Research Article

Comparative outcome study of various chemical peels and surgical procedures in the management of acne scarring

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Abstract

Background: Acne scarring is an unfortunate, permanent complication of acne vulgaris, which may be associated with significant psychological distress. The most common type of acne scarring is atrophic (ice pick, rolling scars, and box scars). Numerous treatment options exist for acne scarring such as chemical peeling, surgical procedures, lasers, and so on. This study is being done utilizing chemical agents (glycolic acid, trichloroacetic acid [TCA]) and simple surgical procedures such as microneedling and subcision.

Objective: To assess and compare the efficacy, side effects, and safety of chemical peels with simple surgical modalities in the treatment of atrophic acne scars.

Materials and Methods: Of the 80 included patients of atrophic acne scars, patients were randomly allotted to four groups of 20 patients. Group A: Glycolic acid peel (35%–70%), Group B: 95% TCA CROSS, Group C: Microneedling, Group D: Subcision. On the basis of a modified scoring system, all the patients were evaluated at their enrollment and further evaluated at 3, 6, and 9 months.

Result: Of the 80 patients, 62.5% (50) of the patients belonged to 21–30 years, 44 men and 36 women. Box scar was the most common type. Overall maximum improvement in acne scarring was found in Group C (59%), followed by Group D (51%), Group B (TCA 48%), and Group A (37%). Prolonged erythema and hematoma were common in surgical treatment whereas pigmentary changes were seen mostly with chemical peels.

Conclusion: Rolling scars were better managed with microneedling and subcision, box scars and icepick scars with TCA CROSS. On subjective evaluation, maximum patient satisfaction was found with microneedling whereas glycolic acid was the least satisfactory. Overall, surgical treatment showed better improvement compared with chemical treatment.

KEY WORDS: Acne scar, comparison, chemical peels, surgical procedures

Introduction

Acne vulgaris is a common disorder affecting the teenagers and young adults.[1] Most of them present with problem of postacne scarring. Acne vulgaris is by and large regarded as a normal phenomenon both by the medical fraternity and the general public, so much so that most people do not seek treatment for acne. Unfortunately, this leads to progression of acne into inflammatory lesions that heal leaving behind cosmetically troublesome scars. Some degree of postacne scarring is an outcome in 95% of patients with acne.[2,3] Acne scarring causes problems cosmetically and psychologically.[4,5] Most teenagers are bothered by the "pimple marks" than the pimples and seek and demand quick and complete remedies.

Acne scars are classified as atrophic and hypertrophic. The most common type of acne scar is atrophic, which includes ice pick, rolling scars, and box scars.[6] Once acne

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scarring has occurred, patients and physicians are left to struggle with the options available for the improvement of the appearance of skin. Unfortunately, there has been no standard treatment option for the treatment of acne scars and there is no general cookbook available to treat every patient. Each scar and each patient must be treated individually and on their merits according to the characteristics of the patient and the scar. Various therapeutic options have been described with variable clinical outcomes and complications, such as subcision, microneedling,[9] chemical peels,[10,11] punch graft, punch excision, dermabrasion, ablative laser treatment, nonablative laser treatment, autologous fat transfer, and injection of dermal fillers.[13]

Till recently there was little to offer to these patients, as the procedures are skill dependent, costly with a long downtime and risk of further scarring, but better understanding of the scar pathology has thrown up many new procedures with shorter downtime.

In this background, this study is being done utilizing locally available chemical agents (glycolic acid, trichloroacetic acid [TCA]) and simple surgical procedures such as microneedling and subcision.

Aims and objectives of the study are to assess and compare the efficacy, side effect, and safety of chemical peels with surgical modalities in treatment of atrophic acne scars and to subjectively evaluate the response to different treatment groups.

Materials and Methods

It is an open evaluation of different treatment modalities on 80 patients with acne scars attending the Outpatient Department of Dermatology, Venereology, and Leprosy, Smt Shardaben Chimanlal Municipal General Hospital, Ahmedabad, over 3 years between June 2010 and September 2012.

Patients with keloids, viral/bacterial infections, tumors, nodulocystic acne, allergies to peeling agents, history of bleeding disorder, history of treatment with isotretinoin, undergoing resurfacing procedures within the past 1 year.

Patients were randomly divided into four groups of 20 patients each based on different modality of treatment offered.

Baseline Evaluation

High resolution digital photographs were taken at baseline and acne scars were evaluated by a modified scoring system[15] based on the nature, depth, and size of scar as follows:

Nature of scar	Depth of scar	Score
Saucer	Shallow < 2 mm	1
Pitted	Intermediate 2–5 mm	2
Punched out	Deep > 5 mm	3

Individual lesion score is defined as the score of the lesion for depth multiplied by the score of the same lesion for nature multiplied by its score for size.

Total score for any particular case is the sum of the individual scores of all the lesions in the patient.

At baseline, all the patients were prescribed suitable priming agents (tretoin 0.5%, etc.) to be used for minimum of 15 days before the procedure. The priming agents were stopped 2 days before treatment session. Patients were advised to use broad-spectrum sunscreen for minimum 6 months after completion of treatment.

Treatment Sessions

Group A: Serial increase in concentration of glycolic acid (35% to 70%) fortnightly for minimum of 10 sessions

Group B: 95% TCA CROSS every month for minimum four sessions

Group C: Microneedling/dermaroller every 6 weeks for minimum of three sittings

Group D: Subcision every month for minimum of four sittings

Evaluation of patients is done at baseline 0, 3, 6, and 9 months.

Baseline: All the enrolled patients were evaluated at the beginning of the study.

Further evaluation: At 3 and 6 months, all the patients were photographed and reevaluated using the modified scoring system mentioned above.

Final evaluation: At 3 months after the end of the treatment protocol, all the patients were photographed and evaluated as above and percentage of reduction in score from baseline was noted.

Subjective evaluation:[16] Patients were asked to rate the degree of improvement after treatment as follows:

0%–15% poor, 15%–30% mild/fair improvement, 30%–50% good/moderate improvement, 50%–75% very good improvement, >75% excellent improvement.

Side effects/adverse effects: Postprocedure, patients were asked to come for follow-up on the 3rd day, 7th day, and on the corresponding session day, and any side effects/adverse effects were duly noted and appropriately treated.

Statistics

Descriptive statistical analysis has been carried out in all the groups in this study. Results on continuous measurements are presented as mean ± SD (standard deviation) and results on the categorical measurements are presented in number (%).

For comparison of treatment response in different groups, analysis of variance (ANOVA) test was employed.

For comparison of treatment response between chemical treatment and surgical treatment unpaired *t*-test was used.

Significance is assessed at 5% level of significance.

Result

Most of the patients (62.5%, $n = 50$) seeking treatment belonged to age group 21–30 years followed by (20%, $n = 16$) in 11–20 years age group.

Table 1: Age distribution of patients

Age groups	Group A		Group B		Group C		Group D		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
10–20	4	20	3	15	4	20	5	25	16	20
21–30	12	60	11	55	14	70	13	65	50	62.5
31–40	4	20	5	25	2	10	2	10	13	16.25
41–50	0	0	1	5	0	0	0	0	1	1.25
Total	20	100	20	100	20	100	20	100	80	100

Table 2: Sex distribution of the patients in the study

Sex	Group A		Group B		Group C		Group D		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Male	10	50	12	60	11	55	11	55	44	55
Female	10	50	8	40	9	45	9	45	36	45
Total	20	100	20	100	20	100	20	100	80	100

Table 3: Distribution of the type of acne scars in the study

Type of acne scars	Number of patients	Percentage of patients (%)
Box scar	41	59.6
Rolling	35	48.6
Ice pick	19	26.3

Table 4: Distribution of grade of acne scar in different groups in the study

Grade of acne scar	Group A		Group B		Group C		Group D		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
1	4	22	3	18	1	5	2	11	10	14
2	6	33	4	24	4	21	7	39	21	29
3	5	28	5	29	6	32	6	33	22	31
4	3	17	5	29	8	42	3	17	19	26
Total	18	100	17	100	19	100	18	100	72	100

Table 5: Comparison of treatment response in different groups

Response	Group A	Group B	Group C	Group D
No. of patients	18	17	19	18
Mean reading (%)	36.88	57.35	61.26	56.33
SD	16.77	24	13.92	16.53

SD, standard deviation.

Table 6: Comparison of response between chemical treatment and surgical treatment

Variables	Chemical treatment	Surgical treatment
No of patients	35	37
Mean readings in score (%)	46.8	58.8
SD	22.8	15.2

SD, standard deviation.

Table 7: Complications during the treatment in different groups

Groups	Lost to follow-up	Persistant pigmentary Cx		Prolonged erythema	Hematoma (persistant)	Hypertrophic scarring
		Hyperpigmentation	Hypopigmentation			
Group A	2	1	-	1	-	-
Group B	3	2	1	-	-	-
Group C	1	1	-	1	-	-
Group D	2	-	-	2	2	-
Total	8	4	1	4	2	0

Cx, .

Table 8: Subjective evaluation at the end of study

Groups	Poor (0%–15%)		Fair (15%–30%)		Good (30%–50%)		Very good (50%–75%)		Excellent (>75%)		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Group A	0	0	5	28	7	39	5	28	1	5	18	100
Group B	0	0	2	12	5	29	6	35	4	24	17	100
Group C	0	0	1	5	3	16	10	53	5	26	19	100
Group D	0	0	1	6	6	33	9	50	2	11	18	100
Total	0	0	9	12	21	29	30	42	12	17	72	100

There were 44 male patients (55%) and 36 female patients (45%) seeking treatment for acne scars. The overall male: female patient ratio was 1.2:1. Majority of the patients in this study had acne scars for around 2 to 5 years (40%, $n = 29$).

Box scar was the most common type seen in 41% patients (59.6%), followed by rolling scar in 35 patients (48.6%), and ice pick scar was the least common type in 19 patients (26.38%).

Overall, most of the patients were presented with grade 3 of acne scarring (31%, $n = 22$) followed by grade 2 (29%, $n = 21$). Grade 1 and grade 4 patients comprised 26% ($n = 19$) and 14% ($n = 10$), respectively.

At the end of our study, total percentage reduction in acne scar score was highest in Group C (microneedling) (61%) followed by Group B (TCA CROSS) (57%), Group D (subcision) (56%), and Group A (glycolic peel) (37%) in that order.

In our study, surgical treatment shows better improvement than chemical peels. It is statistically significant ($p < 0.05$).

Only seven patients out of 80 reported adverse events.

Majority of the patients (n = 30, %) found 50%–75% improvement in their disease burden with treatment.

Discussion

In this study, 80% have been randomly divided in to four groups of 20 each and treated with glycolic acid peel, TCA CROSS, microneedling, and subcision, respectively and these treatment modalities, individually as well as broadly under headings “chemical treatment” and “surgical treatment” were comparatively evaluated for their effectiveness in improving acne scars.

Cordain et al. (2002)[17] and Rzany and Kahl (2006)[18] reported that acne affects 79%–95% and 80% of adolescent population, respectively. Goodman (2000)[19] in his study reported that acne scars affects around 14% of female population and 11% of male population.

In this study, as reported by other authors[20–22] many of the patients presented with more than one type of scar. Although atrophic scarring appears to be the most common type associated with acne, good epidemiologic data are not available on the relative prevalence rates of different types and grades of acne scarring.[7,20,8]

Baseline score: Mean score of acne scarring of the different groups at baseline were as follows: Group A—82.3, Group B—87.9, Group C—82.5, and Group D—76.61.

At the end of 3 months, the percentage reduction in acne scar scores were 15%, 13%, 16%, and 15% in Groups A, B, C, and D, respectively.

At the end of 6 months, the percentage reduction in acne scar scores were 27%, 30%, 35%, and 32% in Groups A, B, C, and D, respectively.

At the end of 9 months, the percentage reduction in acne scar scores were 37%, 57%, 61%, and 56% in Groups A, B, C, and D, respectively.

At the end of our study, total percentage reduction in acne scar score was highest with Group C (microneedling) (61%), followed by Group B (TCA CROSS) (57%), Group D (subcision) (56%), and Group A (glycolic peel) (37%) in that order.

In our study, Group A treatment of glycolic acid showed 37% improvement of acne scarring. Garg et al. (2009)[23] and Erbagci and Akcah (2000)[24] showed that biweekly serial

glycolic acid peels (20%–70%) is an effective tool for treatment of atrophic acne scars and found that majority of the patients showed improvement in the range of 30%–60%.

In our study, Group B TCA CROSS showed 57% improvement by using 95% TCA CROSS method. Lee and colleagues[25] and Khunger et al. (2011)[26] in their study found a mean improvement of 68% and 73% after using 100% TCA CROSS, respectively.

In our study, Group C microneedling showed 61% improvement of acne scarring and the results were consistent with earlier published studies using the microneedling (collagen induction therapy). Leheta et al. (2011)[27] and Imran (2009)[28] showed in their study that microneedling improved acne scars in 100% patients with the mean improvement of acne scarring 68.3% and 72.2%, respectively.

In our study, Group D subcision showed 56% improvement in acne scarring. Alam et al. (2005)[29] and Vaishnavi (2008)[30] showed that around 90% of patients responded to subcision with improvement of around 50%, ranging from 40% to 80%, respectively.

Chemical Treatment versus Surgical Treatment

There is paucity of literature and data on the comparative value of chemical peels and various surgical techniques in the treatment of acne scars.

Jacob et al. (2001),[31] in their article describe that simple surgical procedures produce the best and the most reproducible results in the treatment of acne scars.

Ramadan et al. (2011)[32] showed that the mean decrease in size and depth of scars was significantly greater for subcision side than the 100% TCA CROSS ($p < 0.001$).

Only seven patients out of 80 reported adverse events. Prolonged erythema and hematoma were common in surgical treatment whereas pigmentary changes were seen mostly with chemical peels.

Subjective Evaluation

Majority of the patients (n = 30, %) found 50%–75% improvement in their disease burden with treatment. Excellent response was seen maximally in Group C (26%) followed by Group B (24%). Very good response was seen maximally in Group C (53%) followed by Group D (50%). Good response was seen maximally in Group A (39%) followed by Group D (33%). Fair response was seen maximally in Group A (28%) followed by Group B (12%). None of the patients reported the response as "poor."

Conclusion

Scarring is an unfortunate complication of acne vulgaris. Early and aggressive treatment is vital to minimize if not prevent its occurrence. Rolling scars were better managed with microneedling and subcision, whereas box scar and icepick scars with TCA CROSS. Glycolic acid peel was effective only for superficial acne scars. On subjective evaluations, maximum patient satisfaction was found with microneedling whereas glycolic acid was least satisfactory. Overall maximum improvement in acne scarring was found in Group C (61.26%), followed by Group D (56.33%), Group B (TCA 48%), and Group A (36.88%). Surgical treatment showed better improvement compared with chemical treatment.

References

1. Pandey SS. Epidemiology of acne vulgaris. Indian J Dermatol. 1983;28(3):109–10.
2. Poli F, Dreno B, Verschoore M. An epidemiological study of acne in female adults: results of a survey conducted in France. J Eur Acad Dermatol Venerol. 2001;15(6):541–5.
3. Layton AM, Henderson CA, Cunliffe WJ. A clinical evaluation of acne scarring and its incidence. Clin Exp Dermatol. 1994; 19(4):303–8.
4. Schacter RJ, Pantel ES, Glassman G, Zweibelson I. Acne vulgaris and psychologic impact on high school students. NY State J Med. 1971;71(24):2886–90.
5. Cotterill JA, Cunliffe WJ. Suicide in dermatological patients. Br J Dermatol. 1997;137(2):246–50.
6. Jacob CI, Dover JS, Kaminer MS. Acne scarring: a classification system and review of treatment option. J Am Acad Dermatol. 2001;45(1):109–17.
7. Laurentaci G, Dioguardi D. HLA antigens in keloids and hypertrophic scars. Arch Dermatol. 1971;113(12):1726.
8. Kim G, Del Rosso J. Acne scarring: treatment and management. Cosmet Dermatol. 2009;22;68–72.
9. Cho SI, Kim YC. Treatment of atrophic facial scars with combined use of high energy pulsed CO2 laser and Er:YAG laser: a practical guide of the laser techniques for the Er:YAG laser. Dermatol Surg. 1999;25(12):959–64.
10. Wang CM, Huang CL, Hu CT, Chan HL. The effect of glycolic acid on the treatment of acne in Asian skin. Dermatol Surg. 1997;23(1):23–9.
11. Erbagci Z, Akcali C. Biweekly serial glycolic acid peels vs long-term daily use of topical low strength glycolic acid in the treatment of atrophic acne scars. Int J Dermatol. 2000;39(10):789–94.
12. Fabbrocini G, Cassiapuoti S, Fardella N, Pastore F, Monfrecola G. CROSS technique: chemical reconstruction of skin scars method. Dermatol Ther. 2008;21(Suppl 3):529–32.
13. Khunger N; IADVL Task Force. Standard guidelines of care for acne surgery. Indian J Dermatol Venereol Leprol. 2008;74(Suppl): S28–36.
14. Stagnone JJ. Superficial peeling. J Dermatol Surg Oncol. 1989;15(9):924–30.
15. Rasheed AI. Non-ablative diode laser for the treatment of post acne scars. Egypt Dermatol Online J. 2005;1(2):6.
16. Goodman GJ. Treatment of acne scarring in ethnic skin. In: *Cosmetic Dermatology for Skin of Color*, Alam M, Bhatia AC, Kundu RV, Yoo SS, Chan HH-L (Eds.). McGraw-Hill, 2009. pp. 136–55.
17. Cordain L, Lindeberg S, Hurtado M, Hill K, Eaton SB, Brand-Miller J. Acne vulgaris: a disease of Western civilization. Arch Dermatol. 2002;138(12):1584–90.
18. Rzany B, Kahl C. [Epidemiology of acne vulgaris]. J Dtsch Dermatol Ges. 2006;4(1):8–9.

19. Goodman GJ. Management of post-acne scarring. What are the options for treatment? Am J Clin Dermatol. 2000;1(1):3–17.
20. Rivera AE. Acne scarring: a review and current treatment modalities. J Am Acad Dermatol. 2008;59(4):659–76.
21. Jemec GB, Jemec B. Acne: treatment of scars. Clin Dermatol. 2004;22(5):434–8.
22. Frith M, Harmon CB. Acne scaring: current treatment options. Dermatol Nurs. 2006;18(2):139–42.
23. Garg VK, Sinha S, Sarkar R. Glycolic acid peel versus salicylic-mandelic acid peels in active acne vulgaris and post-acne scarring and hyperpigmentation: a comparative study. Dermatol Surg. 2009;35(1):59–65.
24. Ghersetich I, De Padua MP. [Chemical peels, indications and limitations]. Dermatol Cosmet Skin. 2002;8(11):43–5.
25. Savant SS. Superficial and medium depth chemical peeling. In: *Textbook of Dermatosurgery and Cosmetology*, 2nd edn, Savant SS (Ed.). Mumbai, India: ASCAD, 2005. pp. 177–95.
26. Khunger N, Bhardwaj D, Khunger M. Evaluation of CROSS technique with 100% TCA in the management of ice pick acne scars in darker skin types. J Cosmet Dermatol. 2011;10(1):51–7.
27. Leheta T, El Tawdy A, Hay AR, Farid S. Percutaneous collagen induction versus full-concentration trichloroacetic acid in the treatment of atrophic acne scars. Dermatol Surg. 2011;37(2):207–16.
28. Vaishnavi JB. Subcision in rolling acne scars with 24G needle. Indian J Dermatol Venereol Leprol. 2008;74(6):677–9.
29. Alam M, Omura N, Kaminer MS. Subcision for acne scarring: technique and outcome in 40 patients. Dermatol Surg. 2005; 31(3):310–7.
30. Imran M. Microneedling therapy in atrophic facial scars: an objective assessment. J Cutan Aesthet Surg. 2009;2(1):26–30.
31. Goodman G. Post acne scarring: a review. J Cosmet Laser Ther. 2003;5(2):77–95.
32. Ramadan SA, El-Komy MH, Bassiouny DA, El-Tobshy SA. Subcision versus 100% trichloroacetic acid in the treatment of rolling acne scar. Dermatol Surg. 2011;37(5):626–33.

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