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Original Research Article

Comparative study of efficacy of intense pulsed light versus Intralesional triamcinolone in the treatment of hypertrophic scars and keloids

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ABSTRACT

Introduction: Keloids and hypertrophic scars are hyperproliferative response of dermal connective tissue to trauma. Their management remains a challenge for practitioners as there is still no universally accepted treatment, leading to recurrences which are frustrating for patients and clinicians alike. Hence, it becomes essential to determine a modality with highest efficacy, least recurrence and better patient compliance.

Objectives: To compare the therapeutic effectiveness of Intralesional triamcinolone acetonide versus Intense pulsed light for treatment of keloids and hypertrophic scars.

Materials and Methods: A single centre, cross-sectional study was conducted on 60 patients. Patients were randomly allocated in two groups, group one received Intralesional steroids (ILS)-triamcinolone acetonide and group two was treated by Intense pulsed light (IPL). Both groups were assessed for improvement every 15 days until 5 sessions were complete.

Results: Both study groups showed significant changes after treatment. Patients treated with ILS showed greater reduction in height. IPL group showed significant reduction in vascularity. Pigmentary outcomes were more favourable with IPL, whereas with ILS hypopigmentation was noted as a common side effect. Both groups showed significant reduction in pliability.

Conclusion: Both regimens showed excellent responses with minimum recurrence rates, indicating their high efficacy in management of keloids and hypertrophic scars.

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1. Introduction

The process of wound healing comprises of a series of modifications that ideally culminate into the development of a relatively flat and thin lined normotrophic scar.¹ In the event of excessive wound healing it may lead to scarring. Hypertrophic scars and keloids are the two common major types observed.^{1,2}

Few clinical researchers have reported that they could immensely affect the quality of life of patients.³ Various mode of therapies have been proposed such as the silicone

sheet and gel application, pressure garments, topical and intralesional injections of agents including corticosteroids, interferon, bleomycin, five-fluorouracil (5-FU), as well as cryotherapy, laser, radiotherapy and surgery.⁴⁻⁶ Intense pulsed light (IPL) has been used more often with the similar efficacy of PDL.^{7,8} IPL rests on the principle of selective photothermolysis, in which thermally mediated radiation damage is confined to chosen epidermal and/or dermal pigmented targets at the cellular or tissue structural levels.⁸

Therapy affects melanin, destroy the blood vessels thereby reducing its size, induces tissue hypoxia leading to decreased cellular function. It also, induces disulphide bond disruption with subsequent remodelling of the fibres

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or collagenolysis following cytokine stimulation. Intense pulsed light [IPL] 400-1200 nm devices are non-laser high intensity light sources.

Intralesional steroids (Triamcinolone acetonide 10 mg/ml or 40 mg/ml with 1:1 dilution) has long been a mainstay and relatively effective⁹ first-line therapy of treatment of keloids. Steroids are known to diminish collagen synthesis, reduce inflammation, decrease mucinous ground substance and inhibit collagenase inhibitors that prevent degradation of collagen, thus decreasing dermal thickening.⁹ The present study was conducted to compare the efficacy of Intense pulsed light versus Intralesional Triamcinolone in the treatment of keloids and hypertrophic scar and to study adverse effects associated with them.

2. Materials and Methods

This single center, prospective and interventional study was conducted for duration of 2 years.

The inclusion criteria was individuals of both genders aged above 18 years age who presented to the OPD with keloids and hypertrophic scars. Pregnant, lactating females, those with active tuberculosis, psoriasis, other acute skin lesions, known case of photosensitivity, uncontrolled diabetes, cardiovascular and renal diseases were excluded from the study.

The detailed protocol was explained to the patients. Institutional ethics committee approval was acquired and written informed consent was obtained from all the patients in accordance with the principles of a Declaration of Helsinki as revisited in 2013.

Sample size-total of 60 patients were taken in the study and were divided into two groups of 30 patients each. For calculation of sample size, G*Power software was used. Alpha= α =0.05, Power = 0.80, large effect size was considered =0.8. Using G* Power software sample size of each group was found to be 30 patients.

In IPL group 590nm vascular filter was used and dose was started at 25 J/cm² and increased by 3 J/cm² in subsequent settings depending on patient's tolerance. In second group, intralesional triamcinolone of 40 mg/ml mixed with lignocaine (1:1 dilution) was given with insulin syringe at 2 weeks interval for 5 visits. The patients were followed up at two weeks intervals until 5 visits were done and were assessed for the fate of pigmentation, pliability, height and vascularity of the lesions 15 days after each visit.

3. Results

3.1. Statistical analysis

Data was analysed using SPSS software version 21 and Excel sheets. Categorical variables were given in the form of frequency table. Continuous variables were given in Mean \pm SD/ Median (Min, Max) form. Categorical variables

were analysed by Chi square test. The obtained results are represented as the tables and graphs below.

The mean of age of ILS patients was 32.97 ± 13.26 and the mean age of IPL patients was 36.37 ± 13.15 . There was no significant association observed between the formation of scars and the age of the patients.(Table 1)

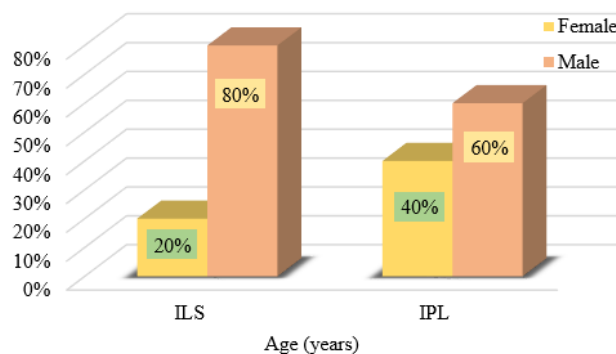


Figure 1: Distribution of subjects according to gender

Majority of the patients had presented with single lesions followed by two lesions. The most common sites of hypertrophic scar and keloids were chest, right shoulder and pubic area. Comparison of results between first and last visit for each parameter is as given below.

There was a strongly significant reduction in the height of the lesions observed in ILS group between the 1st and 5th visit with the p value of <0.001, whereas the change in height with IPL group between the first and last sitting was not significant.

There was significant decrease in vascularity between 1st and last visit of IPL, (p Value= 0.002) but there was no significant decrease in vascularity between the first and final visit with ILS.

28/30 (93.99%) of the study samples in IPL group had normal skin at the end of the study whereas only 8/30(26.6%) had found to be with normal skin in ILS at the last visit.66.66% of those treated with ILS developed hypopigmentation of the lesions at the end of study.

Significant difference in pliability was observed between first and final visits on both IPL(p value <0.001) and ILS (p value -0.015),with IPL showing a much more significant reduction in pliability.

On analysing the degree of pliability, both ILS and IPL had significant improvement.

4. Discussion

On analysis, we did not find any association between the age, gender and other socio-epidemiological data with the incidence of the hypertrophic scar and keloids. Only 13.3% and 6.7% from ILS and IPL groups respectively had blunt trauma as the precipitating factor. Majority of them were

Table 1: Distribution of subjects according to age.

Variables	Sub Category	ILS	IPL
		Number of Subjects (%)	
Age (years)	<20	4 (13.3%)	3 (10%)
	21 – 35	15 (50%)	14 (46.7%)
	36 – 40	2 (6.7%)	4 (13.3%)
	41 – 55	8 (26.7%)	6 (20%)
	56 – 70	0	3 (10%)
	>70	1 (3.3%)	0
	Mean \pm SD	32.97 \pm 13.26	36.37 \pm 13.15
	Median (Min, Max)	30 (16, 71)	33 (14, 65)

Table 2: Distribution of subjects according to various parameters of the sites.

Variables	ILS/IPL	
Number of lesions	1	16 (53.3%)
	2	10 (33.3%)
	3	3 (10%)
	4	1 (3.3%)
Site	Patients receiving IPL	Patients receiving ILS
Chest	5 (16.6%)	4 (13.3%)
Abdomen	3 (10%)	4 (13.3%)
Pubic area	4 (13.3%)	4 (13.3%)
Lower back	2 (6.7%)	2 (6.7%)
Left forearm	2 (6.7%)	2 (6.7%)
Left shoulder	2 (6.7%)	2 (6.7%)
Left thigh	2 (6.7%)	2 (6.7%)
Left arm	1 (3.5%)	1 (3.5%)
Right arm	1 (3.5%)	1 (3.5%)
Right forearm	2 (6.7%)	2 (6.7%)
Right shoulder	4 (13.3%)	4 (13.3%)
Upper back	2 (6.7%)	2 (6.7%)

Table 3: Association and comparison of height of the lesion at first and fifth visit in ILS and IPL at Baseline and 5th visit.

		ILS-Height First Visit			p-value
		Flat	<2 cm	Total	
ILS-Height Fifth Visit	<2 cm	7 (23.33%)	0	7 (23.33%)	<0.001* C
	2-5 cm	0	23 (76.66%)	23 (76.66%)	
IPL-Height First Visit					
IPL-Height Fifth Visit	Flat	0	1 (3.33%)	1 (3.33%)	0.223
	<2 cm	5 (16.66%)	15 (50%)	20 (66.66%)	
	2-5 cm	0	9 (30%)	9 (30%)	

(Abbreviation: C=chi square test)

Table 4: Association and comparison of vascularity at first and fifth visit in both groups

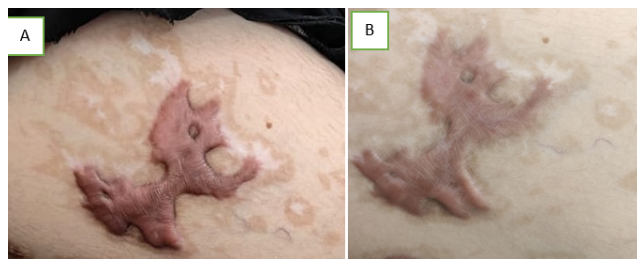
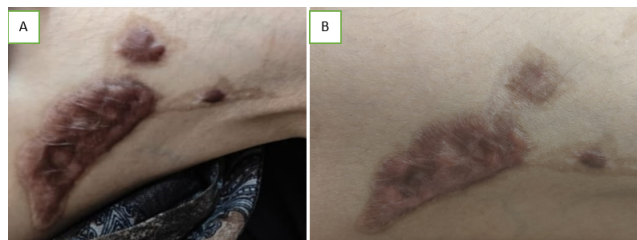
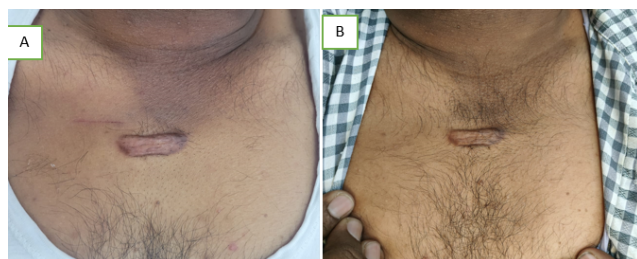
Vascularity		ILS-Vascularity First Visit			p-value
		Normal	Pink	Red	
ILS-Vascularity Fifth Visit	Normal	3 (10%)	11 (36.66%)	0	0.072
	Pink	0	14 (46.66%)	2 (6.66%)	
IPL-Vascularity First Visit					
IPL-Vascularity Fifth Visit	Normal	6 (20%)	9 (30%)	0	0.002
	Pink	0	9 (30%)	6 (20%)	

Table 5: Association and comparison of pigmentary changes at first and 5th visit in both groups

ILS-Pigmentation		ILS-Pigmentation First Visit			p-value
		Normal	Hypopigmentation	Total	
		Number of subjects (%)			
ILS-Pigmentation Fifth Visit	Normal	8 (26.66%)	0	8 (6.33%)	0.704
	Hypopigmentation	2 (6.66%)	20 (66.66%)	22 (93.66%)	
		IPL-Pigmentation First Visit			
IPL-Pigmentation	Normal	28 (93.33%)	0	28 (93.33%)	<0.001*
	Hypopigmentation	0	2 (6.66%)	2 (6.66%)	

Table 6: Association and comparison of pliability at first and 5th visit in both groups

Pliability		ILS-Pliability First Visit			p-value
		Supple	Yielding	Total	
		Number of subjects (%)			
ILS-Pliability Fifth Visit	Normal	2 (6.66%)	0	2 (6.66%)	0.015*
	Supple	6 (20%)	22 (73.33%)	28 (93.33%)	
		IPL-Pliability: First visit			
IPL-Pliability: Fifth visit	Normal	5 (16.66%)	1 (3.33%)	0	6 (20%)
	Supple	3 (10%)	4 (13.33%)	3 (10%)	10 (33.33%)
	Yielding	0	2 (6.66%)	10 (33.33%)	12 (40%)
	Firm	0	0	2 (6.66%)	2 (6.66%)
					p-value <0.001*

**Figure 2:** A: ILS first visit; B: ILS final visit**Figure 5:** A: IPL First Visit; B: IPL Final Visit**Figure 3:** A: ILS first visit; B: ILS final visit**Figure 4:** A: IPL first visit; B: IPL final visit

symptom free and 33.3% each in both groups had presented with itching as the symptom. The clinical studies by Liu AH et al had reported that severe keloids and hypertrophic scars could be varied with sex, age, excessive scrubbing.¹⁰ Other cross sectional and systematic analysis also have reported no sociodemographic association like the present study.¹¹

In the present study, majority of the cases presented with single lesion. Commonest sites were chest and shoulders which was consistent with the observations made by Hunasgi S et al¹² where they had discussed the same pattern of distribution.

On analysis we found that, there was no much difference in the height of the lesion between 1st visit and the 5th visit with IPL, but we observed that ILS group had significant reduction in height of the lesion between the first and fifth visit as compared to IPL. We could assess that the growth of the lesions were arrested and resolved faster with

ILS than IPL. Contrary to our findings, scar thickness was significantly reduced among 10% after the first IPL session itself in the study conducted by Thanh LTV et al, 15% after the second session and >20% after the third session. Also, in contrast to our observations,¹³ Li K et al found that IPL had significantly improved morphological changes in hypertrophic and keloid scars based on both subjective and objective analyses from first visit itself, but in contrast to our study where we used 590nm filter, they had used 1470 nm bare-fibre diode for the IPL.¹⁴

In the present study the vascularity of the lesions had significant reduction in the IPL group. Pigmentary changes were observed in both IPL and ILS group. 93.33% patients treated with IPL attained almost normal skin colour by the fifth sitting at the end of the study while 66.66% patients treated with ILS developed hypopigmentation at the end of study. Coppola MM et al⁹ had discussed in their review that although ILS had shown a faster and more effective response and even though it is associated with a higher complication rate, the combination therapy of ILS with other modes of management is significantly higher than ILS alone.

Kim DY et al, a Korean study had reported that the combination therapy of IPL with corticosteroid injection not only improves the appearance of keloids and hypertrophic scars but also increases the recovery level of skin hydration status in terms of the skin barrier function than the monotherapy.¹⁵ Similar to our outcome with ILS, Nishi N et al, who had compared ILS with cryotherapy also stated that ILS has high efficacy in management of keloids and it is aesthetically superior for exuberant scars.¹⁶

We can analyse that both IPL and ILS are efficacious in the management of hypertrophied scars and keloids but the duration and the improvement in the morphology are associated with the baseline morphological characteristics of the lesions which differ from individual to individual.

5. Conclusion

Both IPL and ILS are effective methods in the management of keloid and hypertrophic scars. ILS results in greater reduction in height of keloid and hypertrophic scars compared to IPL. IPL resulted in significant reduction of vascularity. Both IPL and ILS caused significant reduction in pliability, however the effect of IPL on improvement of pliability was superior compared to ILS. IPL also resulted in the transition of hyperpigmentation to normal skin colour, whereas with ILS the tendency to develop hypopigmentation was significantly high. We conclude that a single modality of treatment may not be as effective as a combination of both these modalities in the treatment of keloids and hypertrophic scars. Thus IPL and ILS can be combined to yield better results.

6. Conflicts of Interest

There are no conflicts of interest.

7. Source of Funding

None.

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