Ann Dermatol Vol. 21, No. 3, 2009

CASE REPORT

Basal Cell Carcinoma Arising in a Tattooed Eyebrow

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Malignant skin tumors, including squamous cell carcinoma and malignant melanoma, have occurred in tattoos. Seven documented cases of basal cell carcinoma associated with tattoos have also been reported in the medical literature. We encountered a patient with basal cell carcinoma in a tattooed eyebrow. We report on this case as the eighth reported case of a patient with basal cell carcinoma arising in a tattooed area. **(Ann Dermatol 21(3) 281～284, 2009)**

-Keywords-
Basal cell carcinoma, Eyebrow, Tattoo, Trauma

INTRODUCTION

Tattoos have been used in many countries for cosmetic purposes throughout the centuries. As the concern for beauty is increasing, cosmetic facial tattooing with permanent makeup such as eyeliner, an eyebrow tattoo and lip lining has become popular among women. Although tattoos are common, popular and usually well tolerated, cutaneous complications can occur. Several benign and malignant lesions may occur in tattoos, including verruca, granulomas, keratoacanthomas, squamous cell carcinomas, malignant melanomas and basal cell carcinomas[1,2]. With the expanding popularity of cosmetic tattoos, dermatologists can expect to observe a vast array of tattoo-associated cutaneous complications, including basal cell carcinoma. To date, there have been only seven patients in the medical literature with basal cell carcinoma that occurred within tattoos[3-7]. We encountered a 60-year-old Korean woman who presented with a depressed sclerotic patch within an eyebrow tattoo, and this lesion had the histological features of basal cell carcinoma.

Received November 19, 2008, Accepted for publication December 31, 2008

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CASE REPORT

A 60-year-old Korean woman presented with a 2-year history of a pruritic depressive patch on her left eyebrow. She was tattooed on her left eyebrow for cosmetic purposes about 5 years previously. Three years later, a pinhead-sized papule developed within the tattooed area and the lesion slowly increased in size.

The physical examination revealed a 1.1×1.3 cm, annular, skin-colored, depressed sclerotic patch with a hard translucent papule and a peripheral erythematous rim in a black tattoo on her left eyebrow (Fig. 1). There was no personal or family history of malignant skin tumors. There was no cervical lymphadenopathy. The results of the routine laboratory studies were normal or negative, including the urine analysis, a complete blood

Fig. 1. A 1.1×1.3 cm, skin-colored, sclerotic, depressed patch with a translucent papule and a peripheral erythematous rim within the black tattoo pigment on the left eyebrow.

count, a differential leukocyte count, the erythrocyte sedimentation rate and the blood chemistry studies. Chest x-ray examination, facial bone and neck computed tomography and a whole body bone scan revealed no abnormalities or metastasis. The histopathologic findings show basal cell carcinoma of various shapes and sizes, and these lesions consisted of basaloid cells in a dense fibrous stroma and black tattoo pigment. The tumor masses show a limited peripheral palisading arrangement of nuclei and peritumoral lacunae (Fig. 2).

The patient was treated with Mohs micrographic surgery and a Burow's graft with using adjacent tissue (Fig. 3). Eyebrow pencil was applied over the eyebrow to conceal the hair loss in the graft area (Fig. 4). There has been no evidence of recurrence or metastasis on the follow-up examinations for 2 years.

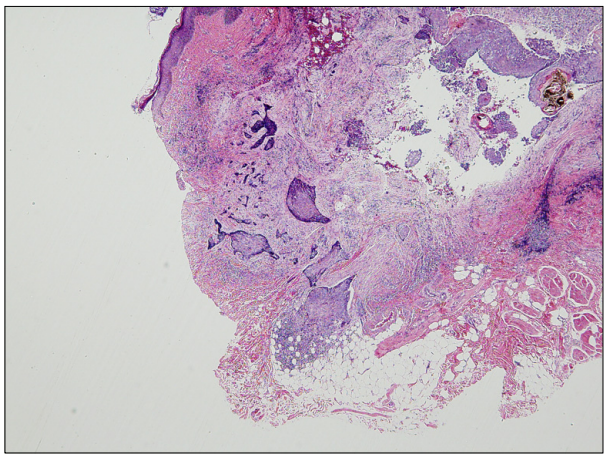

Fig. 2. The histopathological features show tumor masses of various shapes and sizes and the masses consist of basaloid cells and black tattoo pigment. The tumor masses show a limited peripheral palisading arrangement of the nuclei and peritumoral lacunae (H&E, ×100).

DISCUSSION

Tattooing has been practiced worldwide for cosmetic and therapeutic purposes for over 4,000 years. Cosmetic tattoos are used for permanent makeup, such as eyeliner, lip liner, lipstick brush and eyebrows, and cosmetic tattoos have many other practical applications. Tattoos might be a solution for individuals who have scars, birthmarks, alopecia, vitiligo, allergies to conventional cosmetics or difficulties applying cosmetic makeup due to visual impairment or arthrodesis. Cosmetic tattooing of women has increased in spite of the sharp traumatic injury and the introduction of potentially toxic materials into the skin during the procedure. Cosmetic tattooing that includes tattooing eyebrows and that's performed by amateurs in Korean beauty salons is fairly fashionable, but it is still considered an illegal activity that violates Korean medical laws.

Numerous medical complications may result from tattoos, and these complications are primarily infectious and inflammatory in nature. Among these complications are superficial infections, deep skin infections, tetanus, chancroid, syphilis, viral infection (verruca, molluscum, hepatitis, AIDS), mycoses, granulomas, allergic disorders and localized skin disorders such as psoriasis, lichen

Fig. 3. A picture taken immediately following reconstruction with a Burow's graft on the left eyebrow defect.

Fig. 4. The eyebrow, camouflaged by a black eye pencil, two years after the reconstruction.

Table 1. Summary of 7 cases with basal cell carcinoma occurring within tattoos in the literature and present case

Case	Authors	Age/Sex	Site of tattoo	Duration of tattoo at presentation	Color of tattoo pigment	Purpose of tattoo
1	Bashir[3] (1976)	60/M	Right temple	20 years	Black	Therapeutic reason (for relief of headache)
2		52/M	Right temple	15 years	Black	Therapeutic reason (for relief of headache)
3	Earley[4] (1983)	74/M	Right shoulder	55 years	Green, Red, Black	Cosmetic reason
4		64/M	Right hand dorsum	40 years	Black	Cosmetic reason
5	Wiener and Scher[5] (1987)	64/M	Left forearm	46 years	Blue, Green, Red	Cosmetic reason
6	Doumet et al.[6] (2004)	35/NA	Left scapular area	1 year	NA	NA
7	Birnie et al.[7] (2006)	28/F	Central back	6 years	Black	NA
8	Present case	60/F	Left eyebrow	3 years	Black	Cosmetic reason

NA: not available

planus and lupus erythematosus[2]. Several malignant lesions, although extremely rare, have also occurred in tattoos. To the best of our knowledge, 11 cases of malignant melanomas[8], 7 cases of basal cell carcinomas (Table 1)[3-7], 3 cases of squamous cell carcinomas[9,10] and 1 case of reticulohistiocytoma[11] developing within tattoos have currently been reported in the English medical literature. Our patient is the eighth case of basal cell carcinoma arising in a tattooed area and it is the first case of a malignant tumor within tattoos at the eyebrow region.

The pathogenesis of malignant skin tumors in tattoos is still unknown. A review of the literature revealed that a few basal cell carcinomas developed in tattoos located on sun-protected areas, which suggests that other factors such as trauma are associated with the occurrence of basal cell carcinoma. Indeed, many cases of developing basal cell carcinoma have been related to various traumas, including tattoos, thermal burn scars, vaccination sites, chicken pox scars, blunt or sharp injury, exposure to polycyclic aromatic hydrocarbons, scars of lupus vulgaris, chronic stasis ulcers, frostbite, hair transplantation, lesions of epidermolysis bullosa, colostomy, gunshot wound, sternostomy and vasectomy[12]. The mechanism of trauma related to carcinogenesis is not well established, but the mechanism has been hypothesized to involve an increased sensitivity to sunlight due to poor vascularity and elasticity in the damaged tissue[13], a localized nutritional deficiency in a traumatic scar[12], chronic irritation[14], chronic release of toxins that can lead to the mutation of cells[15] or implantation of epidermal cells into the subcutis with disruption of the normal defense system[16]. Moreover, one author has postulated that the dark color of tattoos may indirectly induce carcinogenesis by altering the absorption of ultraviolet rays because most of the basal cell carcinomas that have arose in tattoos have tended to develop within the dark color of tattoos[5]. But it is difficult to deduce whether tattoos act as a primary carcinogen or as a co-carcinogen together with sunlight or trauma. However, on considering the number of individuals tattooed around the world and the extreme rarity of basal cell carcinoma that has developed in tattoos, it may just be a chance finding. Our patient had been exposed to ultraviolet irradiation for many years so that chronic exposure to sunlight can reasonably be considered the main factor for the development of her basal cell carcinoma. However, the eyebrow region, similar to the preauricular area, the jaw and the chin, is a relatively less exposed site of the face and it receives less than 20% of the maximum ultraviolet exposure[17]. Hence, we conclude that other stimuli, such as trauma or an irritative agent from the tattoo, may have acted as an additional cofactor in the pathogenesis of the patient's basal cell carcinoma. Further studies are necessary to determine the causal relationship of trauma and tattoo for the induction of malignant tumors.

The dark color of tattoos can make it difficult to detect pigmented skin lesions, including malignant tumors. Therefore, careful attention and follow-up care should be given to the pigmented lesions within tattoos.

REFERENCES

1. Goldstein N. IV. Complications from tattoos. J Dermatol Surg Oncol 1979;5:869-878.
2. Kazandjieva J, Tsankov N. Tattoos: dermatological complications. Clin Dermatol 2007;25:375-382.
3. Bashir AH. Basal cell carcinoma in tattoos: report of two cases. Br J Plast Surg 1976;29:288-290.
4. Earley MJ. Basal cell carcinoma arising in tattoos: a clinical report of two cases. Br J Plast Surg 1983;36:258-259.
5. Wiener DA, Scher RK. Basal cell carcinoma arising in a

tattoo. Cutis 1987;39:125-126.
6. Doumat F, Kaise W, Barbaud A, Schmutz JL. Basal cell carcinoma in a tattoo. Dermatology 2004;208:181-182.
7. Birnie AJ, Kulkarni K, Varma S. Basal cell carcinoma arising in a tattoo. Clin Exp Dermatol 2006;31:820-821.
8. Paradisi A, Capizzi R, De Simone C, Fossati B, Proietti I, Amerio PL. Malignant melanoma in a tattoo: case report and review of the literature. Melanoma Res 2006;16:375-376.
9. McQuarrie DG. Squamous-cell carcinoma arising in a tattoo. Minn Med 1966;49:799-801.
10. Pitarch G, Martinez-Menchon T, Martinez-Aparicio A, Sanchez-Carazo JL, Munoz D, Fortea JM. Squamous cell carcinoma over tattoos. J Am Acad Dermatol 2007;56: 1072-1073.
11. Beerman H, Lane RA. Tattoo; a survey of some of the literature concerning the medical complications of tattooing. Am J Med Sci 1954;227:444-464.
12. Noodleman FR, Pollack SV. Trauma as a possible etiologic factor in basal cell carcinoma. J Dermatol Surg Oncol 1986;12:841-846.
13. Connolly JG. Basal cell carcinoma occurring in burn scars. Can Med Assoc J 1960;83:1433-1434.
14. Hill BB, Sloan DA, Lee EY, McGrath PC, Kenady DE. Marjolin's ulcer of the foot caused by nonburn trauma. South Med J 1996;89:707-710.
15. Fleming MD, Hunt JL, Purdue GF, Sandstad J. Marjolin's ulcer: a review and reevaluation of a difficult problem. J Burn Care Rehabil 1990;11:460-469.
16. Neuman Z, Ben-Hur N, Shulman J. Trauma and skin cancer. Implantation of epidermal elements and possible cause. Plast Reconstr Surg 1963;32:649-656.
17. Raasch B, Maclennan R, Wronski I, Robertson I. Body site specific incidence of basal and squamous cell carcinoma in an exposed population, Townsville, Australia. Mutat Res 1998;422:101-106.