



COMPARATIVE STUDY OF EFFICACY OF MANUAL, ELECTRICAL DERMABRASERS & COMBINATION OF BOTH IN VARIOUS SKIN CONDITIONS

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ABSTRACT

Introduction-In recent time, increasing cosmetic awareness and life style upgradation has resulted in a recent upswing in the fortunes of dermatologists and cosmetic surgeons. Dermabrasion is one of the modality used as therapeutic as well as cosmetic procedure in various skin conditions.

Objectives-To compare the efficacy of Manual, Electrical Dermabrasers & Combination of both in various dermatoses.

Material and methods- Patients of both gender & different ages who were clinically diagnosed as one of the indications for dermabrasion were selected from OPD Patients were registered in five groups and allocated with three modalities.

Results- There were 60 patients (32 male & 28 female) underwent the treatment and follow up for one year. Maximum number of patients belongs to Lichen planus hypertrophicus and Lichen simplex chronicus. In present study a combined approach of electrical and manual dermabrasion had shown good results than electrical and manual dermabrasion alone. Among electrical and manual dermabrasion, manual dermabrasion had the worst results. Maximum cases are from lower limb.

Limitations-Larger studies are required to further confirm the efficacy of different modalities. Full face dermabrasion was not performed in any patient as it is a major operation requiring a fully equipped operation theater and postoperative care.

Conclusion- Combination of electrical and manual dermabrasion is better than electrical dermabrasion alone and manual dermabrasion has the worst result. Procedure was well tolerated by all patients with no serious complication. Post operative oozing was most common immediate complication (100%) and persistent hypopigmentation at the end of 6 months of study was the most common delayed complication.

KEYWORDS : VEN(Verrucous epidermal nevus), LPH(lichen planus hypertrophicus), LSC(lichen simplex chronicus), Prurigo Nodularis, Nodular amyloidosis, electrical dermabrasion, manual dermabrasion.

Introduction-

Dermatosurgery i.e. surgery of the skin is an overlap specialty evolved from dermatology, reconstructive and cosmetic plastic surgery, ophthalmology, otolaryngology and oncology. Dermatosurgery is divided into three basic types-Diagnostic, Therapeutic and Cosmetic. Dermabrasion plays a part in all the three aspects¹. DERMABRASION is an electromechanical procedure carried out under local anesthesia, regional anesthesia or general anesthesia and consists of sequential scraping of the raised skin from the epidermis, through the papillary dermis to the junction of upper and mid reticular dermis with either rotatory mechanical or manual dermabrader and further allowing this wound to heal by secondary intention, to achieve leveling effect and to make the cutaneous lesion or scar less conspicuous^{2,3}. Facial dermabrasion can enhance appearance and self-confidence, but will not remove all scars and flaws or prevent ageing. Dermabrasion helps to 'refinish' the skin's top layers through a method of controlled surgical scraping⁴. Dermabrasion is an extensively used surgical modality for treating many cutaneous problems. Facial dermabrasion is indicated mainly for acne scars, while the therapeutic spot or regional dermabrasion, which is carried out only on the areas where the specific lesions are located has been shown to be useful in various skin conditions⁵⁻¹³. It is practically possible to dermabrade every portion of the body by altering the methodology, according to the anatomical features of the region taking into consideration the complications and side effects of the procedure¹⁰.

Recent advances in the field of dermabrasion like microdermabrasion and combination with split thickness grafting¹⁴, suction blister grafting^{15,16} and melanocyte culture¹⁷ have given further boost to this technique by improving the final cosmetic appearance of the treated dermatoses. Thus at present dermabrasion has both therapeutic and cosmetic significance. Complete knowledge of advantages and disadvantages of various resurfacing surgeries such as dermabrasion, chemical peeling, ablative laser resurfacing

and microdermabrasion helps to achieve optimal surgical results in patients who undergo resurfacing surgery¹⁸.

Dermabrasion is the surgical procedure by which skin is resurfaced by planning or sanding, usually by means of rapidly rotating abrasive tools such as wire brush, diamond fraise or serrated wheel¹⁹. It consists of sequential planning of raised skin from the epidermis, through the papillary dermis to the junction of upper and mid reticular dermis by abrasers and allowing to heal by secondary intention. Today dermabrasion is very commonly used for treating many skin conditions. The developments of antiviral medication, semipermeable dressings, tumescent anesthesia and cryoanesthesia have advanced the technique of dermabrasion.

Anatomically lesions or defects of the epidermis, papillary dermis or upper reticular dermis which can be improved completely or partially by abrading to the level of upper reticular dermis are amenable to dermabrasion. The objective of every dermabrasion should be to reorganize and restructure the collagen of papillary dermis without causing injury beyond the upper reticular dermis. The thickness of these layers show personal variation and from one area of the skin to another. While doing dermabrasion, skin is sequentially removed from the epidermis to papillary dermis to the junction of upper and mid reticular dermis. Injury to epidermis and papillary dermis heals without scarring, but an injury below the junction of upper and mid reticular will always result in scarring. Thus the level of dermabrasion should be limited to upper reticular dermis⁷. Histopathological studies of dermabrasion scar revision have shown that post-dermabrasion, there is an increase in collagen bundle density and size with a tendency towards unidirectional orientation of fibres parallel to surface. There is also modification of extracellular ligand expression like tenascin and a-4/b₄ integrin in papillary dermis and epidermis. This is responsible for skin rejuvenation effects of dermabrasion²⁰.

MATERIAL AND METHODS -The present study was started with 80

patients in Department of Dermatology and Venereology, Nehru Hospital, BRD Medical college Gorakhpur from May 2003 to October 2004, of them only sixty patients completed the study period of six month with regular follow-ups.

Patients who were clinically diagnosed as one of the indications for dermabrasion and were willing for surgical treatment and regular follow up were selected at random from the Out Patient Department. Confirmation of clinical diagnosis in doubtful cases was done with biopsy and histological examination. Informed consent of the patient was taken.

PATIENT SELECTION CRITERIA³

1. After counseling, only patients having realistic expectations (50-80%) improvement were included in the study.
2. Emotionally imbalanced and overanxious patient's are more likely to be dissatisfied with the eventual result of the procedure, so they were avoided.
3. Certain conditions like Diabetes Mellitus and Immunosuppression are a hurdle in wound healing and are more likely to have postoperative complications.
4. Fairer the patient, better is the results. Lighter skin types (I,II) and darkest type (VI) are less likely to have permanent discoloration.
5. **Contraindicated conditions like** Keloids, Bleeding disorders, Herpes infection etc.

EQUIPMENT USED IN PRESENT STUDY:

- (A) **Electric Dermabrader:** The Bell International Engine unit.
 (B) **Maneksha's Manual Abraders:** Five sizes were used, depending upon the area to be abraded
- 5mm, 7mm, 12mm, 15mm, 20mm.

MODIFICATIONS AS PER CONDITIONS AND SITE³:

- (1) **Lichen Planus Hypertrophicus-** Two sittings of deep spot dermabrasion usually required.
- (2) **Verrucous Epidermal Naevus-** Superficial dermabrasion done initially, if recurrence occurred dermabrasion was repeated followed by skin grafting.
- (3) **Prurigo Nodularis-** Deeper abrasion and multiple sittings required.

FOLLOW UP:

1. Dressing of wounds were changed on 2nd and 7th day, till complete re-epithelisation (1-3 weeks depending upon wound size and complications).
2. Detailed notes about the healing pattern, pigmentation and complications were made on each follow up.
3. After re-epithelisation patients were asked to come for follow up every 3 months.
4. Complications and sequelae were treated as and when they developed.

SCORING PATTERN:

For our assessment following points were taken into consideration.

(1) Size of lesion:

- I - Complete resolution (clearance)
- II - >50% reduction in size
- III - <50% reduction in size

(2) Flattening effect:

- I - Total flattening
- II - >50% normal in thickness
- III - <50% normal in thickness

(3) Pigmentary (colour) alteration:

- I - No pigmentary alteration
- II - >50% normal pigmentation
- III - <50% normal pigmentation

Grading:

Grade-I: Complete resolution with total flattening with complete

normal re-pigmentation.

Grade-II: Complete resolution with total flattening with >50% normal re-pigmentation.

Grade-III: Complete resolution with >50% reduction the thickness with <50% normal re-pigmentation.

Grade-IV: >50% reduction in size with >50% reduction in thickness with >50% normal re-pigmentation or overall cosmetically acceptable results.

Grade-V: <50% reduction in size with <50% reduction in thickness with <50% normal re-pigmentation or overall cosmetically unacceptable results.

Results with grade I, II and III were considered as good results while grade IV and V results were considered as poor results.

RESULTS-The present study was conducted on 60 patients of definite indications of dermabrasion,

attending the Dermatology OPD of Nehru Hospital BRD Medical college, Gorakhpur.

- (1) In this study maximum number of patients were of age group 21-30 years (33.33%) followed by 11-20 years (26.66%). The number of patients were less in age group 0-10 years and above 40 years. This shows that cosmetically aware age group i.e. (11-30 years) constituting (60.00%) cases was more willing to go for dermabrasion. Children were not ideal candidate for dermabrasion as they were apprehensive for any invasive procedure. **(TABLE-I)**
- (2) In our study male and female ratio was almost equal (32:28=1.14:1). **(TABLE-I)**
- (3) Maximum patients were of acquired hypertrophic conditions like lichen planus hypertrophicus (33.33%) and lichen simplex chronicus (33.33%). **(TABLE-II)**
- (4) The most common site of dermabrasion in the study was lower limb i.e. 70% (42 cases) followed by back, upper limb, face & neck. The least common site was chest and abdomen. **(TABLE-III)**
- (5) Maximum patient was taken from combined approach 30(50%), followed by electrical dermabrasion 17(28.33%) and Manual dermabrasion 13(21.66%) **(TABLE-IV)**
- (6) Out of 20 patients of lichen planus hypertrophicus 15 (75.00%) patients showed good results while 5 cases showed recurrence and pigmentary complications. **(TABLE-V,VI,VII)**
- (7) Out of 20 cases of lichen simplex chronicus 13 (65.00%) showed good results while recurrence was seen in 3 cases. **(TABLE-V,VI,VII)**
- (8) In patients of Verrucous epidermal nevus, prurigo nodularis and nodular amyloidosis 50 % cases showed good results. **(TABLE-V,VI,VII)**
- (9) Most of the patients undergoing dermabrasion had their disease for the last 2-5 years (33.33%) followed by 5-10 year duration (26.67%). The outcome of the procedure was good in short duration cases i.e. <6 month duration and the prognosis got worsened with long duration of disease. Cases with >5 year duration had the worst prognosis. The rate of recurrence of disease increases with longer duration of disease. **(TABLE-IX)**
- (10) The most common immediate complication developing in first seven days of dermabrasion was oozing (100.0%) followed by oedema, pain and bleeding. Most immediate complication decreased in incidence with time. The most common delayed complication was hypopigmentation and scarring. No cases of milia and Keloid/hypertrophic scars were seen in our study. **(TABLE-X)**
- (11) The study showed that neither electrical dermabrasion (58.82%) alone nor manual dermabrasion alone had good results. Manual dermabrasion (38.46%) alone had the worst result. A combined electrical and manual dermabrasion

approach had shown good results (76.67%) thus combined approach should be suggested instead of either manual or electrical dermabrasion alone. (TABLE-VIII)

DISCUSSION—Dermabrasion is an extensively used surgical modality that has been applied to a multitude of cutaneous conditions. Facial dermabrasion is indicated mainly for acne scars, while the therapeutic spot or regional dermabrasion which is carried out only on the areas where the specific lesions are located has been shown to be useful for treating many cutaneous problems. In the present study of 60 patients, age group ranged from 8 year to 60 years. Maximum patients were of 11-30 year (60.00%) age group. This showed that cosmetically aware age group (11-30 years) was more willing to get their dermatoses corrected.

In this study out of 60 patients, number of male (32 cases) and female (28 cases) patients were almost equal (male:female= 1.14:1). Thus there was no sex specific variation in patient selection. In our study, maximum patients were of acquired hypertrophic conditions (20 cases or 33.33%) Lichen planus hypertrophicus and lichen simplex chronicus were the most common condition, 20 cases each (33.33%) for which patients were dermabraded. Full face dermabrasion was not performed in any patient, as it is a major operation requiring a fully equipped operation theatre and post operative management.

The most common site of dermabrasion in the present study was lower limb (70.00%) followed by back, upper limb, face & neck. This showed that the indications of therapeutic dermabrasion were more commonly present on the lower limb.

The fact that people were more conscious of skin lesions on exposed parts and more willing to try surgical modalities on them, if medical measures fail. Among hypertrophic or lichenified conditions, maximum cases were of lichen planus hypertrophicus (33.33% cases) and lichen simplex chronicus (33.33% cases). Out of 20 cases of lichen planus hypertrophicus 15 cases (75.00 %) showed good results while recurrence was seen in 5 cases. Out of 20 cases of lichen simplex chronicus 13 cases (65.00%) showed good results while recurrence was seen in 3 cases.

In the present study maximum patients had their disease for the last 2-5 years (33.33%), followed by 5-10 years (26.67%). The outcome of the procedure was good in patients with disease duration <6 months (100%) and it progressively deteriorated with longer duration of disease. Similarly the recurrence percentage was maximum in patient with disease duration greater than 10 year (75.00%) and least in disease duration <6 months (0.0%). The recurrence percentage increases progressively with duration of disease. These results indicate that earlier the lesion were dermabraded, the better the results.

Postoperative oozing was the most common immediate complication (100%) and persistent hypopigmentation (20% cases) at the end of 6 months of study was the most common delayed complication. Other immediate complications were oedema, pain/tenderness, infection and bleeding, which gradually decreased in incidence with time. Other delayed complications were recurrence hyperpigmentation and scarring.

In the present study, patients were divided into 3 groups according to mode of dermabrasion used—electrical, manual and combined electrical & manual. The criteria for selection of mode of dermabrasion to be used was mainly the thickness of lesion to be abraded. A combined electrical and manual approach was used in maximum number of patients. First the hypertrophic lesions were abraded with electrical dermabrader and then fine dermabrasion was done with manual dermabraders.

Only 17 (28.33%) cases were abraded by electrical dermabrader alone. Only 10 (58.82%) cases had good results, in which electrical dermabrasion alone had been used. The results had shown that a combined electrical and manual dermabrasion had the best

outcome (76.67%).

CONCLUSION—The present study was conducted on 60 patients who were clinically as one of the indication for dermabrasion and were willing for surgical treatment and regular follow up.

The electrical dermabrader used in the study was a hand held motor dermabrader with Bell International Engine, DERMABRADER KIT (Deluxe) manufactured by DermaIndia (speed rang from 600 to 1800 rpm) Maneksha's manual dermabraders were of 5 size (5mm, 7mm, 12mm, 15mm, 20mm,) were also used.

The minimum age recorded in the study was 8 years and the maximum age was 60 years. Most of patients (60%) were of the age group, 10-30 years which was the cosmetically most aware population.

Maximum patients were of acquired hypertrophic conditions like lichen planus hypertrophicus (33.33 %) and lichen simplex chronicus (33.33 %).

Most common site of dermabrasion was the lower limb (70.00 %) and the least common site was chest and abdomen (1.66%).

Maximum patients (50 cases, 83.33%) had their disease for the last 1-10 years. Best result were seen in lichen planus hypertrophicus (75%). Poor results were seen in Verrucous epidermal nevus, Prurigo Nodularis and Nodular amyloidosis. The outcome of the procedure was good in short duration cases i.e. <6 months duration (100.0%) and it progressively worsened with longer duration of disease.

The recurrence percentage was maximum in patients with longer disease duration and least in cases of <6 months duration. Thus earlier the lesions were dermabraded, the better the results. Post-operative oozing was the most common immediate complication present in all cases (100.0%) and persistent hypopigmentation was the most common delayed complication after 6 months at the end of study.

In the present study, we concluded that a combined electrical and manual dermabrasion was much better approach (76.67% good results) as compared to either of them used separately. Electrical dermabrasion was successful only in 58.82% cases.

The procedure was well tolerated by all patients with no serious complications. From this study, we concluded that with a comprehensive knowledge of procedure, proper patient selection, adequate patient's education correct intra-operative techniques and careful post-operative management, dermabrasion may be useful effective tool in the armamentarium of dermatosurgeons for the surgical management of chronic and resistant dermatoses.

LIMITATIONS OF STUDY: As it is a single centre study with a relatively small study population results cannot be generalized to the entire population.

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S.N o.	Age group (In Years)	Male		Female		Total	
		No.	(%)	No.	(%)	No.	(%)
1	0-10	0	0	4	14.29	4	6.67
2	11-20	10	31.25	6	21.43	16	26.67
3	21-30	12	37.5	8	28.57	20	33.33
4	31-40	6	18.75	6	21.43	12	20
5	41-50	2	6.25	2	7.14	4	6.67
6	51-60	2	6.25	2	7.14	4	6.67
	Total	32	100	28	100	60	100

TABLE-II							
Distribution of patient According to type of Dermatoses							
S.N o.	Conditions	Total No.	Male		Female		Total
			No.	(%)	No.	(%)	
1	Verrucous epidermal naevus	8	5	15.63	3	10.71	8 13.34
2	Lichen planushypertrophicus	20	11	34.38	9	32.15	20 33.33
3	Lichen simplex chronicus	20	10	31.25	10	35.72	20 33.33
4	PrurigoNodularis	6	3	9.37	3	10.71	6 10.00
5	Nodular Amyloidosis	6	3	9.37	3	10.71	6 10.00
Total No		60	32	100	28	100	60 100

TABLE-III							
Distribution of patient According to Site of Dermabrasion							
S.N o.	Conditions	Site of lesion (No. of patients)					
		Total No.	Lower limb	Upper limb	Back	Chest and abdomen	Face, head and neck
1	Verrucous epidermal naevus	8	0	0	5	1	2
2	Lichen planushypertrophicus	20	14	3	3	0	0
3	Lichen simplex chronicus	20	17	1	0	0	2
4	PrurigoNodularis	6	5	1	0	0	0
5	Nodular Amyloidosis	6	6	0	0	0	0
Total		60	42(70.00%)	5(8.33%)	8(13.33%)	1(1.67%)	4(6.67%)

TABLE-IV					
Distribution of patient According to type of Dermabrasion					
S.No.	Conditions	Total No.	Manual Dermabrasion	Electrical Dermabrasion	Both
1	Verrucous epidermal naevus	8	2	2	4
2	Lichen planushypertrophicus	20	4	6	10
3	Lichen simplex chronicus	20	5	5	10
4	PrurigoNodularis	6	1	2	3
5	Nodular Amyloidosis	6	1	2	3
Total		60	13(21.67%)	17(28.33%)	30(50.00%)

TABLE-V								
Evaluation of efficacy of manual dermabrasion								
S.No.	Conditions	Total No.	RESULTS (GRADE)					Recurrence Rate
			I	II	III	IV	V	
1	Verrucous epidermal naevus	2	-	-		1	1	1

2	Lichen planushypertrophicus	4	-	1	2	1	-	1
3	Lichen simplex chronicus	5	-	1	1	2	1	1
4	PrurigoNodularis	1	-	-	-	1	-	1
5	Nodular Amyloidosis	1	-	-	-	-	1	1
Total		13		2	3	5	3	5

TABLE-VI								
Evaluation of efficacy of electrical dermabrasion								
S.N o.	Conditions	Total No.	RESULTS (GRADE)					Recurrence Rate
			I	II	III	IV	V	
1	Verrucous epidermal naevus	2	-	-	1	1	-	1
2	Lichen planushypertrophicus	6	1	2	1	2	-	2
3	Lichen simplex chronicus	5	1	1	1	2	-	1
4	PrurigoNodularis	2	-	1	-	1	-	1
5	Nodular Amyloidosis	2	-	-	1	-	1	1
Total		17	2	4	4	6	1	6

TABLE-VII								
Evaluation of efficacy of combined electrical and manual dermabrasion								
S.N o.	Conditions	Total No.	RESULTS (GRADE)					Recurrence Rate
			I	II	III	IV	V	
1	Verrucous epidermal naevus	4	1	1	1	1	-	1
2	Lichen planushypertrophicus	10	3	3	2	2	-	2
3	Lichen simplex chronicus	10	2	4	2	2	-	1
4	PrurigoNodularis	3	-	1	1	1	-	1
5	Nodular Amyloidosis	3	-	1	1	-	1	1
TOTAL		30	6	10	7	6	1	6

TABLE-VIII										
Comparative evaluation of efficacy of electrical, manual and combined electrical and manual dermabrasion										
S.N o.	Conditions	Total No.	MANUAL		ELECTRICAL		BOTH		TOTAL CASES IMPROVED	
			Patients	Improved	Patients	Improved	Patients	Improved	No.	(%)
1	Verrucous epidermal naevus	8	2	0	2	1	4	3	4	50
2	Lichen planushypertrophicus	20	4	3	6	4	10	8	15	75
3	Lichen simplex chronicus	20	5	2	5	3	10	8	13	65
4	PrurigoNodularis	6	1	0	2	1	3	2	3	50
5	Nodular Amyloidosis	6	1	0	2	1	3	2	3	50
Total		60	13	5(38.46%)	17	10(58.82%)	30	23(76.67%)	38	63.33

TABLE-IX

Effect of disease duration on results

S.No	Duration of disease	Total Patient		Good Result		Recurrence Rate	
		No	%	No	%	No	%
1	< 6 month	2	3.33	2	100	-	-
2	6 month -1yr	4	6.67	3	75	-	-
3	1-2 yrs	14	23.33	10	71.43	2	14.29
4	2-5 yrs.	20	33.33	13	65	5	25.00
5	5-10 yrs.	16	26.67	9	56.25	7	43.75
6	>10 yrs.	4	6.67	1	25	3	75.00
	Total	60	100	38	63.33	17	28.33

TABLE-X

Complication of Dermabrasion

	Complications	I (2Day s)	II (7 Day)	III (15 Days)	IV (30 Days)	V (3 month)	VI (6M oth)	Percentage of patients developing complication (%)
(A)	IMMEDIATE							
1	Oozing	60	50	28	6			100%
2	Oedema	50	23	8				83.33%
3	Pain/tenderness	50	25	15	4			83.33%
4	Infection	10	20	8	02			33.33%
5	Bleeding	35	10	2				58.33%
6	Itching		05		10	12	17	28.33%
(B)	DELAYED							
1	Hypopigmentation			52	30	12	12	20.00%
2	Hyperpigmentation			10	6	5	4	6.60%
3	Scarring				5	5	4	6.60%
4	Recurrence					17	17	28.33%
5	Keloid/milia	-	-	-	-	-	-	-

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