

## Chemical Peeling in the Treatment of Xeroderma Pigmentosum

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### ABSTRACT:

#### BACKGROUND:

Xeroderma pigmentosum is a rare autosomal recessive disease characterized by abnormal sensitivity to ultraviolet radiation with early appearance of variable premalignant and malignant skin lesions leading to a reduction in life expectancy because of tumor metastasis .

#### OBJECTIVE:

To assess the role of chemical peels in clearing the skin background in patients with xeroderma pigmentosum.

#### PATIENTS AND METHODS:

To achieve the objective of the present study, a case-series design was adopted covering 14 patients with xeroderma pigmentosum. They were treated in the Plastic Surgery Unit at Al-Jumhori Teaching Hospital in Mosul, for the period from March 2011 to May 2012. Surgical excision was done first for the malignant skin lesions then chemical peeling of the face, using 30% trichloro- acetic acid was done. Assessment of the results was performed by the patients or their caregivers and by two plastic surgeons, depending on the number of lesions and the degree of pigmentation which were classified into 3 degrees, as poor, (no changes occur), moderate and good (depending on the improvement in skin background by the decrease in freckling and lightening of the pigmentation).

#### RESULTS:

Fourteen patients with xeroderma pigmentosum were enrolled in this study, 9 males and 5 females, their age range was 1 to 30 years. Malignant lesions were treated by excision and split- thickness skin graft or local flaps. The evaluated results of facial skin improvement after chemical peeling were poor in 2 patients, moderate in 7 patients and good improvement was shown in 5 patients. No significant complications developed, except scarring in one case and hyperpigmentation in 2 cases.

#### CONCLUSION:

Chemical peel is a simple procedure which was tolerated by the patients and can be used to improve the facial skin background and eliminate all subclinical premalignant lesions .

**KEYWORDS:** xeroderma pigmentosum, chemical peeling, skin cancer

### INTRODUCTION:

Xeroderma pigmentosum (XP) is an autosomal-recessive disease characterized by extreme sensitivity to sunlight, resulting in sunburn, pigment changes in the skin and a greatly elevated incidence of skin cancers. The clinical manifestations appear early in life, after the child is first exposed to the sun. Life expectancy is significantly reduced because of metastases, infection or neurologic complications <sup>(1)</sup>. Estimated incidences vary from 1 in 20, 000 in Japan to 1 in 250, 000 in the USA and the incidence in North Africa and the Middle East,

where there is a high level of consanguinity, is substantially higher <sup>(2)</sup>.

As there is no cure of the disease, the treatment modalities have been prophylaxis by avoidance of solar exposure, topical 5-fluorouracil, oral retinoids, surgical excision of premalignant and malignant tumors and resurfacing with skin grafts, and dermabrasion <sup>(3)</sup>. Any agent or modality that minimizes the background skin damage could greatly facilitate patient care.

Treatment of photoaging, actinic keratoses, lentiginos, and other pigmentary dyschromias are the principle indications for the trichloroacetic acid (TCA) chemical peel <sup>(4)</sup>. TCA has been the gold standard in chemical peeling for many decades <sup>(5)</sup>. As with other chemical peel agents, it generally renders the skin a more pleasant, smooth, and less dry or irritated appearance and feel <sup>(4)</sup>

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Excision and reconstruction followed by full-face chemical peeling and dermabrasion were accomplished by Akan et. al. in XP patients<sup>(6)</sup>. Surgical excision of the lesions followed by full-face chemical peeling is thought to provide effective prophylaxis against malignant degeneration<sup>(6)</sup>.

The aim of the study is to assess the role of chemical peels in improving the skin background in patients with XP, hence to decrease the rate of development of new lesions.

### **PATIENTS AND METHODS:**

In this study a case-series of 14 patients who were diagnosed by clinical examination as XP. They were treated in the Plastic Surgery Unit at Al-Jumhori Teaching Hospital for the period from March 2011 to May 2012.

Under general endotracheal anaesthesia, surgical excision was done first for the malignant skin lesions with different modalities for closure, including direct suturing, skin grafting or local skin flaps. Then full-face chemical peeling was carried out during the same operative session.

Trichloro acetic acid (TCA) in a concentration of (30%) was used for the peeling of the face which was applied evenly and uniformly over the entire face. A first application was done on the area to be treated, allowing the substance to penetrate for a few seconds, and then a second application made, followed by another one until frosting appears (whitening due to the coagulation of the protein in the epidermis), (figure 1B). At this point the process is stopped by sprinkling water at room temperature on the treated area. Then a thin coat of antibiotic ointment, applied postoperatively, three times per day after gentle cleansing. Beginning at day 4–5, wet dressings applied twice a day after cleansing which may aid in the exfoliation. Reepithelialization was completed in 7–10 days. The patients were submitted to 3-7 chemical peeling sessions with a 3 weeks interval between

the sessions, depending on the degree of patient's improvement of skin background.

Results were ascertained by clinical examination and pre- and postoperative digital photography (i.e. after each chemical peeling session). Assessment was done by the patients or their caregivers and two plastic surgeons. The criteria used in the assessment were : number of lesions and degree of pigmentation and freckling. The assessment of final aesthetic results were classified into three subsets: poor (no changes occur), moderate (improvement in skin background, decrease in freckling and lightening of pigmentation) and good i.e. improvement of skin background. Data related to patient's age, sex and length of follow-up were enrolled, too.

### **RESULTS:**

Fourteen patients, 9 males and 5 females ranged in age from 1 to 30 years. One patient has no previous lesion on his face, the other 13 patients had 1- 11 lesions treated by excision and split thickness skin graft or local flaps.

Case no.4, was a 4-years old girl with XP presented with 2 lesions on her face, which were excised with direct closure of the wound. They were proved histologically as basal cell carcinomas. The patient underwent 30% TCA full-face chemical peels, 3 times which showed a satisfactory result (figure 1), while case no.2 and 6 needed 4 and 7 sessions, respectively, to give satisfactory result (figure 2,3).

The evaluated aesthetic results of facial skin improvement after chemical peeling were poor in 2 patients, moderate in 7 patients and good improvement in 5 patients. No significant complications were developed, except scarring occurred in 1 case and hyperpigmentation in 2 patients.

In this study, after a follow up ranged from 15 to 20 months (mean:17.4 months), there was no sign of recurrence of 5 malignant lesions treated during chemical peeling sessions, and all patients showed no sign of developing new lesion after the last session (Table 1).

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**Table 1: Profile of study cases with follow-up period ( in months) and treatment sessions.**

serial No.	Age (year)	sex	No. of total lesions before chemical peel	No. of lesions during follow up	No. of lesions after last session	No. of sessions	complications	Period of follow up in months
1.	25	F	7	0	0	3	_____	20
2.	16	M	3	1	0	4	_____	20
3.	1	F	0	0	0	5	scarring	15
4.	4	F	2	0	0	3	-----	15
5.	30	M	11	2	0	4	Hyper pigmentation	20
6.	17	M	10	0	0	7	_____	19
7.	22	M	5	2	0	5	_____	16
8.	23	M	11	0	0	7	Hyper pigmentation	16
9.	17	F	1	0	0	5	_____	16
10.	8	M	1	0	0	7	_____	16
11.	18	F	5	0	0	5	_____	20
12.	16	M	8	0	0	5	_____	18
13.	12	M	2	0	0	5	_____	18
14.	5	M	1	0	0	5	_____	15



A

B

C

**Figure:1 A:** Case no. 4, shows the patient with XP before chemical peeling, with 2 lesions marked on left cheek and nose, **B:** shows the frosting sign after TCA chemical peel, **C:** shows the patient after last chemical peel.



A

B

Figure: 2 Case no. 2, shows the patient with XP before (A) and after (B) chemical peeling.



A

B

Figure: 3 Case no. 6, shows the patient with XP before (A) and after (B) chemical peeling.

**DISCUSSION:**

Xeroderma pigmentosum is a rare inherited disease. It was first described in 1874 by Hebra and Kaposi<sup>(7)</sup>. In 1882, Kaposi coined the term XP for the condition, referring to its characteristic dry, pigmented skin. It occurs with an estimated frequency of 1:250,000 in the US and somehow more common in Japan<sup>(8)</sup>. The principal clinical features of the disease are characterized by dermatologic and ocular symptoms and signs that follow exposure to sunlight. The clinical manifestations appear early in life, after the child is first exposed to the sun. Individuals with XP develop multiple cutaneous neoplasms at a young age<sup>(9)</sup>. Tumors that are seen most often include squamous cell carcinoma, basal cell carcinoma and malignant melanoma<sup>(10)</sup>. Two important causes of mortality are metastatic malignant melanoma and squamous cell carcinoma<sup>(11)</sup>. Affected patients have a frequency of skin cancer more than 1000 times that seen in general population<sup>(10)</sup>.

As there is no cure of the disease, the care is both prophylactic and ablative. Protective measures include avoiding sunlight, covering the body with clothing, and use of protective sunscreens<sup>(12)</sup>. Ablation includes topical application

of 5-fluorouracil to scaling areas<sup>(13)</sup>, surgical excision of cancers with skin grafting<sup>(14)</sup>, dermabrasion<sup>(15)</sup>, chemical peel<sup>(16)</sup>, and complete resurfacing of the face. Yosipovitch et.al.<sup>(15)</sup> performed local excision of tumors or radical excision of the involved areas with resurfacing aesthetic units of the face with split-thickness skin grafts. Although significant decrease of the tumor recurrence was achieved, the increased morbidity of the donor site and unnatural facial appearance were noticed, and surgery was not a permanent cure.

The benefit of dermabrasion in patients with severely photodamaged skin is also well documented<sup>(17)</sup>. Regenerated epidermis arises from the deeper adnexae that had been relatively protected from solar damage<sup>(18)</sup>. The cosmetic result has been claimed to be better with dermabrasion than that achieved by split skin grafting.

Nelson et al. reported using dermabrasion and periodic peeling with TCA in treating xeroderma pigmentosum. After full-face dermabrasion, periodic peeling with TCA was done. Although TCA was noted to have minimal morbidity, it was also reported to be less effective when

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compared to dermabrasion<sup>(16)</sup>. Wee and Ahn proposed using chemical peeling as a simple and effective procedure for his two patients with xeroderma pigmentosum<sup>(19)</sup>.

Histologically, TCA produces superficial coagulation of skin proteins and destruction of the epidermis and the upper papillary dermis, followed by epidermal and dermal rejuvenation with new collagen deposition and normalization of the elastic tissue<sup>(20)</sup>. Brodland et al.<sup>(21)</sup> showed in a porcine model that a minimum of 30% (w/v) TCA is required for complete epidermal necrosis with a single application. In the present study, chemical peeling clears the skin background and could work better than dermabrasion with less morbidity. Moreover, multiple procedures are impracticable in dermabrasion but more convenient in chemical peeling. However, the effect of chemical peel was transient because lentiginos returned nearly to baseline approximately 6 months after the procedure. Chemical peel cannot be a method of complete cure, but it may increase self-esteem and quality of life owing to better cosmetic results.

The number of the sessions of chemical peels performed in this study ranged from 3 to 7 sessions depending on the severity of the disease and the response and improvement of the patients. Repeated peeling is usually indicated, especially in severe cases, to get an acceptable results as shown by Wee, who performed chemical peelings, using 40% TCA, 5 times for his patient to get a reasonable improvement<sup>(19)</sup>.

With the advent of lasers and newer techniques, the use of chemical peels has declined; however, its simplicity, minimal morbidity, easy availability and cost-effectiveness ensure that it still holds an important place as a tool to treat dyschromias as XP.

Fortunately no significant complications occur following chemical peeling in this study. There were 2 patients who hyperpigmentation which may be due to premature exposure to sun light. Development of scarring was noticed in one patient which may be due to deep peeling with delayed washing of the peeling site when frosting appear to prevent deep penetration of the acid and was treated with topical corticosteroids. Hypertrophic scarring can occur if the peel reaches the reticular dermis<sup>(22)</sup>. No infection were reported since well preparation of the patients before the procedure with the use of local

antibiotic to the peeled areas post operatively was followed.

In this study there was a reasonable aesthetic improvement of the facial skin in 12 patients out of 14. Adding to that, there was an increase in self-esteem and improvement in quality of their lives, because it substitute the dry, hyperpigmented and atrophied skin by a smooth, clear and lesion free skin and the patient not only benefit from removal of the erythematous, scaly actinic keratoses but also obtain cosmetically pleasing rejuvenation of his facial skin. The improvement of their facial appearance will become a stimulating factor for those patients to take a more preventive measures such as avoiding sun exposure by cover the exposed body surfaces, not going out doors and the use of sunscreens.

It has been shown that excision and then resurfacing the skin of patients with XP with sun-protected split-thickness and full-thickness skin grafts resulted in a tumor-free period of 2 to 5 years<sup>(23,24)</sup>. The benefit of dermabrasion in patients with severely photodamaged skin is also well documented<sup>(25)</sup>. Regenerated epidermis arises from the deeper adnexae that had been relatively protected from solar damage<sup>(18)</sup>. The same logic promoted efforts to use dermabrasion for patients with XP (3). Nelson et. al noted in his two patients after chemical peeling that no tumors developed 2 years after facial dermabrasion<sup>(16)</sup>.

In this study, after a mean follow up of 17.4 months, all patients showed no sign of developing new lesion after the last session of chemical peeling. The decreased tumor formation in the follow up period in this study may reflect the derivation of the new epidermis from light-protected, less damaged, adnexal progenitor cells. It is also possible that epidermis generated from cells originally committed to adnexa formation has inherently different properties irrespective of exposure to light of the progenitor cells<sup>(4)</sup>. Chemical peeling is a good method to remove the subclinical premalignant lesions and may prevent or delay appearance of new tumors in XP patients. In addition, another advantage of this treatment was cost reduction when compared to laser and multistage operations. It appears that the main drawbacks of this study are the small number of patients treated by this method and the relatively short period of the follow up.

### CONCLUSION:

Chemical peel is a simple procedure used for the treatment of XP that can lead to excellent cosmetic improvement. In addition, it helps to identify preexisting tumors not easily detected before the procedure. It is well tolerated in all patients with minimal grade of pain and no significant side effects. Further study is needed enrolling larger number of patients with long duration of follow up.

### REFERENCES:

1. Harper J. Genetics and genodermatoses. In: Champion RH, Burton JL, Ebling FJG, eds. Textbook of dermatology; vol 1. 5th ed. Cambridge: Blackwell, 1992:348-51.
2. Lehmann A, McGibbon D, Stefanini M. Xeroderma pigmentosum. *Orphanet J Rare Dis.* 2011; 6:70.
3. Epstein E. H., Burk, P. G., Cohen, I. C., and Deckers, P. Dermotome shaving in the treatment of xeroderma pigmentosum. *Arch. Dermatol.* 1972;105:589.
4. Nguyen T H, Rooney J A. Trichloroacetic acid peels. *Dermatologic Therapy*, Vol. 13, 2000:173-82.
5. Ghersetich I, Brazzini B, Lotti T. Chemical peeling. In: AD Katsambas, T Lotti, eds.
6. European Handbook of Dermatological Treatments, 2nd edn. Berlin: Springer-Verlag; 2003:599 -612.
7. Akan I, Özdemir R, Sungur N, Ulusoy M, Sensöz O. Combined treatment of xeroderma pigmentosum with full-face chemical peeling and dermabrasion. *Eur J Plast Surg* 2001;24:243-46.
8. vonHebra FR, Kaposi M. On disease of skin including the Exanthemata, (translated by W. Tay). London: The New Sydenham Society 1874;3:252-58.
9. Robbins JH, Kraemer KH, Lutzner MA, Festoff BW, Coon HG. Xeroderma pigmentosum, an inherited disease with sun sensitivity, multiple cutaneous neoplasia and abnormal DNA repair. *Ann inter Med* 1974;80:221-48.
10. Kramer KH. Xeroderma pigmentosum, In: Demis DJ, Dobson RL, McGuire J., eds. *Clinical Dermatology*, Vol.4, Unit-19-7. Hagerstown, Maryland: Harper and Row 1980;1-33.
11. Culliford A, Hazen A. Dermatology for plastic surgeon. In: Thorne C. Grabb and Smith's plastic surgery. 6<sup>th</sup> Ed. Philadelphia : Lippencot Williams & Wilkins, 2007:110.
12. English JS, Swerdlow AJ. The risk of malignant melanoma, internal malignancy in xeroderma pigmentosum patients. *Br J Dermatol* 1987;117:457-61.
13. Smithers, D. W., and Wood, J. H. Xeroderma pigmentosum: Attempt at cancer prophylaxis. *Lancet* 1969;1:945.
14. Carter, V. H., Smith, K. W., and Noojin, R. O. Xeroderma pigmentosum: Treatment with topically applied fluorouracil. 1968; *Arch. Dermatol.* 98:526.
15. Moore, C., and Iverson, P. C. Xeroderma showing common skin cancer plus melanocarcinoma controlled by surgery. *Cancer* 1954;7:377.
16. Yosipovitch, Z., Sachs, M. I., and Neuman, Z. Multiple tumor formation in xeroderma pigmentosum. *Br. J. Plast. Surg.* 1965;18:314.
17. Nelson BR, Fader DJ, Gillard M, Baker SR, Johnson TM. The role of dermabrasion and chemical peels in the treatment of patients with xeroderma pigmentosum. *J Am Acad Dermatol* 1995; 32:623-26.
18. Epstein, E. Planing for precancerous skin. *Arch. Dermatol.* 1956;74:312.
19. Epstein, E., Sr. Dermabrasion. In E. Epstein and E. Epstein, Jr. (Eds.), *Skin Surgery*. 5th Ed. Springfield, Ill.: Charles C Thomas, 1982:593-610.
20. Wee SY, Ahn DS. Facial resurfacing in xeroderma pigmentosum with chemical peeling. *Plast Reconstr Surg* 1999;103:1464.
21. El-Domyati M, Attia S, Saleh F *et al.* Trichloroacetic acid peeling versus dermabrasion: a histometric, immunohistochemical and ultrastructural comparison. *Dermatol Surg* 2004; 30:179-88.
22. Brodland DG, Roenigk RK, Cullimore KC, Gibson LE. Depths of chemexfoliation induced by various concentrations and application techniques of trichloroacetic acid in a porcine Perrotti J. Cutaneous resurfacing: chemical peeling, dermabrasion & laser resurfacing. In: Thorne C. Grabb and Smith's plastic surgery. 6<sup>th</sup> Ed. Philadelphia : Lippencot Williams & Wilkins, 2007:461.

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23. Gleason M. Xeroderma pigmentosum: fiveyear arrest after total resurfacing of the face. *Plast Reconstr Surg* 1970; 46:577-81.
24. Atabay K, Celebi C, Cenetoglu S, et al. Facial resurfacing in xeroderma pigmentosum with monoblock full-thickness skin graft. *Plast Reconstr Surg* 1991;87:1121-25.
25. Benedetto AV, Grifhn TD, Benedetto EA, et al. Dermabrasion: therapy and prophylaxis of the photoaged face. *J Am Acad Dermatol* 1992;27:439-47.