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Original Research Article

Comparative Study of Various Treatment Modalities in Management of Keloids and Hypertrophic Scars

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Abstract:

Keloids and hypertrophic scars are benign cutaneous lesions produced by uncontrolled synthesis and deposition of dermal collagen. Both the lesions follow injury to the skin of predisposed individuals but keloids can occur spontaneously. Amongst the various regimens used intralesional steroids, cryosurgery and their combination are simple techniques without gross complications and can be performed on outdoor patient basis without local anaesthesia and the overall results are satisfactory compared with the results reported using alternative regimens. The study was conducted on 45 selected patients from amongst group of 60 patients attending Department of Dermatology of Jawaharlal Nehru Hospital & Research Centre, Bhilai, and Chhattisgarh, India diagnosed as having either keloids or hypertrophic scars during the period from June 2008 to June 2010. A total of 45 patients having 45 lesions (30 keloids and 15 hypertrophic scars) were treated. Recurrence was seen in 2 keloids (33.3%) treated with intralesional triamcinolone alone and 1 keloid (14.2%) treated with cryosurgery alone. The treated lesions were treated followed up for 6 to 12 months. Recurrence was seen in 2 keloids (33.3%) treated with intralesional triamcinolone alone and 1 keloid (14.2%) treated with cryosurgery alone. No recurrence was seen in lesions treated with combination therapy. There was no recurrence in hypertrophic scars treated with any of the three modalities. The average number of sittings required for the keloids and hypertrophic scars that showed good to excellent response; were least with the combination therapy whereas it was almost equivalent with cryosurgery and intralesional triamcinolone alone with cryosurgery faring marginally better.

Keywords: Keloids, Lesions, ER (Effective Response), GR (Good Response), Cryosurgery.

Introduction

Keloids and hypertrophic scars are benign cutaneous lesions produced by uncontrolled synthesis and deposition of dermal collagen [1]. Both the lesions follow injury to the skin of predisposed individuals but keloids can occur spontaneously.

Most frequently involved sites are chest, shoulders, head-neck area (especially ear lobes), arms and upper part of the back [2,3,4]. While keloids have a strong tendency to grow beyond the confines of the previous wound, hypertrophic scars remain within the borders of the original dermal trauma [1,5]. Dark skinned individuals and individuals between the ages of 2 and 40 have an increased risk of developing hypertrophic scars and keloids [6].

The incidence of 4.5% to 16% is reported in Black and Hispanic populations [4]. It affects both sexes equally within same age group [7].Onset most commonly occurs between 10 and 30 yrs of age and are uncommon at extremes of age [4]. Without treatment, keloids tend to persist indefinitely [8] whereas hypertrophic scars regress spontaneously within a few years [9].

Amongst the various regimens used intralesional steroids, cryosurgery and their combination are simple techniques without gross complications and can be performed on outdoor patient basis without local anaesthesia and the overall results are satisfactory compared with the results reported using alternative regimens [1,2,5,10-12].

On the basis of these studies, the present study is an attempt to assess the efficacy of intralesional steroid (triamcinolone acetonide injection) alone; cryosurgery (liquid nitrogen) alone & combination of cryosurgery and intralesional steroids and to compare their results in the treatment of keloids and hypertrophic scars.

Materials & Methods:

The study was conducted on 45 selected patients from amongst group of 60 patients attending Department of Dermatology of Jawaharlal Nehru Hospital & Research Centre, Bhilai diagnosed as having either keloids or hypertrophic scars during the period from June 2008 to June 2010.

- Patient screening, selection & pre- procedure assessment was done for initial 3 months
- Therapeutic procedures for subsequent 3 months
- Monthly follow up till 6 months & subsequently 3 monthly follow up at 9th & 12th months
- Data analysis & conclusion in 3-6 months
- Following clinical criteria (used by Zouboulis et al [1]) were used for differentiating keloids from hypertrophic scars.

Keloids:

- Spontaneous appearance of the lesions or
- Extension of the lesions beyond the site of the original wound

Hypertrophic scars:

Lesions confined to the site of original wound.

Selection criteria:

1. Patients with single lesion (Either Keloid or Hypertrophic scar but not both).
2. Otherwise, healthy patients.
3. Patients not subjected to any sort of treatment previously (New patients).

Exclusion criteria:

- Patients with history of spontaneous resolution of the present or of the past lesions.
- History of vitiligo, cold urticaria, hypersensitivity to triamcinolone acetonide and the patients who showed cold intolerance.
- Lesions with size more than 8 cm^2.
- Lesions with duration more than 2 years.
- Patients with age less than 14 yrs.
- Pregnant and lactating mothers.

These criteria were defined to ensure uniformity and comparability.

Sample size and sampling technique:

The method of sampling used was simple random sampling technique.

60 patients with single lesion (40 keloid & 20 hypertrophic scars) were selected from amongst patients attending Dermatology OPD of our hospital.

These patients were then Randomised into 2 groups; 30 patients with keloids & 15 patients with hypertrophic scars by lottery method (by assigning a unique number).

- Each patient was having equal probability of being selected into each group. The study population thus, was of 45 patients.
- The study groups were selected in multiples of 3(i.e 30+15) to ensure uniform distribution for 3 modalities.
- These study groups (30+15) were re-Randomised into 3 sub- groups(of 10 & 5 each respectively) to be allocated for the treatment with 3 modalities.
- The method used was simple random sampling (lottery method).

- Each patient in group was again assigned a unique number.
- Patients from both groups were distributed into 3 sub-groups of 10 (for keloids) & 5 (for hypertrophic scars); one sub-group for each modality.
- Thus, each patient with single lesion received a single treatment modality only.

Treatment modalities used included following

1. Intralesional injection of triamcinolone acetonide alone
2. Liquid nitrogen cryosurgery alone
3. Combination therapy with liquid nitrogen cryosurgery and intralesional triamcinolone acetonide.

A total of 45 patients having 45 lesions (30 keloids and 15 hypertrophic scars) were treated.

Equipment's:

1. For Intralesional triamcinolone acetonide injection

a. Standard 3 ml Luer-Lock syringe and a 24-gauge needle
b. Injection triamcinolone acetonide 10 mg/ml vial.

2. For Liquid nitrogen cryosurgery:

a. Liquid Nitrogen container
b. Hand held cryo equipment (Dermojet)
c. Liquid nitrogen storage cylinder

3. for combination therapy:

All the above equipment's

Methods:

1. Intralesional triamcinolone acetonide injection

- Informed consent was taken & the site of the lesion was prepared by cleaning with spirit swab.
- Local anaesthesia (1% lignocaine) was used in non-cooperative patients, especially with lesions on painful sites (i. e Anterior chest)
- Maximum total dose of intralesional triamcinolone used was 40 mg per session[85]. This was repeated every 15 days till maximum 6 sittings.

The lesion was pierced through the margin and the needle was passed along the long axis of the lesion parallel to the surface. The efforts were made to distribute the drug as evenly as possible in the lesion. The drug was injected into the lesion, avoiding injection into normal tissues adjacent to and beneath the lesion to avoid undesirable side effects as excessive atrophy, hypopigmentation and systemic effects.

2. Liquid nitrogen cryosurgery

Cryosurgery was administered using DERMOJET hand held spray equipment. Two freeze-thaw cycles using 15 seconds freezing time were employed.

Two types of spray methods were used:

1. Spot freeze method- for lesions upto 2 cm^2
2. Paint-spray method-for lesions between 2 to 8 cm^2.

In spot freeze method the liquid nitrogen spray tip was held approximately 1 cm from the skin over the centre of the lesion to be treated. Spraying commenced and white ice spread outwards forming a circular "ice field". The ice field was allowed to reach the outer limit of the treatment area, including small rim of the normal tissue before thawing.

In paint-spray method the spray tip was held approximately 2 cm from the surface of the lesion and moved in a zigzag manner to produce an even effect, before thawing.

3. Combination therapy with liquid nitrogen cryosurgery and intralesional injection of triamcinolone acetonide.

Freezing the lesion with liquid nitrogen in the conventional manner or cryosurgery was done initially. This was followed immediately by injection of triamcinolone acetonide in the same dose as mentioned above.

After each treatment modality, patients were observed for first 30 minutes post operatively for immediate type of side effects (as mentioned in proforma)

Post-treatment follow up and if needed repeat treatment was done every 15 days till 6 sittings (approx. 3 months). The therapeutic results were clinically assessed one month after the last session.

Assessment of response:

The treatment response (flattening of lesions) was evaluated as follows;

1. Excellent Response (ER):

a. Flattening of the lesions to skin level with or without resting erythema.
b. Relief of symptoms.

2. Good Response (GR):

a) A Considerable improvement with some skin atrophy or slightly persisting hypertrophy.
b) Partial relief of symptoms.

3. Failure of Treatment (FT):

a. No Change in lesions (compared to pre-treatment dimensions).
b. No relief of symptoms.

After 3 months (maximum 6 sittings), the patients were followed up monthly till 6^{th} month; then at 9^{th} month, and lastly after one year. During each follow up visit the lesions were observed for maintenance of improvement, repigmentation of lesions and recurrence.

Results

In this study, a total of 45 patients having 45 lesions (30 keloids and 15 hypertrophic scars) were treated. All the patients included in the study were having only single lesion; either keloid or hypertrophic scars but not both.

Maximum patients with keloids belonged to age group range 31-40 yrs and with hypertrophic scars belonged to age group 21-40 yrs.

Out of 30 keloids lesions patients, 17 were male & 13 were female; whereas out of 15 hypertrophic scars lesions patients, 7 were male & 8 were female. (Table1)

Table 1: Particulars of the lesions included in the study

Particulars	Keloids	Hypertrophic Scars
Total number of patients	30	15
Number of males	17	7
Number of females	13	8
Mean age(range) of males (years)	35 (14-65)	36 (15-47)
Mean age(range) of females (years)	34 (14-55)	27 (14-45)
No. of lesions included in the study	30	15

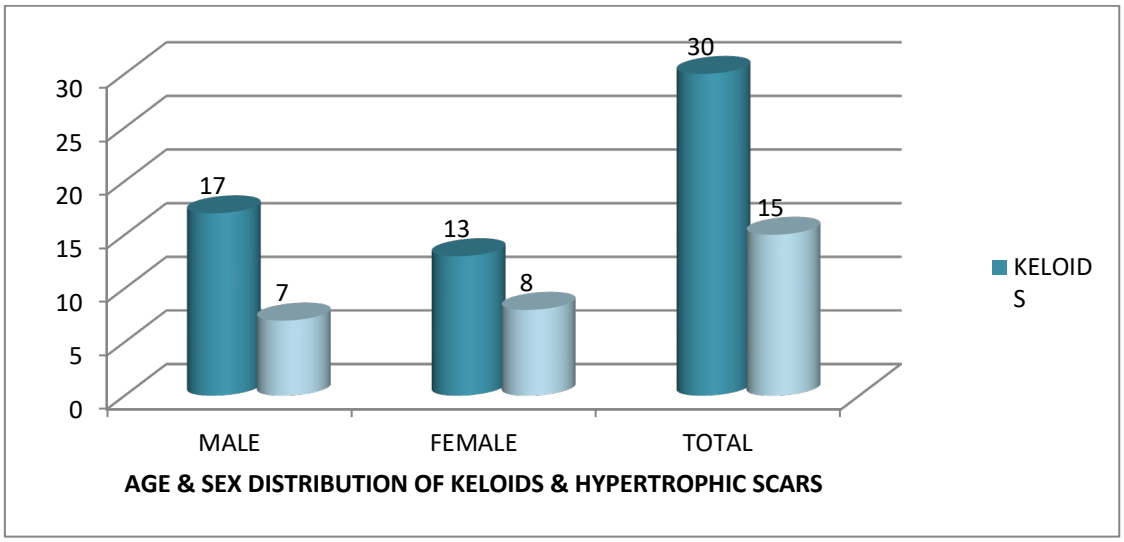

Figure 1: Age & Sex distribution of Keloids & Hypertrophic Scars

Table 2: Distribution of keloids and hypertrophic scars treated with three modalities.

Lesions	Modality			Total
	Intralesional Triamcinolone	Cryosurgery	Combination Therapy	
Keloids	10	10	10	30
Hypertrophic Scars	5	5	5	15

In the above table, out of 30 keloids lesions, each 10 patients were treated with Intralesional triamcinolone, cryosurgery, and combination therapy. And out of 15 hypertrophic scars lesions, each 5 patients were treated with Intralesional triamcinolone, cryosurgery, and combination therapy.

Table 3: Analytical comparison of the three modalities in keloids

Particulars	Intralesional Triamcinolone	Cryosurgery	Combination Therapy
No Of Keloids Treated	10	10	10
No (%) Of Keloids Which Showed GR To ER	6 (60%)	7 (70%)	9 (90%)
Average No Of Sittings Required For Keloids To Show GR To ER	**4.6**	**4.4**	**3.4**

Thus average no of sittings required for keloids to show GR to ER were least with combination therapy (i.e 3.4).

Table 4: Analytical comparison of the three modalities in hypertrophic scars

Particulars	Intralesional Triamcinolone	Cryosurgery	Combination Therapy
No Of Hypertrophic Scars Treated	5	5	5
No (%) Of Hypertrophic Scars Which Showed GR To ER	3 (60%)	4 (80%)	5 (100%)
Average No Of Sitting Required For Hypertrophic Scars To Show GR To ER	**3.6**	**3.5**	**2.8**

Thus average no of sittings required for hypertrophic scars to show GR to ER were least with combination therapy (i.e 2.8).

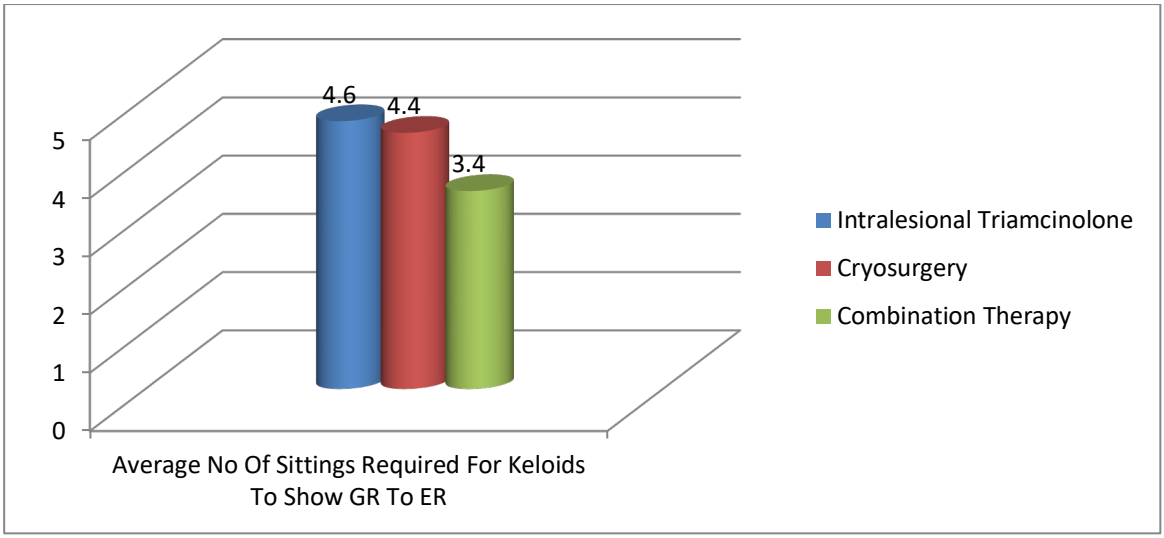

Figure 2: Average number of sitting required for keloids to show GR to ER

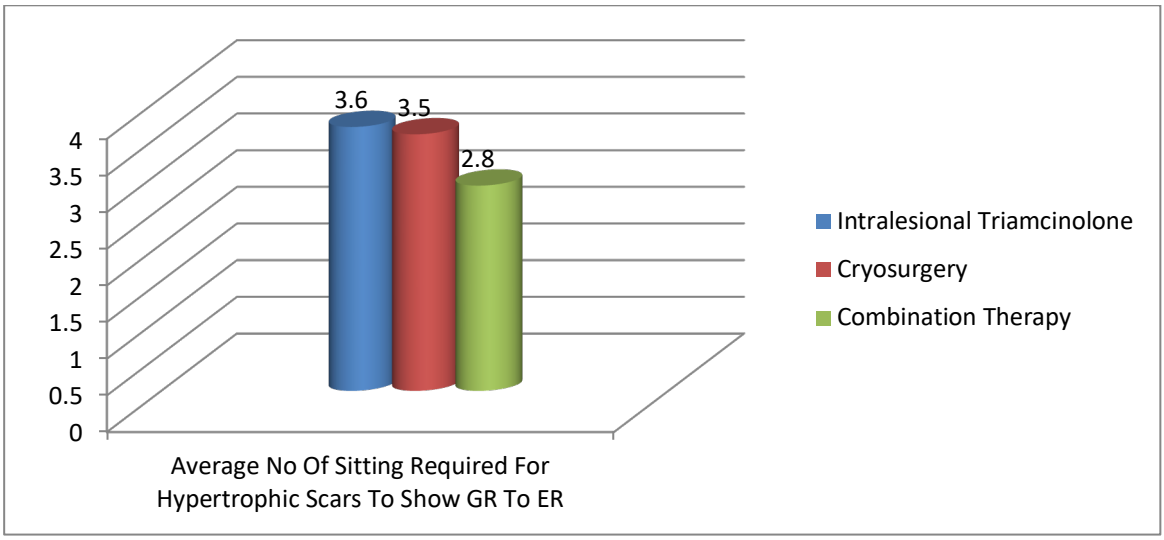

Figure 3: Average number of sitting required for Hypertrophic scars to show GR to ER

Table 5: Comparison of the recurrence occurring in the lesions that showed initial good to excellent response (GR to ER) with the three modalities

Modality of treatment	Keloids				Hypertrophic Scar			
	No of lesions treated	No of lesions showing GR To ER	No of lesions recurred	Recurrence %	No of lesions treated	No of lesions showing GR to ER	No of lesions recurred	Recurrence %
Intralesional Triamcinolone	10	6	2	33.3	5	3	-	-
Cryosurgery	10	7	1	14.2	5	4	-	-
Combination therapy	10	9	-	-	5	5	-	-

Thus, recurrence rates were least with combination therapy (nil) for both keloids and hypertrophic scars.

Discussion

The study was conducted on randomly selected 45 patients (with 30 keloids and 15 hypertrophic scars) attending Dermatology OPD of Jawaharlal Nehru Hospital & Research Centre, Bhilai (C.G). This was a hospital based study with smaller size of cohorts of each group of patients (keloids & scars). Statistical tools of data analysis couldn't be used because of smaller size of study groups. Age and sex distribution of the lesions have been depicted in

figure1.Out of 45 patients, 30 were having keloids and 15 were having hypertrophic scars.

All the patients included in the study were having single lesion; either a keloid or a hypertrophic scar but not both. Out of 30 keloids, a random group of 10 each was subjected to one of the three treatment modalities. Likewise, out of 15 hypertrophic scars, 5 patients each were treated with one of the three modalities (Table 2)

Analytical comparison of three modalities of treatment: The comparative study was done under the following heads:

1. Technique
2. Symptomatic relief achieved with each modality.
3. Treatment response (degree of flattening) achieved with each modality.
4. Average no. of sittings required by each modality to show good to excellent response.
5. Side effects
6. Recurrence

1. Technique

A) Intralesional triamcinolone acetonide injection: This is found to be a simple technique. Lesions at any anatomical site can be subjected to this modality without much care. Initially, it is very difficult to push the drug into the firm lesion but in subsequent sittings it becomes easy as the lesion softens.

B) Liquid nitrogen cryosurgery: It is also a simple technique but there are some technical problems of unit clogging secondary to ice formation. This problem can arise when the unit is run continuously or when used in humid environment. The frequent handling of the clogged nozzle for a long time causes temporary sensory loss of fingertips of the operator. Clogging can be kept to a minimum by not running the unit continuously and by being sure that all parts are dry before filling liquid nitrogen.

It was observed that liquid nitrogen runoff into normal skin can occur when spray is directed at one spot without interruption.

This causes burns in unwanted areas and one must be especially cautious to avoid runoff into the eyes. Treating forehead lesions in a sitting patient makes this more likely. Thus, possible protective measures should be undertaken wherever necessary.

It was noticed that spattering of liquid nitrogen spray may lead to the appearance of multiple small erythematous macular lesions surrounding the treated area. This is much preventable by simple precautions.

C) Combination therapy: All the precautions taken for the above two procedures were observed. It was found that combination therapy was more painful than either of the above two procedures.

After freezing the lesion, the injection was given within 10 to 15 minutes. Freezing the lesion first makes the lesion oedematous and soft and allows triamcinolone to be injected more easily and accurately.

Summary: Intralesional injection is a simple technique. Cryosurgery and combination therapy requires technical care and judgment. Cryosurgery prior to injection, allows triamcinolone to be injected more easily and accurately.

Average No of Sittings Required by Each Modality to Show Good to Excellent Response: Table 3&4 illustrates no and site of distribution of individual lesions with good to excellent response to one of the three modalities with average no of sittings required in achieving the same.

In Keloids:

a) Intralesional triamcinolone alone: Out of 10 lesions treated, 6 lesions showed good to excellent treatment response with an average of 4.6 sittings.

b) Cryosugery alone: Out of 10 lesions treated, 7 lesions showed good to excellent treatment response with an average of 4.4 sittings.

c) Combination therapy: Out of 10 lesions treated, 9 lesions showed good to excellent treatment response with an average of 3.4 sittings.

Thus combination therapy required less number of sittings than cryosurgery alone and intralesional steroid alone to produce good to excellent response (GR to ER) in keloids

In Hypertrophic Scars:

a) Intralesional triamcinolone alone: Out of 5 lesions treated, 3 lesions showed good to excellent treatment response with an average of 3.6 sittings.

b) Cryosugery alone: Out of 5 lesions treated, 4 lesions showed good to excellent treatment response with an average of 3.5 sittings.

c) Combination therapy: Out of 5 lesions treated, 5 lesions showed good to excellent treatment response with an average of 2.8 sittings.

Thus, combination therapy required less number of sittings than cryosurgery alone and intralesional alone to produce good to excellent response (GR to ER) in hypertrophic scars.

Summary: Combination therapy required less number of sittings than cryosurgery alone and intralesional triamcinolone alone to produce good to excellent response (GR to ER) in keloids and hypertrophic scars whereas cryosurgery alone required less number of sittings than intralesional

triamcinolone alone in treating both types of lesions.

Recurrence: The treated lesions were treated followed up for 6 to 12 months. Recurrence was seen in 2 keloids (33.3%) treated with intralesional triamcinolone alone and 1 keloid (14.2%) treated with cryosurgery alone. Berman et al[4] reported recurrence in 9% to 50% of lesions in 5 yrs treated with intralesional triamcinolone alone. No recurrence was seen in lesions treated with combination therapy. There was no recurrence in hypertrophic scars treated with any of the three modalities. The previous studies, using cryosurgery alone recorded the following results:

Shepherd et al [13] - No recurrence in one year follow up

Zouboulis et al [1] - No recurrence in 32 months of average follow up

Rusciani et al [14] - No recurrence in 17 to 42 months follow up

Conclusions

The present study was an attempt to assess the efficacy of intralesional injection of triamcinolone acetonide, liquid nitrogen, liquid nitrogen cryosurgery and their combination in treating keloids and hypertrophic scars and to compare results.

The comparative analysis was done on 45 patients with equal no of lesions (45) (both keloids and hypertrophic scars); and included symptomatic relief, treatment response (flattening), average no of sittings required; side effects and recurrence as major parameters of comparison.

Following conclusions were drawn:

1. Intralesional injection of triamcinolone acetonide was an easily available treatment modality while cryosurgery and the combination therapy required the sophisticated equipments viz DERMOJET cylinder or CRYOGUN; adequate storage cylinder and regular supply of liquid nitrogen.
2. Intralesional injection of triamcinolone acetonide was a simple technique. Cryosurgery and the combination therapy required more technical skill.
3. The average number of sittings required for the keloids and hypertrophic scars that showed good to excellent response; were least with the combination therapy whereas it was almost equivalent with cryosurgery and intralesional triamcinolone alone with cryosurgery faring marginally better.
4. Combination therapy showed no recurrence of the treated keloids and hypertrophic scars whereas intralesional triamcinolone alone showed more recurrence than cryosurgery alone in treatment of keloids but not in hypertrophic scars during the observation period of 6 to 12 months.

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