Periorbital Hyperpigmentation: What Lies Beneath?

Periorbital hyperpigmentation (POH) is a common dermatological problem and constitutes a significant percentage of patients visiting the clinics of dermatologists. It is also known as periocular hyperpigmentation, periorbital melanosis, dark circles, infraorbital darkening, and idiopathic cutaneous hyperchromia of the orbital region.[1] Though the condition is benign, it has a significant impact on the quality of life.[2] Majority of the patients are females, and belong to the age group of 16–25 years.[3] Huang *et al*. classified POH into four types, namely pigmented (brown color), vascular (blue/pink/purple color), structural (skin color), and mixed type.[4]

POH is multifactorial in etiology, important causative factors being familial, inadequate sleep, postinflammatory hyperpigmentation following atopic dermatitis, allergic contact dermatitis, lichen planus pigmentosus, erythema dyschromicum perstans,[5] tear-trough depression, and periorbital edema.[6,7] Superficial vasculature and thin skin overlying orbicularis oculi is another important cause of POH.[8] It can also result from extension of pigmentary demarcation lines from the face towards the infraorbital region.[9] Authors of the study (published in this issue) have found acanthosis nigricans, cholecystectomy, hysterectomy, etc., associated with POH. In addition, they have attributed few cases of POH, secondary to viral hepatitis and varicella. Consistent with previous studies, authors have found that majority had an underlying chronic illness, atopy, anemia, or irregular menses.

Pigmentation can be epidermal or dermal, and histopathological examination is required to differentiate between them. Stains such as hematoxylin and eosin, Fontana Masson, or Perl's potassium ferricyanide are done to ascertain the nature of the pigment. Fontana Masson stains the melanin pigment and Perl's stain imparts color to the hemosiderin deposition.[8]

On histology, one may find dermal or epidermal melanin. As the authors of the study of POH in this issue have pointed out, dermal melanin incontinence, dermal melanophages, and perivascular lymphocytic infiltrate was the most consistent finding. Similar findings have been reported by Watanebe *et al*. in a series of 12 patients[10] and by Graziosi *et al*. in a study of 28 patients.[11] In addition, Graziosi *et al*. also proposed that dilation of dermal blood vessels may contribute to the severity of POH. Interestingly, presence of melanin in vellus follicular epithelium has been noted by the authors, which has not been documented previously. Hypermelanization of the basal layer and lower Malphigian layer, with increased melanin granules was the most common finding. We had performed biopsy in four patients (published in a previous study),[12] wherein histopathology showed mainly epidermal pigmentation with prominent basal layer pigmentation along with scattered dermal melanophages. It is to be noted that hemosiderin was not demonstrable in the epidermis or dermis in cases of POH.

Woods's lamp and dermoscopy may be useful in the evaluation and differentiation of pigmentary and vascular causes of POH.[13] Ahuja *et al*. recently studied the dermoscopic findings of POH in 200 patients, where 39% had light brown epidermal pigmentation, 9% had dark brown-to-gray dermal pigmentation, and 52% had mixed type. Reticular pattern was the only type of vascular pattern which was observed in the mixed type.[14] Verschoore *et al*. used a novel device Siascope, (a combination of dermatoscopy, contact remittance spectrometry, and hyperspectral imaging) to study the concentration and distribution of total melanin, dermal melanin, and oxyhemoglobin, and pointed towards a possible role of hemostasis in the etiopathogenesis of POH.[15] Similar findings were reported by Ranu *et al*., wherein the most common type was vascular, followed by constitutional, postinflammatory hyperpigmentation, and shadow effects.[16] We reiterate that dermoscopy and Wood's lamp may be useful as skin biopsy in periorbital hyperpigmentation is difficult to perform in patients due to reluctance.

Treatment of POH revolves around the identification and removal of contributing factors, counselling of patients, and aesthetic modalities, whenever suitable.[7] Topical agents include hydroquinone, kojic acid, azelaic acid, arbutin, vitamin C, etc. Like any other facial pigmentary disorder, POH responds well to sunscreens, particularly broad-spectrum sunscreen and ultraviolet (UV)-coated sunglasses. Chemical peels (glycolic acid 20% and lactic acid 15%) are useful in POH. We have recently published a study comparing the effectiveness, safety, and tolerability of 4% hydroquinone and 30% salicylic acid peel (SA), in POH. SA peel was well tolerated in POH, without any significant side effects.[12]

Lasers have been used for treating dark circles such as Q-switched ruby laser (694 nm),[17] Q-switched alexandrite laser, and Nd:Yag laser (1064 nm). Age-related changes respond well to carbon dioxide laser.[18] The Q-switched Nd:Yag laser (1064 nm) is effective in reducing the pigmentation as well as the vascular component. Most data on lasers pertain to the Western population, and there is a paucity of literature regarding the effectiveness, safety, and tolerability of different lasers in Indian population. POH secondary to tear trough deformity responds well to autologous fat transplantation, hyaluronic acid fillers,[19,20] platelet-rich plasma, etc.[21] Mehryan *et al*. studied the

efficacy of platelet rich plasma in infraorbital circles due to tear trough deformity. Improvement was noted so far as color homogeneity of the region is concerned, but larger studies are required for external validity of the results.

Thus, periorbital hyperpigmentation is a notorious and chronic entity, which poses a therapeutic challenge to the treating physicians. There is a dearth of literature regarding the epidemiology, pathogenesis, histopathology, and therapeutic options, especially in Asian population. Few recent studies, including the one published in this issue, have provided us with useful information for future research. Further evaluation of histological and dermoscopic findings of POH is the need of the hour to devise newer therapeutic options. It is pertinent to find whether the histopathological changes are more postinflammatory or vascular for better therapeutic response in patients.

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