

Dermabrasion Again and Again

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ABSTRACT

Dermabrasion is a surgical procedure that, as its name implies, wears away or abrades successive layers of skin, permitting a controlled removal of the epidermis and upper dermis to a depth sufficient to treat disease, tumor, or deformity. The outcome of any resurfacing procedure depends upon: 1- Type of the skin, according to Fitzpatrick classification, 2- The depth of excision. 3- Homogeneity of the procedure. 4- The anatomical site. 5- Exposure to the sun (Ultraviolet rays).

Patients and Methods: We did our assessment within the period from Jan. 1999 to Feb. 2003 in Plastic and Reconstructive Surgery Department, Assiut University Hospital, Egypt. It included 60 patients, their ages ranged from 3-37 years, male to female ratio was equal. All patients included in this study were examined by a team of plastic surgeon and dermatologist (Assiut University Hospital) for proper patient selection and to prepare them for the operation. Strict promise was obtained from the patient to avoid direct and indirect exposure to sun from 7am to 4pm every day for 3 months postoperatively, the technique was described, post operative care explained, we started the application of corticosteroid containing cream immediately.

Results and Conclusions: Although there were two risk factors in our patients, 1- The climates in Assiut-Egypt is sunny all over the year. 2- All our patients had skin type III, IV and V (i.e. Susceptible for Hyperpigmentation and Hypertrophic Scarring). Complications were minimal and respond to medical treatment. Explanation will be discussed. Early application (immediate post-operative) of corticosteroid in small dose for 3 months did not interfere with healing and it had a rule in improvement of the results.

INTRODUCTION

Dermabrasion is a surgical procedure that, as its name implies, wears away or abrades successive layers of skin, permitting a controlled removal of the epidermis and upper dermis to a depth sufficient to treat disease, tumor, or deformity. The Ancient Egyptians first performed dermabrasion in 1550 B.C.; they recommended alabaster and pumice, for smoothing skin and removing blemishes [1,2]. The physiological basis of healing after dermabrasion rests upon the capacity of the skin to regenerate its epidermal cover by epithelialization through

skin appendages, primarily the pilosebaceous units [3]. Dermabrasion forces the growths of new tissue in which fibers are more plentiful and better organized. Although it may take as long as 12 weeks for skin to recover from dermabrasion, the end result is skin that is smoother and more youthful looking [4].

Indications of Dermabrasion: Acne scarring is the most common indication for dermabrasion [5,6,7]. It is often done after surgery to make a scar less noticeable. It is best if it is done approximately 8 weeks after the surgery [8]. It can also be used to remove wrinkles and tattoos [9]. Other indications described in the literature are, Telangiectases, Melasma, Epidermal nevi, Adenoma sebaceum, Actinic keratoses, Syringomas, Rhytides, Cysts and milia, Trichoepitheliomas, Rhinophyma, Recalcitrant acne, Seborrhic keratoses [10,11]. The choices of modalities for resurfacing procedures now include microdermabrasion [12], chemical peel [13], dermabrasion, pulsed CO₂ laser, scanned CO₂ laser, long pulsed Erbium laser [14] and electrical heating, as well as various new modalities that are presently undergoing testing.

Outcome of any Resurfacing Procedure: This depends upon 1- Type of skin, Types III, IV and V, according to Fitzpatrick classification are respectively susceptible for hyperpigmentation and hypertrophic scarring after resurfacing procedures, while type I and II are susceptible for hyperemia [15]. 2- Depth of excision should not extend beyond the level of the papillary dermis, otherwise there will be risk of hypertrophic scarring [16]. 3- Homogeneity of the procedure [17]. 4- Anatomical site, favorable healing is seen in the regions of the skin that have the largest number of adnexal structures and where the skin is thickest [2]. 5- Exposure to sun (Ultraviolet rays) after a single exposure to ultraviolet light in vivo, the skin of Caucasoid, when examined with the dopa reaction showed no increase in the density of melanocytes population

but does show an increase in the size and functional activity of the existing melanocytes [18]. Repeated exposure to ultraviolet light; however, causes an increase in the concentration of dopa-positive melanocytes as well as an increase in their size and functional activity [19].

Contraindications for Dermabrasion: 1- Decrease or absence of skin appendages such as patients with deep thermal burns (of the third degree). Similarly split thickness skin graft, and patients who have received radiation therapy for active cystic acne diseases that cause epidermal atrophy such as discoid lupus, scleroderma, and chronic radiodermatitis are relative contraindication to dermabrasion. 2- Hypertrophic scars and keloids [20]. But some consider them among indication. 3- Blood diseases such as clotting disorders present a contraindication to dermabrasion. 4- Certain medical conditions such as, uncontrolled diabetes mellitus, or severe cardiovascular diseases, and congenital dermal aplasia. 5- Viral infections such as herpes simplex, verruca plana or molluscum contagiosum should be treated prior to surgery. 6- Infectious diseases. Before dermabrasion, all patients should be screened for chronic systemic diseases like, serum hepatitis or AIDS. Patients with positive serological tests for AIDS or serum hepatitis (active one) should not undergo any type of dermabrasion and 7- Neurotic patients some patients are poor candidates for dermabrasion, because of their neurotic attitude. Usually those patients do not understand the procedure and its goal. Also, those patients do not understand that the operation has its limitation, and may have some defects and complications, even if done by skilled surgeons [6].

Following dermabrasion, some skin reactions are expected to occur as: Hemorrhage, edema, exudates, discomfort and crust formation. These reactions occur in the first week, where epithelialization process is going on. After completion of the latter, other reactions are expected like erythema, pruritus, milia, pustule, flushing and acne-form like lesions. Purpura, petechiae and pigmentary disorders are also reported. Complications of dermabrasion include: Skin necrosis, persistent erythema, infection, hyperpigmentation, hypopigmentation and scarring [21,22].

PATIENTS AND METHODS

We did our assessment within the period from Jan. 1999 to Feb. 2003 in Plastic and Reconstructive Surgery Department, Assiut University Hospital, Egypt. It included 60 patients, their ages were

ranged from 3-37 years, male to female ratio were equal. All patients included in this study were examined by a team of plastic surgeon and dermatologist (Assiut University Hospital) for proper patient selection and to prepare them for the operation. Pre-and postoperative instructions were explained to the patients as avoiding aspirin and aspirin containing products for two weeks before dermabrasion. Strict promise was obtained from the patient to avoid direct and indirect exposure to sun from 7am to 4 pm every day for 3 months postoperatively. Clinical assessment was done to determine whether there was any contraindication or exclusive criteria to the procedure.

Operative Procedure: Certain precautions were done before doing dermabrasion, like wearing surgical masks to guard against sprayed blood and aerolization of blood particles, wearing glasses to guard against absorption of blood through the conjunctiva. The patient's eyes then were covered with gauze after applying sterile ointment. Sterilization was done by alcohol 70% then the face (in case of post-acne scars) was painted with gentian violet to map the area to be abraded and to act as a guide for the dermabrasion. Then we injected adrenaline diluted to 1:200 000 with saline at the site of dermabrasion in all cases. We impacted a piece of gauze within the buccal cavity to overstretch the skin. Sustained traction by the operator and the assistant was maintained by triangular stretch with the assistant's two hands forming the base and the operator free hand forming the apex. We used wire brush abrasive end piece for all cases and we pulled it in the direction of handle perpendicular to the plane of rotation. Back and forth or circular movement was done in certain situations but carefully because it may gauge the skin. Suggested rotational speeds of 15,000-20,000rpm for the abrading heads result in a controlled gradual planning of the treated surface. The procedure of dermabrasion was started from the outermost and dependent areas toward the central and upper most areas of the face to take the advantage of gravity and keep blood out of the next operative field. The rotating wire brush was moved with steady and firm manner and with applying greater pressure to areas of deeper scarring. We planned the dermabrasion to end at a natural fold, a line of demarcation, or at a relatively hidden site (e.g., at the nasolabial fold, at the hairline, or under the jaw line, respectively). We did feathering at the periphery of the area that was abraded by decreasing the number of strokes and the pressure on the hand piece. This feathering gave the skin a more uniform appearance. So, obvious demarcation was avoided. We knew that we reached the superficial papillary

dermal layer by smooth, sparse, and punctate bleeding surface. The deep papillary dermal layer was reached when the surface became rougher with more evident bleeding points. Controlling the depth of dermabrasion is an indicator of the experience of the surgeon.

After dermabrasion, we applied a topical preparation containing antibiotic and corticosteroid cream followed by sterile gauze impregnated with vaseline petroleum jelly to avoid drying of the abraded areas and covered with sterile dressing. Bandages were applied to stabilize the underlying dressing and to enhance absorption of the trasudate that will occur. We used systemic antibiotics from the day of surgery till complete healing, analgesics for one week, and vitamin C for 3 months to all cases. The whole dressings were removed by running water 24 hours after dermabrasion and washing with saline was done, then a thick film of topical antibiotic cream and corticosteroid cream (0.5mg per gram betamethasone) is applied by the patient himself twice daily till complete healing. Areas of persistent soft crust in sites of slower healing were not removed forcibly but were treated with the regimen of ointment applications and warm water soaks until healing occurred. Throughout the post-operative period till complete healing, the patient was instructed to avoid hard exercise, straining, lifting heavy objects, bending, and excessive heat, cold, and sun exposure. Also, we avoided the contact of the patients with persons who have herpes simplex, herpes zoster, chicken pox, impetigo, and other skin diseases. After complete healing, we continue to apply the same combination (antibiotic and corticosteroid containing cream) once daily for two weeks, then every other day for two months the patients were instructed to avoid sun exposure (direct and indirect) for 3 months postoperatively. Sunscreen cream (factor > 50) was prescribed to all patients after the 3rd month for at least 3 months. The patients were advised to avoid astringents, exfoliatives or abrasives on the new delicate skin for approximately 6 months

after re-epithelialization. Hydroquinone-containing cream applied once daily at night from the third month for approximately 3 months postoperatively to all cases (Table 1).

RESULTS

The results of our study revealed that most of our patients (55%) were between 21-30 years. 30 males and 30 females with a ratio of 1:1. The commonest indication in our patients was post acne scars (29 patients 48%) followed by hyperpigmentation (13 patients 22%), other indications were presented in Table (2) and Figs. (1-4). The site of dermabrasion was in the face in 52 patients (87%), upper limbs in 4 patients (6.5%), and lower limbs in 4 patients (6.5%). Four (6.5%) out of the 60 patients needed more than one session of dermabrasion with 6 months interval, three had post-acne scar, and one had pigmented skin lesion (Lentigenes). We did face lift in one patient in conjunction to three sessions of dermabrasion to treat severe acne scarring with dimples (Fig. 1). The duration of healing after dermabrasion ranged from 10-21 days (Mean 15 ± 4). The risk factors in our patients were: The climate in Assiut which is sunny all over the year. All our patients had skin type III, IV and V according to Fitzpatrick skin types classification (i.e. susceptible for hyperpigmentation and hypertrophic scarring). Complications developed in 6 (10%) out of the 60 patients. The first was infection in 2 patients (3.3%), one in the upper and the second in the lower limb, it responds rapidly to frequent dressing. The second complication was hyperpigmentation, it was detected in 2 patients (3.3%) underwent dermabrasion in the face, it responded well to the application of Hydroquinone (4%) and completely faded within 6 months postoperatively. The third complication was hypopigmentation in 2 patients (3.3%), in the upper limb, it persisted and did not disappear up to one year. The healing time was delayed up to 3 weeks in patients showed infection and hyperpigmentation.

Table (1): Medication used for patients undergoing dermabrasion.

Drugs	Start of treatment	End of treatment	Remarks
Systemic antibiotic	Just before surgery	Complete healing	Suggested group was 1 st generation cephalosporin
Topical antibiotic cream	At the end of surgery	3 Months*	Gentamycin sulphate 1mg/gram
Corticosteroid cream	At the end of surgery	3 Months*	0.5 mg/gram betamethasone valerate
Hydroquinone 0.4% cream	3 rd post-operative month	3 Months	Applied once at night
Multivitamins and minerals (C,A, zinc)	2 weeks before surgery	6 Months	Three times daily Vit. C 500 mg/3 times daily
Sun block cream SPF < 50	3 rd post operative month	3 Months	Applied before exposure to the sun

Note:*The combination of antibiotic and corticosteroid cream applied once daily for 2 weeks, then every other day for the remaining 3 months.

Table (2): Indication of dermabrasion in our study.

Indications	Post acne scar	Hyperpigmented skin lesion (Freckles and Lentigenes)	Facial scars	Verrocus naves	Tricho epithelioma	Total No.
No. of patients	29	13	6	6	6	60

Fig. (1): Post-acne scarring. Pre and after 2 sessions of dermabrasion and face lift to detach the fibrous attachment of deep scars.



Fig. (2): Pre and post operative view of pigmented skin lesion (Lentigenes).



Fig. (3): Trichoepitheliomas pre and early post operative.

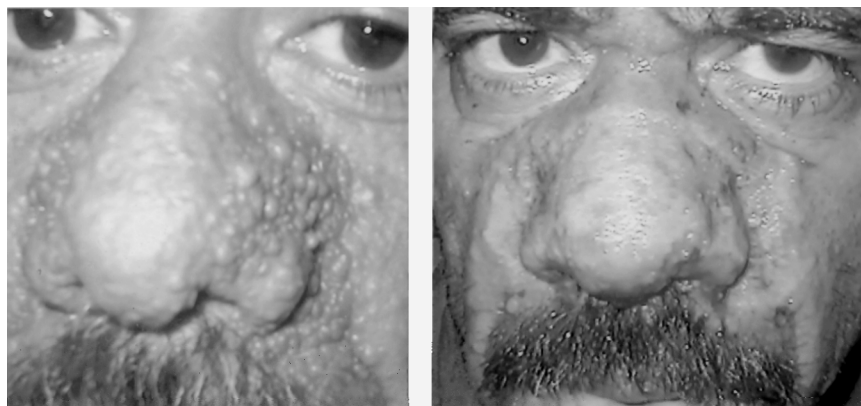
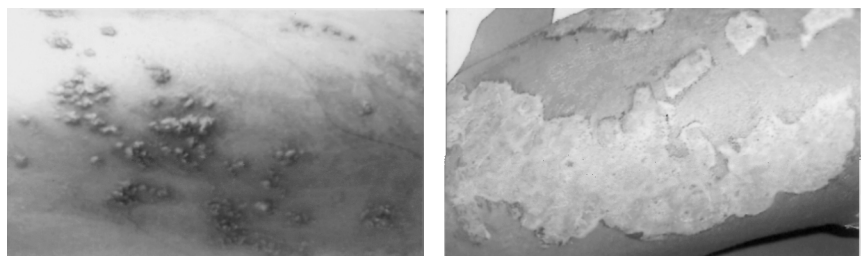


Fig. (4): Verrocus epidermal nevus.



DISCUSSION

Dermabrasion is an extremely useful modality when employed for the proper indication. Although, laser resurfacing has many advantages over dermabrasion because of its blood less field, no risk of blood born pathogens to the operator can be used in the eyelids, and the learning curve is lesser with laser than with dermabrasion [23]. We agree with Baker [24] and Hruza [25], that dermabrasion remains an effective and reliable resurfacing option for many dermatologic lesions. It has some advantages over laser, as it is inexpensive, portable, and widely available. It is well taught in most plastic surgical training programs and therefore, does not require expensive secondary training courses. Dermabrasion requires no specialized accessory equipment and possesses no fire hazard in the operating room. The surgeon can go deeper into the dermis in a layered manner in one setting, so, it requires fewer sessions. In expert hands, dermabrasion can achieve results comparable with laser resurfacing. When performed by an infrequent user of the procedure, however, the results achieved can be expected to be far less predictable than laser resurfacing.

Patients with mild and moderate form of acne scarring or superficial scars gave satisfactory results and responded very well to only one setting of dermabrasion. Patients with severe form of acne scarring showed minimal improvement after one stage but satisfactory results obtained after multiple stages with 3 months interval and after doing undermining of the skin to detach the fibrous septa between the skin and the underlying structures, this procedure allowed lifting of the skin at the same time.

Superficial dermabrasion for hyperpigmented skin lesions in the face specially Freckles and Lentigenes gave rapid and satisfactory results, while medical treatment, by the use of Hydroquinone 2-5% twice daily for months, only decreases the intensity of pigmentation but not eradicate it.

We agree with Rook [26] who stated that dermabrasion tends to produce only temporary benefit in case of verrocus epidermal naevi because this type of naevi tends to recur unless much of the underlying dermis is removed or destroyed at the same time as the epidermal component. So, excision with the underlying dermis is the only completely reliable way of ablating lesion permanently, but dermabrasion may be the only reliable method for improving the extensive cases of verrocus epider-

mal naevi when the excision of the lesion with closure cannot be achieved.

Old facial scars were improved but not eradicated by dermabrasion. This was consistent with the results of Yarborough JM [27] who stated that scars of long duration from 3 months to 13 years are improved but not eradicated by dermabrasion. But dermabrasion of facial scars 4-8 weeks after injury frequently eliminates visible evidence of scar formation. All scars were hypertrophic; we did not trust that dermabrasion is the procedure of choice in management of atrophic scars.

Prieto and Shea [28] in 2002 found that when multiple facial lesions of Trichoepitheliomas were surgically flattened by dermabrasion, they tended to regrow into elevated papules or nodules. This regrowth may occur rapidly within months or may take several years. Some patients find a prolonged cosmetic improvement to be worthwhile even if repeated procedures are necessary. So, close follow up and early interference in case of recurrence was important. Our study included small number of cases, we did not face recurrent cases with three years follow up.

Although, there were two risk factors in our patients, 1- The climate in Assiut-Egypt is sunny all over the year. 2- All our patients had skin type III, IV and V (i.e. Susceptible for Hyperpigmentation and Hypertrophic scarring). The complications were minimal and respond to medical treatment. This could be explained by the following:

1- In spite of the preoperative use of topical tretinoin has become a routine part of dermabrasion because it may enhance wound healing [29], we did not use this line because it was suggested that pre treatment with topical tretinoin contributes to the prolonged erythema which often persists for months [30].

2- Tumescence technique: We injected xylocaine and adrenaline diluted to 1: 200 000 (Tumescence Technique) as advised by Goodman [31] and impacted a piece of gauze within the buccal cavity. These two steps in addition to the assistant's hands resulted in overstretch of the skin and gives a firm surface to dermabrade against skin easily which reduces the bleeding markedly, and allow adequate visualization of the depth of the abrasion. We stopped the use of topical skin refrigerants to avoid their side effects, which were mentioned in the literature (prolonged erythema, delayed wound healing and scarring).

3- Early application (immediate post-operative) of corticosteroid in small dose for 3 months did not interfere with healing. It minimizes the hyperemia through its anti-inflammatory and vasoconstrictive effect. It inhibits melanogenesis, and minimizes hyperpigmentation. Also, it inhibits the fibroblastic activity, so it prevents the development of hypertrophic scarring.

4- Avoid going deep in the dermis to remove deep scars, help to minimize the complications. However, we can repeat the procedure with three months interval.

5- Hydroquinone-containing cream applied once daily at night after the 3rd month for 3 months postoperatively help to prevent Hyperpigmentation disorders.

As regard the postoperative precautions after dermabrasion; it is the same as in case of the other resurfacing procedures, mainly the protection from the sun (Ultraviolet rays). In this study we performed dermabrasion in our population in Upper Egypt (skin types IV, V according to Fitzpatrick skin types classification) and the results were encouraging when sun exposure was avoided for 3 months and then application of sun block for another 3 months. Also, the use of the Hydroquinone cream (2% or 4%) once daily at night for 3 months starting from the 3rd postoperative months as a prophylaxis through blocking the action of tyrosinase. Hyperpigmentation, which developed in 2 patients in this study completely faded by the same regimen.

REFERENCES

- 1- Yarborough J.M.Jr. and Beeson W.H.: Dermabrasion. In: *Aesthetic Surgery of Aging Face*. Edited by: Beeson W.H. and McCullough. C.V. Mosby, St. Louis, pp. 142-81, 1986.
- 2- Baker T.J. and Stuzin J.M.: Chemical peeling and dermabrasion. In: *Plastic Surgery*. Edited by: McCarthy J.G. W.B. Saunders. Philadelphia, p. 748, 1990.
- 3- Spira M., Dahl C. and Freeman R.: Chemosurgery: A histological study. *Plast. Reconstr. Surg.*, 45: 247, 1970.
- 4- Stegman S.J.: A comparative histological study of the effect of three peeling agent and dermabrasion on normal and sun-damaged skin. *Aesthetic Plastic. Surg.*, 6: 123-135, 1982.
- 5- Baker T.J. and Stuzin J.M.: Chemical peeling and dermabrasion. In: *Plastic Surgery*. Edited by: McCarthy J.G. W.B. Saunders. Philadelphia, p. 748, 1990.
- 6- Alt T.H., Coleman W.P., William H.C. and Yarborough J.M.: Dermabrasion In: *Cosmetic surgery of the skin: Principles and techniques*. Edited by: Coleman III W., Hanke C., Aly T. and Asken S., B.C. Decker Inc., Philadelphia, pp. 149-95, 1991.
- 7- Napolitano M. and Seagel M.B.: Skin resurfacing, dermabrasion. *eMedicine Journal*, 2 (7), 2001. <http://www.emedicine.com/plastic/topics514.htm>.
- 8- Katz B.E. and Oca M.A.S.: A controlled study of the effectiveness of spot dermabrasion (scarabrasion) on the appearance of surgical scars. *J. Am. Acad. Dermatol.*, 24: 462-6, 1991.
- 9- Orentreich D. and Orentreich N.: Dermabrasion. *Dermatologic clinics*, 13 (2): 313-393, Apr. 1995.
- 10- Orentreich D. and Orentreich N.: Dermabrasion as a complement to dermatology. *Clinics in Plastic Surgery*, 25 (1): 63-88, 1998.
- 11- Nelson B.K., Majmuder G. and Engriffint C.H.: Clinical improvement following dermabrasion of photoaged skin correlates synthesis of collagen I. *Arch. Dermatol.*, 130: 1139-1192, 1994.
- 12- Shpall R., Beddingfield F.C. 3rd, Watson D. and Lask G.P.: Related: Microdermabrasion: A review. *Facial Plast. Surg.*, 20 (1): 47-50. Feb., 2004.
- 13- Fulton J.E. and Porumb S.: Chemical peels: Their place within the range of resurfacing techniques. *Am. J. Clin. Dermatol.*, 5 (3): 179-87, 2004.
- 14- Airan L.E. and Hruza G.: Current lasers in skin resurfacing: *Facial Plast. Surg. Clin. North Am.*, 13 (1): 127-39, Feb., 2005.
- 15- Fitzpatrick T.B., Miyamoto M. and Ishikawa K.: The evolution of concepts of melanin biology. *Arch. Dermatol.*, 96: 305-323, 1967.
- 16- Nelson B.K., Majmuder G. and Engriffint C.H.: Clinical improvement following dermabrasion of photoaged skin correlates synthesis of collagen I. *Arch. Dermatol.*, 130: 1139-1192, 1994.
- 17- Alt T.H.: Technical aids for dermabrasion. *J. Dermatol. Surg. Oncol.*, 13 (6): 638-48, Jun., 1987.
- 18- Pathak M.A., Sinei S.J. and Szabo G.: The effect of a single dose of ultraviolet radiation on epidermal melanocytes. *J. Invest. Dermatol.*, 45: 520-528, 1965.
- 19- Quevedo W.C.Jr., Szabo G. and Virks J.: Melanocyte populations in UV-radiated human skin. *J. Invest. Dermatol.*, 45: 295-298, 1965.
- 20- Farber J.A.: Dermabrasion (wire brush surgery, surgical skin planning). In: *Current Dermatologic Therapy*. Edited by: Maddin S. W-B Saunders Co., pp. 116-8, 1982.
- 21- Yarborough J.M.Jr.: Dermabrasion by wire brush. *J. Dermatol. Surg. Oncol.*, 13 (6): 610-5, Jun., 1987.
- 22- Christopher B. Harmon: Dermabrasion. <http://www.emedicine.com/derm/topic744.htm> Last Updated: Uly 31, 2003.
- 23- Orentreich D. and Orentreich N.: Dermabrasion as a complement to dermatology. *Clinics in Plastic Surgery*, 25 (1): 63-88, 1998.
- 24- Baker T.M.: Demabrasion as a complement to aesthetic surgery. *Clin. Plast. Surg.*, 25 (1): 81-8, 1998.
- 25- Hruza G.J.: Dermabrasion. *Facial Plast. Surg. Clin. North Am.*, 9 (2): 267-81, 2001.
- 26- Rook A.: Treatment of verrocos epidermal naevi in:

- Texbook of Dermatology. Edited by: Champion R.H. and Burton J.L. Osney Mead, London, p. 171, 1986.
- 27- Yarborough J.M.: Scar revision by dermabrasion. In: Dermatologic surgery. Edited by: Roenigk R.K. and Roenigk H.H., Marcell Dekker, New York, pp. 909-33, 1989.
- 28- Prieto V.G. and Shea C.R.: Trichoepithelioma. *eMedicine Journal*, 3 (2), 2002. <http://www.emedicine.com/DERM/topic429.htm>
- 29- Manday S.H.: Tretinon the preoperative and postoperative management of dermabrasion. *J. Am. Acad. Dermatol.*, 15: 878-9, 1986.
- 30- Ruiz-Esparsa J., Gomez K.M.B., Delatorre O.L.G. and David L.: Erythema after laser skin resurfacing. *Dermatol. Surg.*, 24: 31-4, 1998.
- 31- Goodman G.: Dermabrasion using tumescent anesthesia. *J. Dermaol. Surg. Oncol.*, 20: 802-807, 1994.