.75% (48); mucosal 16.01% (41) cases, upper limb 14.06 (36) (Figure 2). Duration of vitiligo at the time of presentation ranged from 1 month to 50 years. Maximum number of patients had disease duration of 1 to 5 years (53.12%), at the of hospital visit (Fig.-3). A positive family history was observed in 37 (14.4%) of patients. It was observed that 136 (53.1%) patients had a body surface area involvement of less than 2 %, 76 patients (30.15%) had a body surface involvement of 2-5% and 44 patients (17.46%) had more the 5% body surface area involvement (Figure 4). Koebner phenomenon was present in 23.8% (61 cases). Leucotrichia was noted in 17.8% (46 patients). Other associated conditions that were noted in our study included alopecia areata in 2.6%, psoriasis 0.8%, eczema 3.1%, halo nevus in 1.1%, lichen planus 0.3% and thyroid disorders in 6.6% cases (Table 1)

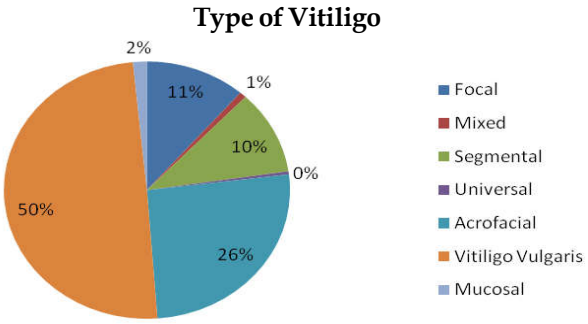

Fig. 1: Chart showing type of Vitiligo

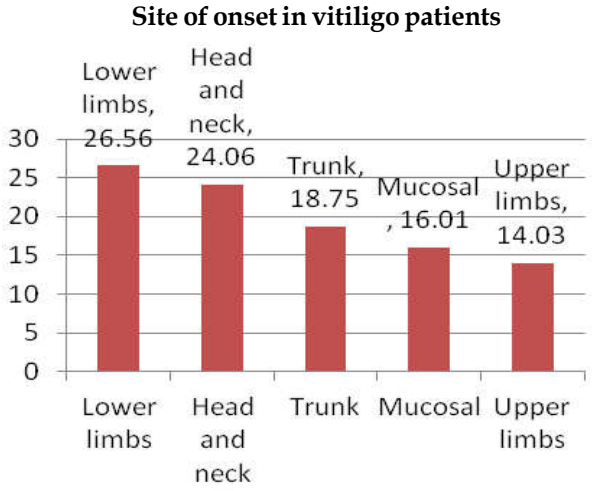

Fig. 2: Chart depicting site of onset of vitiligo

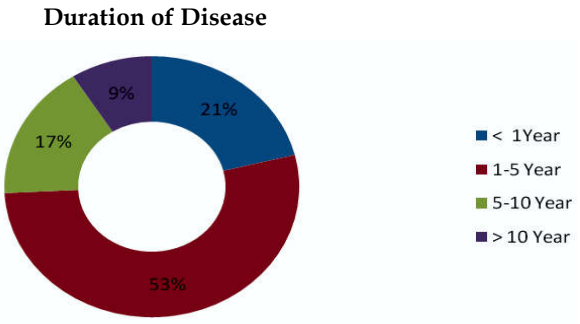

Fig. 3: Duration of Disease

Table 1: Associated Conditions

Alopecia Areata	**6 (2.4%)**
Thyroid Disorder	17 (6.6%)
Eczema	8 (3.1%)
Halo nevus	3 (1.1%)
Lichen Planus	1 (0.3%)
Psoriasis	2 (0.8%)
Diabetes	11 (4.3%)
Atopic Dermatitis	4 (1.6%)

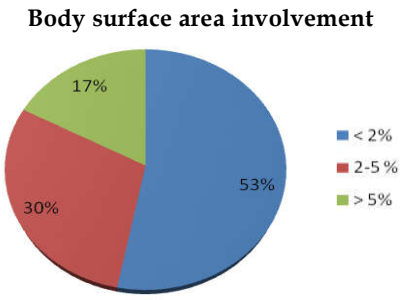

Fig. 4: Chart showing body surface area involvement

Discussion

Vitiligo is an acquired depigmentary disorder that is caused by loss of melanocytes, the pigment producing cells of skin. It presents as chalky white spots over skin which are more noticeable in dark skin people. It causes many social and psychological problems especially in regions with dark skinned people as they are more noticeable. The exact etiology of vitiligo is still not known.

Prevalence of vitiligo varies from country to country and from region to region and in different ethinic group. In our study the prevalence was 2.78%. Most studies from India have reported prevalence of 1-3% [6,7,8,9,10]. All these studies are hospital based studies. A community based study from China found the prevalence to be as low as 0.56% [2]. A Korean study showed annual prevalence of vitiligo determined by hospital visiting rate to be 0.12% to 0.13% over a period of three years [15].The varying ethnic backgrounds of the population residing in different geographic region with varying environmental conditions may contribute to the wide variation in the prevalence in India. The incidences of vitiligo reported in other studies are 2.5% by Handa and Kaur, 1.84% by Martis et al and 1.4% by Sehgal [6,16,17].

Male to female ratio in our study was 1.2. Most of other studies report near equal incidence in males and females [8,18,19]. A study conducted by Handa and Kaur reported female to male incidence of 1.2 [6]. The predominance in females could be attributed to higher aesthetic concern among female population [20]. In males, focal and acrofacial variants were more common where as in females, vitiligo vulgaris was more commonly reported. The number of females affected with vitiligo was higher than males in our study. This may be because of earlier reporting by female patients because of more concern and matrimonial issues. Most of the Indian studies have documented similar result of higher prevalence in female population [9,16]. In contrast to above studies Handa et al found higher prevalence of vitiligo in male population [6].

The duration of disease ranged from 3 months to 50 years with a mean duration of 6.4±8.1 years. Most of the cases (74.1% patients) had disease duration of less than 5 years. Progressive disease was reported in 59.2% patients at the time of presentation. Asyptomatic nature and slow response to medications could be the reason for long duration of the disease. The longer duration of disease could be attributed to the slow progressive nature of the disease and slow response to most of the therapeutic modalities available. Most other studies have reported similar mean duration of disease ranging from 1-5 years [6,8,9]. Disease duration of less than 1 year was present in 21.1%, where as 8.9% patients presented with disease duration of greater than 10 years. 16.8% patients had disease duration between 5-10 years.

Most common clinical type of vitiligo noted in our study was vitiligo vulgaris (127 patients,49.6%). This was followed by acrofacial, focal, segmental, mucosal, mixed and universal. Vitiligo vulgaris has been reported as commonest type of vitiligo in various studies [3,6,9,16]. In contrast, very few studies have reported acrofacial to be the commonest type of vitiligo [8,21]. A study from Japan reported segmental as second most common type of vitiligo[23].

Most common age of onset in our study was 2nd decade (10-20 age group). There was wide variation in age of onset. It ranged from 3 months to 87 years. On comparing age of onset in male and females, we found that female patients presented more commonly 2nd decade where as male patients presented more commonly in 3rd decade. Age of onset was also found to be lower in cases of segmental vitiligo. Other

studies have also reported 2nd -3rd decade as most common age of onset [6,8,9,16]. Wide variation has also been reported in age of onset [2,18].

Family history was noted in 9.4% of patients. Most common type of vitiligo associated with positive family history was arofacial (3.2%), followed by segmental (2.8%), vulgaris (1.9%) focal (1.1%) and mucosal (0.4%). Zhang et al reported highest familial clustering of segmental vitiligo [2]. In most studies, family history in vitiligo patients varies from 8-20% [6,8,9,16]. A study from Pakistan has reported a high family history of 27.8%. [22].

Lecotrichia was noted in 7.5% of patients. Handa and Kaur reported incidence of lecotrichia to be 11.5% [6]. Vora et al reported lecotrichia in 33.5% of patients [9]. A study from Turkey reported leukotrichia in only 3.38% of patients [24]. Leukotrichia was associated most commonly with vitiligo vulgaris (3.4%) followed by segmental vitiligo (2.9%) and focal vitiligo (1.2%). Presence of lecotrichia is significant because it is associated with poor response to medical therapy. Koebnerisation was noted in 6.2% of patients. Koebnerisation was more common in progressive form of disease than in non progressive form. Incidence of koebneration phenomenon ranged from 5-31% in different studies [6,8,16].

Systemic diseases like hypo/hypertheroidism, diabeties, hypertension, pernicious anaemia, autoendocrinopathy, Sjogren syndrome can occur in patients of vitiligo. A retrospective population –based study conducted in Taiwan showed a significant association between vitiligo and several comorbid diseases, including alopecia areata, Hashimoto thyroiditis, myasthenia gravis, psoriasis, Graves' disease, Sjögren's syndrome, systemic lupus erythematosus and atopic dermatitis [25]. In our study, thyroid disorder was noted in 6.6% of patients. Incidence of thyroid disorders has been reported to vary between 0.2-9% in various studies [3,8,16]. Diabetes was noted in 0.8% of patients.

Various cutaneous diseases and findings like alopecia areata, halo nevus, atopic dermatitis, psoriasis, eczema, premature greying can occur in vitiligo [26, 27]. In our study vitiligo was associated with alopecia areata (2.4%), atopic dermatitis (2.6%), halo nevus (1.1%), eczema (3.1%), psoriasis (0.08%). Handa and Kaur reported alopecia areata in 0.4% and atopic dermatitis in 1.4% in their study [6]. Yazanpanath et al reported coincidence of vitiligo and psoriasis in 0.19% of patients. [28]

Though we didn't screen all patients for audiometric abnormality, 6.2% (16) patients reported impaired hearing, which was confirmed by test. Akay et al reported that sensineural hypoacusis was found in 37.7% of vitiligo patients [29]. In a study from south India hypoacusis was present in 10% of cases [30]. Melanocytes play an important role in hearing process as melanocytes reside in the cochlea and loss of these melanocytes leads to deafness [31].

Though the result of our study was similar to studies from other parts of India, this is first study on the clinical and epidemiological aspect of vitiligo from this part of India. A limitation of our study was that it was hospital based study which may not reflect the true prevalence rate of vitiligo in the general population.

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Original Article

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Application of Low Level Laser in Managament of Biofilm

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Abstract

Management of biofilm in chronic wounds is rapidly becoming a primary objective of wound care. However management of biofilm is an undeniably complex task. Beyond the basic steps of initial prevention (use of anti-biofilm agents), removal (debridement, desloughing) and prevention of reformation (use of antimicrobial agents), there are myriad patient, environmental and clinical parameters that must be considered when identifying a tailored solution. Systemic treatment strategies are required for infected chronic wounds, whereas in non-infected wounds where the presence of biofilm is impeding healing, strategies can be adopted to break up the biofilm. The antimicrobial effects of various lasers have been studied in vitro, and most reports have indicated that laser irradiation is useful for bacterial suppression. In the present case report we discuss the use of low level laser therapy in chronic leg wound.

Keywords: Biofilm; Chronic Wound; Low Level Laser Therapy.

Introduction

Biofilms are described as bacteria attached to surfaces, encapsulated in a self-produced extracellular matrix and tolerant to antimicrobial agents (this includes antibiotics and antimicrobials). Less than 10 studies have visualised biofilms in non-healing chronic wounds using the accepted approaches of microscopy with or without molecular analysis [1,2]. These studies identified the presence of biofilms in 60% to 100% of samples. Currently, there is no 'gold standard' diagnostic test to define the presence of wound biofilms and no quantifiable biomarkers. Clinicians should 'assume all non-healing, chronic wounds that have failed to respond to standard care have biofilms' and, therefore, treatments should be targeted towards this [3]. Targeted therapies could be used to improve healing in cases where microbial biofilms is a causal component of chronic wounds as unique strategies to make microbes more susceptible to antimicrobials for clearance by the host immune system and therapiesdirected at preventing a prolonged inûammatory component of wound healing.

Low level laser therapy (LLLT) is the application of light usually alow power laser or LED in the range of 1mW – 500mW. Thelight is typically of narrow spectral width in the red or near infrared(NIR) spectrum (600nm – 1000nm), with a power density (irradiance) between 1mw-5W/cm^2. LLT is not an ablative or thermal mechanism, but rather a photochemical effect comparable to photosynthesis in plants whereby the light is absorbed and exerts a chemical change [4]. In our case report we discuss the application of LLLT in chronic leg wound and the changes in the wound leading to effective treatment of a debilitating condition.

Material and Methods

57 year male with wounds over right leg since 8months post traumatic injury which was non progressive in nature with minimal, non-foul smelling discharge with no associated fever. On examination wounds were of size 6 x 5cm and12x8cm over medial and anterior aspect of lower one-third of leg respectively, both covered by pale, slimy granulation tissue with slough, surrounding skin hyper pigmented and indurated. No evidence of arterial or venous insufficiency confirmed by

Doppler study. Patient tissue culture was positive for pseudomonas and proteus. Biopsy showed no evidence of malignancy.

Patient underwent LLLT therapy using Gallium Arsenide laser for 10 minutes over the raw area of the wound over the medial surface and saline dressing of wound for 2 weeks every alternate day. At the end of 2 week wound over medial surface showed pink granulation tissue with reduction of surrounding oedema whereas wound over anterior surface remained pale. During this period patient was splinted, no debridement of wound performed and systemic antibiotics were administered as per sensitivity report. No local antibiotics used.

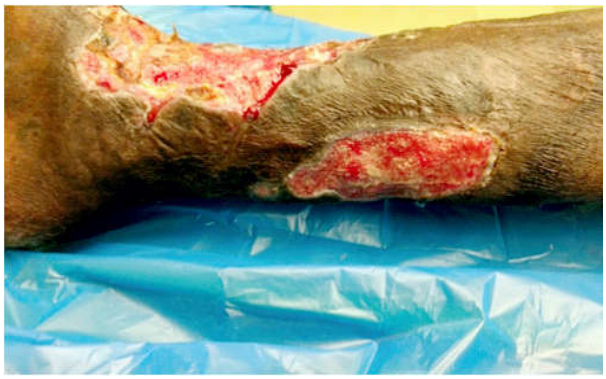

Fig. 1: Wound at presentation

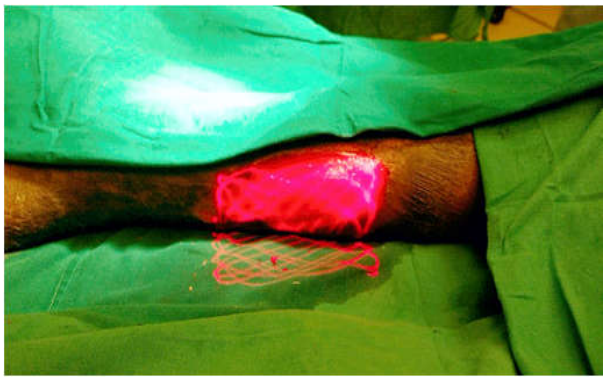

Fig. 2: LLLT of wound over medial surface

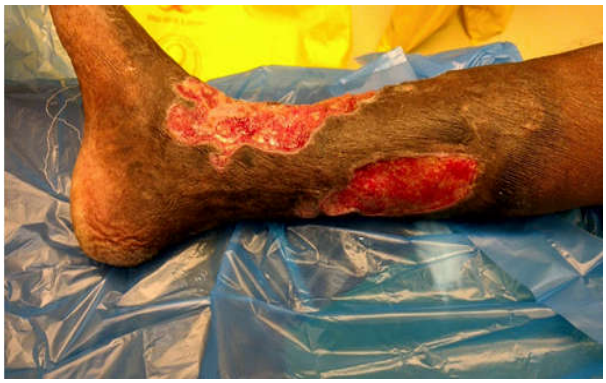

Fig. 3: wound at the end of second week

Discussion

The prevention and management of biofilms in chronic wounds is rapidly becoming a primary objective of wound care, with the presence of biofilms acknowledged as a leading cause of delayed wound healing. The biofilms interfere with normal wound healing, apparently by 'locking' the wound bed into a chronic inûammatory state that leads to elevated levels of proteases (matrix metalloprotease and neutrophil elastase) and reactive oxygen (ROS) that damage proteins and molecules that are essential for healing, biofilms maintain localised low oxygen tensions in the wound, thus contributing to chronicity [5,6]. A large percentage of bacteria in biofilms communities are metabolically dormant, which generates tolerance to antibiotics. Identification of biofilms in clinical practice is difficult, with few guidelines availableto facilitate its recognitionKeast et al. propose four main features that may increase suspicion of the biofilm presence, as follows:

1. Antibioticfailure
2. Infection of >30 days duration
3. Friable granulation tissue
4. A gelatinous material easily removed from wound surface that quickly rebuilds[7].

Once the likelihood of biofilms presence is established, an appropriate treatmentstrategy should be determined with aims to reduce burden and preventits reconstitution.

Low level laser therapy is irradiation of pathology (raw area) with light of near infrared radiation spectrum affects the biofilm and the wound. LLLT causes to disaggregation of microorganisms which form the biofilm and lose of adherence but doesn't reduce the number of micro-organisms.Different microbial species have different susceptibility to LLLT [8]. Nussbaum et al. also demonstrated that LLLT (λ=810 nm) at 5, 10, 20 and 50 J/cm2 doses was effective in inhibiting growth of Pseudomonas aeruginosa and Staphylococcus aureus [9].

LLLT not only affects biofilm but has effect on surrounding tissue. The molecular and cellular mechanisms LLLT suggest that photons are absorbed by the mitochondria; they stimulate more ATP production and low levels of ROS, which then activates transcription factors, such as NF-κB, to induce many gene transcript products responsible for the beneficial effects of LLLT. ROS are well known to stimulate cellular proliferation of low levels, but inhibit proliferation and kill cells at high levels. Nitric

oxide is also involved in LLLT, and may be photo-released from its binding sites in the respiratory chain and elsewhere. It is possible that NO release in low amounts by low dose light may be beneficial, while high levels released by high dose LLLT may be damaging. The third possibility is that LLLT may activate transcription factors, up regulating protective proteins which are anti-apoptotic, and generally promote cell survival [10,11].

Hence LLLT can be an effective tool in management of chronic wound. Further research is needed to evaluate the behaviour of different microorganisms, and their interaction in biofilms when subjected or not to LLLT and substantiate benefit of LLLT on wound healing.

Conclusion

LLLT an evolving option for chronic wounds and biofilm management can be considered during routine wound care.

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Non Responder of Alopecia Totalis to Diphencyprone Responding to Addition of Betamethasone Pulse

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Abstract

Introduction: Contact sensitizers remain the mainstay of treatment of alopecia areata totalis (AT). Systemic steroids in different regimes have been tried in AT with variable success. Many authors consider that addition of systemic steroids to the contact sensitizing protocol may mitigate the effect of the latter. However, there is scarcity of studies evaluating the response to combination therapy of systemic steroids with contact sensitizers. *Case Summary*: We report the case of a 19-year-old boy with AT of 5 years duration. Diphenylcyclopropenone (DPCP) was applied to right half of the scalp as per the standard protocol. With no response even after six months of this treatment, DPCP application was stopped and oral betamethasone pulse at the dose of 0.1 mg /kg weekly was started. Within 4 weeks of Betamethasone pulse, new hair growth was visible only on the right half of the scalp. DPCP was re-instituted on the same side of the scalp along with continuation of systemic steroids. Left half of the scalp served as control. At 8 weeks, DPCP treated side showed excellent growth while the left side responded poorly. *Conclusion:* This singular split scalp treatment outcome suggests that the response of contact sensitizers like DPCP is not suppressed by systemic corticosteroids; rather seems to have a synergistic effect in the treatment of AT.

Keywords: Alopecia Totalis; Areata; Diphenylcyclopropenone; Oral Minipulse; Steroid.

Introduction

Alopecia areata (AA) is relapsing disease with a variable course. Its management is guarded with a highly variable response to DPCP.

Systemic corticosteroids have been used in severe forms of alopecia areata [1]. To minimize the side effects of daily systemic corticosteroids, oral mini-pulse (OMP) therapy with various steroids has been used with success in alopecia areata [2,3,4]. Topical immunotherapy has been variably advocated in extensive alopecia areata, efficacy of which varies from 5 to 85%. Non responders to DPCP have also been reported. The reason for non response to DPCP has not been studied extensively. There aren't any reports of combination of DPCP and systemic steroids in AA.

Hereby, we report a case of alopecia totalis (AT) a non responder to DPCP monotherapy who responded to addition of betamethasone pulse; contradicting to the assumption that steroids negate the effect of contact sensitizers.

Case Report

A nineteen year old Asian boy had total baldness on the scalp since five years. On examination, he had complete alopecia over the scalp with presence of few terminal hairs and his body hair was normal. Skin over the scalp showed no evidence of atrophy or scarring (Figure 1). The patient did not receive any treatment in the past. A clinical diagnosis of AT was made and patient was started with topical immunotherapy in the form of DPCP.

The patient was sensitized with DPCP 2% on the occipital bald area of 4cm. A mild to moderate irritant reaction as expected was noted after 48 hours. After 2 weeks of sensitization, a single coat of 0.001% DPCP was applied to the right half of the scalp using cotton tipped applicator in view of conducting a split scalp placebo control comparative study. Application was repeated weekly with gradual increase in the DPCP concentration (0.001%, 0.01%, 0.05%, 0.1%) according to the patient's response; the aim being to maintain erythema and pruritus for 48 hrs. The

patient developed mild erythema at concentration of 0.1%; therefore this concentration of DPCP was maintained for the next 6 months. However, there was no response in terms of hair growth (on the right side of the scalp) (Figure 2). Therefore, DPCP was discontinued and patient was shifted to oral minipulse (OMP) steroids in the form of oral minipulse betamethasone 0.1 mg /kg/week in two divided doses, on two consecutive days. Within four weeks of betamethasone pulse therapy, new hair growth was noted on the DPCP treated side (Figure 3). Having noticed such a dramatic response in a short period of time, DPCP was reintroduced in order to evaluate the synergistic effect of DPCP and oral steroids. In this way, the right half the scalp received DPCP while left half served as control along with continuation of oral betamethasone. Within 8 weeks of treatment, right side of the scalp (DPCP+ OMP) showed significant regrowth as compared to the left side (DPCP only) which showed poor response (Figure 4).

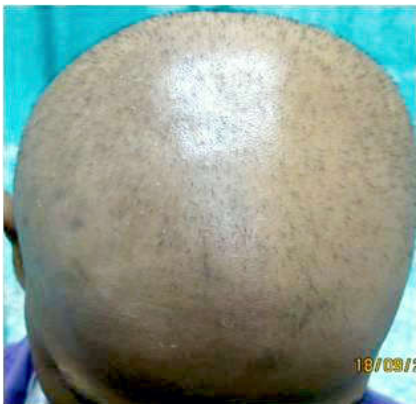

Fig. 1: Patient of alopecia totalis with presence of few terminal hairs and no evidence of atrophy or scarring

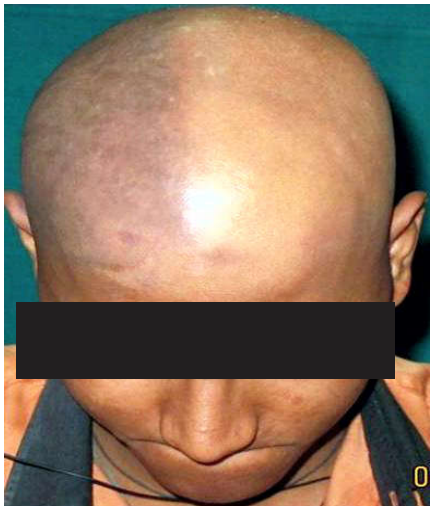

Fig. 2: No response in terms of hair growth noted on the DPCP treated right side of the scalp at the end of 6 months. Only mild erythema of DPCP seen

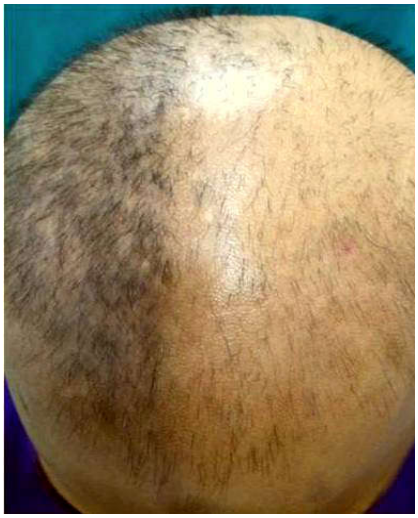

Fig. 3: New hair growth noted on the DPCP treated side within four weeks of betamethasone pulse therapy

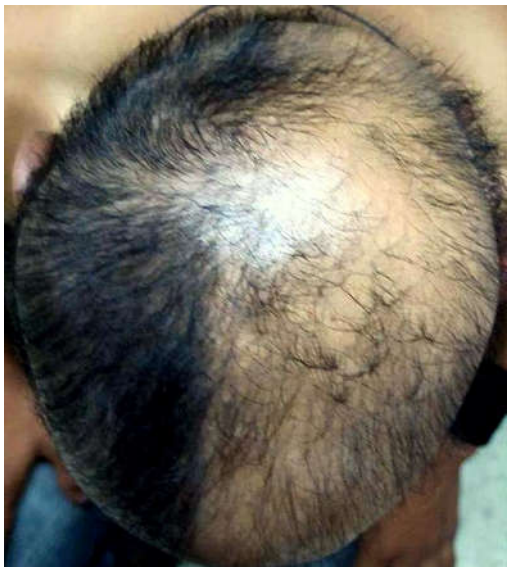

Fig. 4: Right side of the scalp (DPCP+ OMP) showing significant regrowth as compared to the left side (DPCP only) at the end of 8 weeks of treatment.

Discussion

Pathogenesis of alopecia areata is multifactorial. The recent theory on pathogenesis of alopecia areata as per Paus et al [5] focuses on a breach of immune privilege as main cause of AA, the anagen hair bulb represents an immune privileged site characterized by the absence of major histocompatibility complex (MHC) class I expression and the presence of immunosuppressive cytokines such as TGF-b (transforming growth factor b).There is induction of CD8+ and CD4+ T cells targeted to newly exposed follicular antigens, which are normally sequestered from immune recognition. This immune

dysregulation could induce hair loss in AA through multiple mechanisms including: Direct cytotoxicity by CD8+ T cells, natural killer cells (NK), or NK-T-cell activity; Antibody dependent cell-mediated cytotoxicity (ADCC) etc. Immunotherapy reverses these changes. Skin treated with topical sensitizers shows a decrease in peribulbar CD4D CD8 ratio. There is a shift in the position of T lymphocytes from the perifollicular to the interfollicular area.

Systemic steroids for AA have been used in various forms. Sharma [3] administered oral prednisolone as pulses in doses of 300 mg at 4 weeks intervals. Cosmetically acceptable hair growth was seen in 58.3% patients at 4 months of treatment and relapse was seen in 2 patients after stoppage of therapy at 3 and 9 months respectively. In another study, Sharma et al [4] have reported complete hair growth in 26.6% of patients and a good response in 36.6% of patients treated with oral mini-pulse with dexamethasone.

Topical immunotherapy has been used for the treatment of severe alopecia areata. Immune modulating effect of topical immunotherapy is unclear. Response rate with diphencyprone ranges from 5% to 85% [6-11] which has led to considerable confusion surrounding its therapeutic value and efficacy. Several prognostic criteria have been identified: presence of nail changes, personal history of atopy, duration and extent of AA, age at onset of disease. In contrast to these parameters, histopathological features that may exert an influence on the therapeutic outcome of topical immunotherapy in AA have not been much explored. Paul et al [12] have examined histopathological changes in scalp biopsy obtained from 85 patients with severe AA before initiation of Diphencyprone treatment and concluded that non responder to topical sensitizers tend to have rather pronounced inflammatory reaction with dense perifollicular lymphocytic infiltrate.

A similar study showed that the combination of corticosteroids and contact sensitizer (anthralin) showed good response in treatment resistant, extensive alopecia areata. Out of eight patients with alopecia universalis/alopecia totalis, two attained cosmetic response as early as three months, two at six months and one showing partial response; thus concluding that the combination therapy was synergistic, safe and effective [13].

This study showed synergistic response with anthralin as a contact sensitizer; whereas in our study, DPCP was used. This explains the augmented effect of corticosteroids with topical sensitizers where corticosteroids may help in reducing the pronounced inflammation around the bulb leading to a more favourable response to contact sensitizers.

This split scalp study similarly proves the synergistic effect of corticosteroids with contact sensitizers in treatment of alopecia totalis.

Conclusion

The efficacy of DPCP in the treatment of AT is poor. This split scalp study proves that the addition of systemic steroids augments the effect of DPCP.

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Anaesthetic Management of a Patient with Known Latex Allergy and Hypersensitivity to Multiple Drugs

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Abstract

The first case report of natural rubber-associated allergic reaction was described in Germany in the year 1927: a case of latex associated allergy by type I or immediate hypersensitivity [1]. Despite the increase of latex associated allergy in general population, severe anaphylactic reactions during some surgical procedures are still rare; however, they are associated with increased morbidity and mortality. Up to now, natural latex rubber is still the second most common cause for anaphylactic reactions during anesthesia [2]. Prevention, diagnosis, treatment, and follow-up of patients affected by this event represent a big challenge for anesthesiologists. The objective of this report was to describe the anesthetic management of a patient with known latex allergy and associated allergy to multiple drugs, food and fibres and to take measures to prevent life threatening allergic emergencies.

Keywords: Anaphylaxis; Contact Dermatitis; Latex Rubber.

Case Report

The following manuscript describes the perioperative management of a healthy 32 year old married Asian female, health worker by profession with a known history of latex hypersensitivity and allergy to multiple drugs and other allergens (food and fibres) diagnosed by skin prick and patch testing (Table 1) on allergist follow-up and was on immunotherapy posted as an elective case for laparoscopic Cholecystectomy. The patient had no other associated co-morbidities. The Patient was diagnosed for latex hypersensitivity 10 years back when she developed urticaria on multiple exposures to latex gloves as well as to the powder used in rubber gloves.

This patient was planned for an elective cholecystectomy one month back at a District hospital in view of her chronic cholecystitis with multiple gall stones. But she developed a severe anaphylactic reaction on the day of surgery in the preoperative room two hours after she was cannulated by a nurse in the ward without any intravenous drugs being given. The patient was resuscitated immediately with boluses of IV adrenaline, antihistamines and corticosteroids and was discharged after an overnight observation in that hospital. The cause of this severe allergic reaction was attributed to her previous history of latex allergy as none of the medical equipments used were confirmed to be latex free and that she did not receive any other drugs before the anaphylaxis occured. This patient was then referred to our superspeciality referral hospital for the perioperative management of her laproscopic cholecystectomy in view of her being a high risk case for developing latex associated severe allergic reactions.

At our hospital a thorough workup about the patients history and investigations was done in the preanesthesia evaluation clinic, the patient was referred to the immunologist for further evaluation and to know about cross sensitivity and reactions to other drugs to be used during her stay in the hospital. Skin prick testing and patch testing were done to ascertain and document the allergic reaction to latex and other allergens. On evaluation she was found to be allergic to a multitude of drugs, food and fibres (Table 1) was put on immunotherapy by the allergist for a period of 4 weeks before giving clearance for the anesthesia and surgery. She was also evaluated for allergy to anesthetic drugs which was found to be

negative. Since, this patient had a uneventful history of tooth extraction under local anesthetic lidocaine 7 years back.

The patient was given clearance for anesthesia and a high risk informed consent was taken for anesthesia and surgery. The theatre staff was notified a day before the surgery and all necessary preparations were done to minimize latex exposure to the operation theatre. The patient was kept first in the list in order to minimize the use of latex containing substances in the theatre to get a latex safe environment. On the morning of surgery patient received oral premedication Montelukast 10 mgs, Levocetrizine 10mg, Ranitidine 150 mgs and Metoclopromide 10mgs with a sip of water one hour before the scheduled surgery. The patient's latex allergy was documented in the case notes and the operation theatre was sealed for minimum flow of human traffic and the main door of theatre was notified as a restricted zone in order to minimize airborne latex exposure. All items containing latex were removed from the patient care area. Only non-latex medical supplies were used including, (Figure 1, 2 &3) but not limited to

- Gloves
- IV equipment
- Ventilation and airway equipment
- Catheters
- Surgical tape
- Tourniquets
- Medication containers without latex stoppers.

Anaesthetic circuit which was used was made of silicon and latex free PVC face mask were used. Patient was induced after attaching all the standard ASA monitoring. Airway was secured with size 4 latex free LMA, paper dressings were used for securing the intravenous cannula and fixing the LMA. A resuscitation trolley with resuscitation drugs and equipments was kept standby with prior notification to the ICU staff in order to avoid any catostrophe.

Table 1: *Allergic Skin Prick Testing Report:* Showing patient strongly positive for multiple allergens viz; D. Mite, F Salavius, R. nigricans,Penicillin Sp., few pollens, house dust, epithelial and Insects

DEPARTMENT OF IMMUNOLOGY AND MOLECULAR MEDICINE
SHER-I-KASHMIR INSTITUTE OF MEDICAL SCIENCES

ALLERGEN SKIN PRICK TESTING REPORT

Name of the patient: Bhat Haseena Age/Sex:32/F MRD:024010

CC NO._____ Ward/Bed: OPD Previous Diag: Urticaria under Evaluation

Date of Testing:09/12/2015 Referred by_____ Lab. No.581

S No.	Name of The Food Allergen	Result	S No.	Name of The Food Allergen	Result
1	Mite(D.pteronyssinus)	**P 6x6mm**	12	R.Nigricans	**P 5x2.5mm**
2	Pollens	**P 5x5mm**	13	Penicillin Sp.	**P6x5mm**
3	Fungi	**P5x5mm**	14	Asp. Few pollens	**P5x5mm**
4	Dust	**P5x2.5mm**	15	House dust	**P8x6mm**
5	Dog epithelia	**P8x6mm**	16	Mosquito	**P5x5mm**
6	Sheep wool	**P6x6mm**	17	Cucumber	**N**
7	Cockroach	**P5x5mm**	18	lemon	**N**
8	Spinach	**N**	19	Chocolate	**N**
9	Cheese	**N**	20	Cat epithelia	**P5x5mm**
10	Eggwhite	**N**	21	Peanuts	**N**
11	Peas	**N**	22	Prawns	**N**
	Positive Control (Histamine)			Negative Control (Normal Saline)	

POSITIVE : **Multiple Allergens viz; Drugs, Food, fibres, dust, pollens, insects and fibres.**

Sign of Resident Sign of Consultant

Table 2: *Food Allergen, Skin Prick and Patch Testing Report*: Suggests Latex allergy positive report

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FOOD ALLERGEN SKIN PRICK TESTING REPORT

Name of the patient: Bhat Haseena Age/Sex: 32/F MRD: 193017

CC NO._____ Ward/Bed: OPD Previous Diag: Chronic Urticaria, Asthma

Date of Testing: 07/09/2016 Referred by_____ Lab. No.90

S No.	Name of The Food Allergen	Result	S No.	Name of The Food Allergen	Result
1	Walnut	N	10	Egg white	N
2	Pista	N	11	Garlic	N
3	Raddish	N	12	Orange	N
4	Curd	N	13	Carrot	N
5	Almonds	N	14	Tomato	N
6	Fish	N	15	Rice	N
7	Saffron	N	16	milk	N
8	Spinach	N	17	Peanuts	N
9	Cheese	N	18	Latex	P 6mmX5mm
	Positive Control (Histamine)	15mm P		Negative Control (Normal Saline)	NIL

*P-positive *N-Negative

Positive : **Latex**

Comments

Sign of Resident

Sign of Consultant

Fig 1: Anesthetic Drugs and antibiotics being used without latex impregnated rubber caps and(b) latex free Intravenous cannula

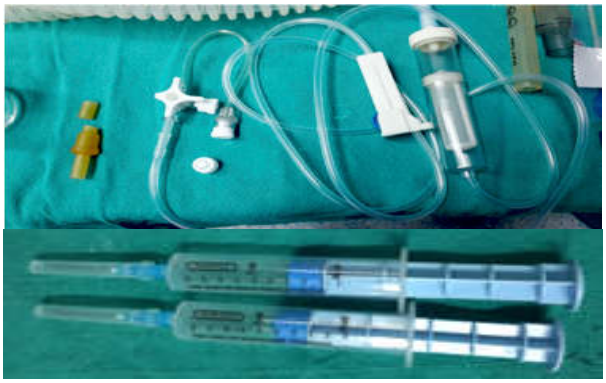

Fig. 2: Rubber material removed from the intravenous drip set to make it latex free. (b)Latex free syringes and arterial cannula

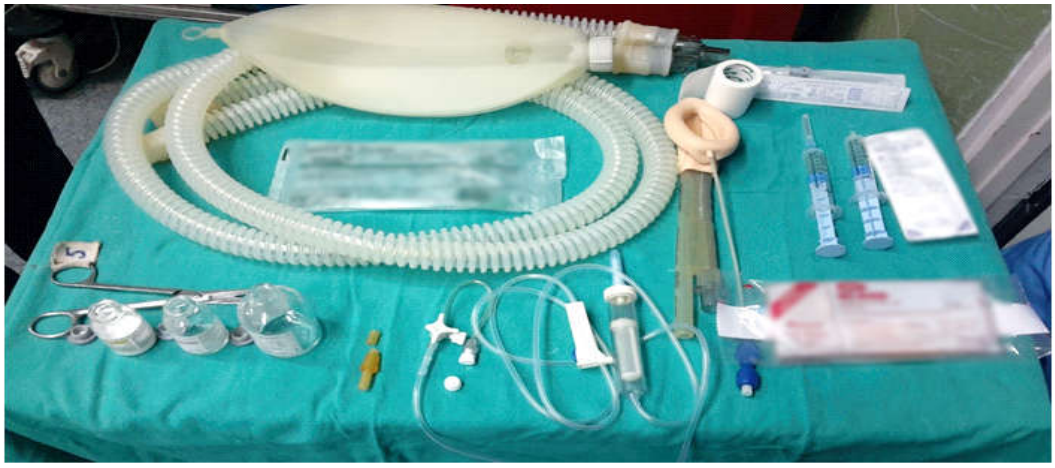

Fig. 3: Anesthetic Trolley with latex free drugs and equipments

Surgery was started 20 minutes after the initiation of anesthesia. No reactions or any other complications to anesthesia occurred during that period. After extubating, patient was shifted to the postoperative recovery (PACU) area for monitoring where she remained stable and was shifted to general surgery ward after being observed for 2 hours postoperatively. Patient was discharged after two days in a stable condition with uneventful post operative course.

Discussion

The clinical manifestations of exposure to latex is a well established spectrum ranging from mild allergic contact dermatitis, which is not mediated by the immune associated response, to late hypersensitivity reaction (type IV mediated by T cells and immediate hypersensitivity reaction type I), also known as anaphylactic or IgE-mediated reaction [3]. The degree of severity, type I reactions can be divided into: I) cutaneous-mucous reactions II) moderate multivisceral reactions III) life-threatening with mono- or multi-visceral reactions IV) cardiorespiratory arrest V) death occurring because of inadequate response to cardiorespiratory resuscitation maneuvers [4].

Severe allergic manifestations to natural latex rubber have been documented in the literature since the last two decades. Since then, the incidence of allergic reactions could be decreased considerably by avoiding rubber exposure during surgeries in the operation theatres, which is considered to be the most important measure to reduce such reactions in the vulnerable population. Despite this knowledge and documentation, natural latex rubber products are still in use because of the higher costs of latex-free products and their inferior quality. Incomplete manufacturer's specifications or labels on the surgical anesthetic equipments pose yet another problem in identifying the products containing latex.

The other important reasons for reducing the use of natural latex rubber were high-risk groups, such as patients with atopic syndrome or Spina bifida, surgery in infancy, and health professionals [5]. Prevalence is very high, and allergic reactions to natural latex rubber represent potentially life-threatening intraoperative complications [6]. Allergic reactions to natural latex rubber during anesthesia still amount a mortality rate from 5% to 7% [7]. Patients with atopic syndrome show a predisposition towards sensitization to natural latex rubber significantly, meaning a constant repeated contact with rubber containing materials [8]. Many affected patients have had history of multiple surgeries because of Spina bifida or anomalies of the urogenital tract in early infancy and thus high natural latex rubber exposure [9].

The medical history itself was conclusive taken from this patient as documented in this case report .The fact that the patient had been previously exposed to natural latex rubber- because she was a healthcare worker was ascertained on history and the available investigations and that she had received multiple immunotherapies so far (Table 1 and 2). Early exposure to natural latex rubber is a relevant factor for developing an allergy to latex in later life [9]. For preventing allergies to natural latex rubber, premedication with antihistaminics and corticosteroids has been suggested. Premedication with histamine receptor antagonists (Ranitidine-H2 blocker + Levocitrizine-H1 blocker) and leukotriene (LT4) receptor antagonist (Montelukast) was used in

our case. The cost of extensive pre-surgery screening is also not relevant for every patient [10]. However, the diagnosis was well established in our case pre operatively by skin prick and patch testing guided by strong positive allergic episodes. Preoperative diagnosis by means of 'skin prick method' is not required always but can aid in the diagnosis, particularly for patients with spina bifida (upto 44% show latex allergies), dysplasia of the genitourinary tract and atopic dermatitis aswell as for the patients with occupational exposure to latex and allergies to food(eg; figs, papayas, chestnuts and kiwis) [10].

In case of all precautionary measures, if an intraoperative anaphylactic reaction occurs, it is crucial to first stop the contact with the allergen. The following list of measures shows a short overview of necessary interventions to be done:

- Stop contact with the allergen:
  - ⊙ Gloves have to be taken off outside the theatre and clothes must be changed.
  - ⊙ All personnel wearing latex gloves have to leave the operating theatre immediately or as quickly as possible.
- All items containing latex should be removed from the theatre.
- Recruitment of personnel, such as physicians and nursing staff.
- Priorities are ist securing the airways, oxygen administration and maintaining normal haemodynamics by increasing volume intake and early adrenaline administration.

  Simultaneous corticosteroids and antihistamine administration. The authors of this case report suggest the following measures to be taken in case of an acute anaphylaxis- As per the hospital protocol in case of a severe allergic reaction of any kind.
- In case of a suspected airway swelling, administer nebulised adrenaline via a mask, intravenous corticosteroids and intubate as soon as possible if already not done so.
- Oxygenation with sufficient FiO2, bronchoconstriction needs to be treated with nebulised bronchodilators.

Additional intravenous cannulae, volume replacement, adrenaline boluses and cardiopulmonary resuscitation if necessary.

Second line-therapy- with H1/H2-antihistaminics.

Further physical examinations- reevaluation.

Conclusion

Regular and systematic education of patients, their families, healthcare workers and employers is an integral part of the management of latex allergy.

Patients and their family members who are diagnosed with latex allergy should be educated about the common symptoms and the management of this condition. They should also be made aware about the preventive measures to avoid future exposure of the offending allergen.

Healthcare workers should be imparted knowledge and trained about how to recognise the signs and symptoms of an allergic reaction and to treat an anaphylactic reaction.

Hospitals and healthcare centres should have set protocols and policies to ensure safety of both patients and the healthcare workers.

Natural latex rubber products can cause allergic reactions with a wide range of clinical signs and symptomatology, the spectrum ranging from mild eczema to severe and life threatening anaphylactic reactions. Furthermore, intraoperatively the diagnosis might get impeded by highly variable clinical symptoms, the ill response of patients, anesthesia-induced change in haemodynamics, blood loss during surgery. Therefore, prevention of exposure particularly in the high risk group seems to be even more important than raising awareness for allergies to natural latex rubber.

- Stopping the use of natural latex rubber or its by-products is the ist step to prevent a latex associated anaphylactic reaction.
- A standardized questionnaire on preoperative assessment about latex allergy or any previous exposures to latex should be documented before any anesthetic procedure.
- A list of latex containing equipments in the operation theatre should be compiled and replaced by non-latex containing material.
- A hospital based standardized protocol must be laid down about the treatment should a anaphylactic reaction occur at anytime in the perioperative period and such a policy be written down in a standard operating procedure (SOP).
- Simulations and continuous medical education about the management of an anaphylaxis can be exercised along with the

basic and advanced life support training in a hospital setting.

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Radiofrequency Assisted Management of Trap Door Scar

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Abstract

Scar revision forms a major part of plastic surgery practice. Various methods of scar revision have been described including revision by Z Plasty, W Plasty, serial excision, dermabrasion of the scar etc. the final outcome of scar revision depends on various factors like type of scar, skin type of the patient, orientation of the scar, technique used for revision and instrument used for revision. In this article we describe the use of the radiofrequency probe for revision of a trapdoor scar in a 32 year old patient and its benefits.

Keywords: Scar; Radiofrequency.

Introduction

The Radiofrequency cautery is also known as "poor man's laser" or "cold cautery". It uses alternating current at very high frequencies (500-4000 KHz) for producing ablation of tissues. It can be used for electrofulgration, electrodessication or electrocoagulation [1,2]. The radiofrequency probe ensures precise cutting with minimal collateral damage producing more aesthetically pleasing scars. This also ensures that healing is faster. It is highly effective in causing cutting of the skin at the same time coagulating tissues ensuring good hemostasis. Because of the simultaneous effects of cutting and coagulation, time taken to finish surgery is also faster. Procedures can be performed under local anesthesia. Lesions that would otherwise require the use of expensive ablative lasers can be treated in a fast, cost effective manner by the use of radiofrequency ablation [3,4,5,6]. It can be used to do full thickness excisions or to superficially shave off lesions. Its cosmetic uses include excision of naevi, removal of vascular lesions like hemangiomas, face lifts, abdominoplasty etc [7].

Here we present the case of a 32 year old male patient with a post traumatic, post operative trapdoor scar on the right cheek for whom scar revision was done with the use of radiofrequency cautery.

Case Report

A 32 year old male patient presented to the plastic surgery outpatient department with history of post traumatic, post operative unsightly scar over the right cheek since 30 years. Patient did not complain of pain, pruritis or altered sensation in the region of the scar.

On examination, a curvilinear, hyperpigmented, mature, depressed scar was present over the right cheek measuring 8 cm in length and 4mm wide in the broadest part of the scar. There were multiple

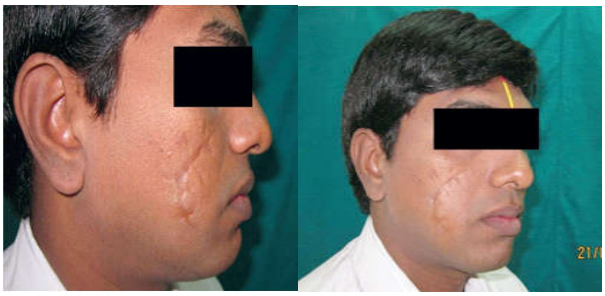

Fig. 1a and b: Preoperative pictures showing unsightly scar over right cheek

hatch marks running across the central scar. A trapdoor component was also noted to be present. There was no tethering to the underlying structures. The Vancouver scar scale (VSS) score was 3. The patient had Fitzpatrick type 5 skin. The patient was informed about various treatment modalities available and a final plan for serial excision of the scar was made.

After investigating the patient and obtaining informed written consent, the patient underwent Radiofrequency assisted excision of the central part of the scar under local anesthesia. The power of the radiofrequency used was 1W. The wound was closed with absorbable subcuticular sutures. Intraoperatively it was noted that the use of the radiofrequency probe provided good cutting of the scar tissues with adequate hemostasis. This ensured faster completion of the surgical procedure. The first post op check dressing was done on post op day 3 which showed good wound healing with a fine scar. After 10th post operative day, the patient was advised silicone gel application and sunscreen application to prevent hypertrophy and hyperpigmentation of the scar. The patient was followed up for a total period of 2 weeks and the follow up was uneventful. The postoperative VSS score was 0.

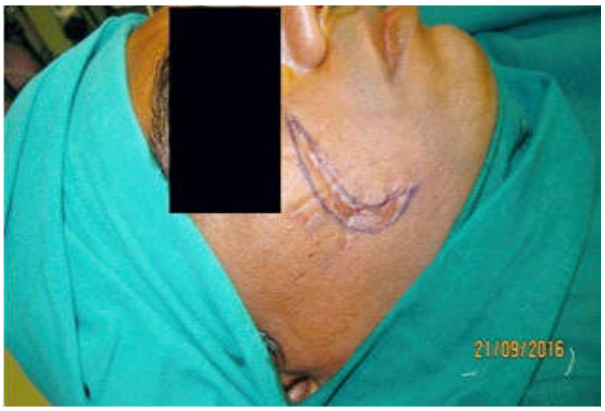

Fig. 2: Intraoperative picture showing markings for excision

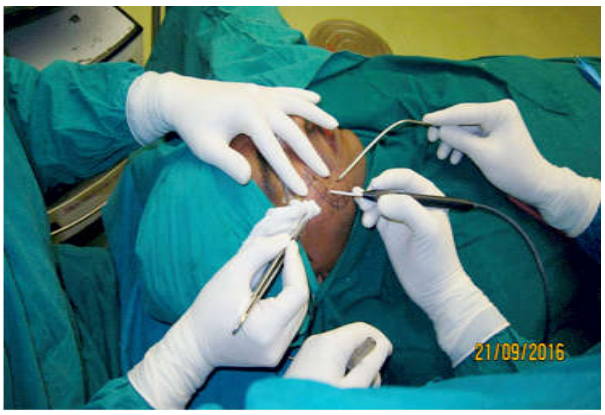

Fig. 3: Use of Radiofrequency for excision of scar

Fig. 4a and b: Intraoperative pictures showing scar after excision and immediate postoperative appearance following suturing.

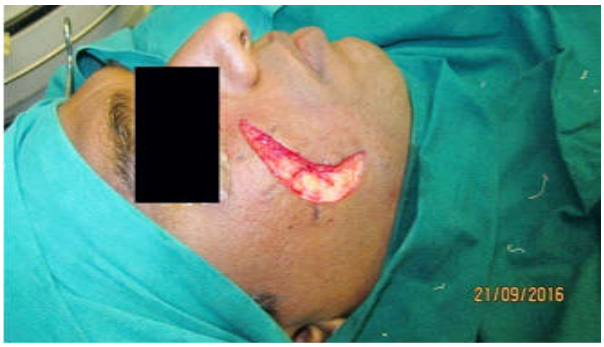

Fig. 5: Appearance at 10 days postop

Discussion

Since the establishment of electricity, electrosurgery has been used in medical practice. Electrosurgical instruments have evolved from more basic instruments to better developed machines [8]. The radiowaves created by the radiofrequency unit travel through the cautery tip to the patient and back to the unit through a plate antenna placed close to the patient. When the waves pass through the body, the body tissues offer resistance which in turn generates heat which causes boiling of the tissue water and rupture of the cell membrane producing a cutting effect. The heat causes denaturation of the body proteins causing a coagulation effect. The various waveforms used causes three main patterns of its action. Fully rectified and filtered waveform causes cutting. Fully rectified waveform causes partial cutting and partial coagulation. Partially rectified waveform causes predominantly coagulation [9,10,11].

The electrodes in the Radiofrequency unit cause very minimal collateral damage (upto 75 micrometre) as the electrodes remain cold during the procedure and only the tip of the electrode comes in contact with the skin for a very short period of time. As the diameter of the electrode tip is small, the electrode-tissue interface is small. The Radiofrequency unit uses high frequency but at low intensity [9,10,11].

Scar revision forms one of the procedures performed routinely in plastic surgery. The ultimate result after revision depends on many factors. One of

those factors is the trauma caused to the tissue intraoperatively. The radiofrequency probe, by ensuring good cutting with minimal collateral damage ensures an aesthetically satisfying scar appearance after revision. The use of scalpel causes bleeding when the incision is made and obscures the surgical field prolonging surgical time. The radiofrequency probe ensures adequate hemostasis intraoperatively and prevents complications such as hematoma formation, postoperative wound gape and infection ensuring a good final outcome after surgery.

Conclusion

Through this case report we would like to suggest that the use of radiofrequency for scar revision is a better option to conventional methods such as revision with scalpel or electrocautery. It is precise with minimal collateral damage and good hemostasis ensuring faster surgery with better postoperative outcomes.

Conflicts of Interest

None

Source of Funding

None

Disclosures: None

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Indian Journal of Anesthesia and Analgesia	4	7000	6500	500	450
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International Journal of Food, Nutrition & Dietetics	3	5000	4500	357	300
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Standard journal article

[1] Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. J Oral Pathol Med 2006; 35: 540-7.

[2] Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. Acta Odontol Scand 2003; 61: 347-55.

Article in supplement or special issue

[3] Fleischer W, Reimer K. Povidone iodine antisepsis. State of the art. Dermatology 1997; 195 Suppl 2: 3-9.

Corporate (collective) author

[4] American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. J Periodontol 2000; 71: 1792-801.

Unpublished article

[5] Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure. Dent Mater 2006.

Personal author(s)

[6] Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

Chapter in book

[7] Nauntofte B, Tenovuo J, Lagerlöf F. Secretion and composition of saliva. In: Fejerskov O, Kidd EAM,

editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. p. 7-27.

No author given

[8] World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

Reference from electronic media

[9] National Statistics Online—Trends in suicide by method in England and Wales, 1979-2001. www.statistics.gov.uk/downloads/theme_health/HSQ 20.pdf (accessed Jan 24, 2005): 7-18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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