Activation of Flat Warts (Verrucae Planae) on the Q-Switched Laser-Assisted Tattoo Removal Site

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Flat warts, or verrucae planaе, are a common cutaneous infection, which tends to be multiple and grouped. They are more often found on sun-exposed areas such as the face, neck, and extremities, and sometimes develop at the sites of skin trauma. The author reports on a case of flat warts which developed on the Q-switched laser tattoo removal site. Histologic findings confirmed the diagnosis of verruca plana. The author suggests that activation of the human papillomavirus should be included in the possible complications of the laser-assisted tattoo removal procedure.

Key words

Human papillomavirus; Q-switched lasers; Tattooing; Warts

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INTRODUCTION

Verruca plana, also called flat wart or plane wart, is a chronic, eruptive condition that presents as flat papules mostly on the face. It is an intraepidermal infection with the human papillomavirus (HPV) of the papova group, mainly HPV 3 and 10. Flat warts usually present as smooth, skin-colored to greyish-yellow or brown, slightly elevated papules with a round or polygonal base, varying in size from 1 to 5 mm or more in diameter.¹ The lesions vary from only a few to many hundreds in number. They are spread by direct or indirect contact and generally occur during childhood and adolescence, but may be seen in patients of all ages.² The author reports a case of flat warts developing within a few weeks of a Q-switched laser treatment of black tattoos, which seems both temporally and anatomically related.

CASE REPORT

A 23-year-old Korean man was submitted to laser treatment for removal of black tattoos on his right thigh. The patient's history revealed the self-made tattoos were placed using commercial black ink and unsterilized sewing needles 9 months before. There was no history of prior warts on the body. After topical anesthesia and thorough sterilization, the patient's tattoos were treated by Q-switched neodymium-doped yttrium aluminium garnet (Nd:YAG) laser system (MedLite C6, Conbio-Cynosure, Westford, MA, U.S.A.). Entire tattoo area was irradiated using a parameter of 1064 nm wavelength, 3

mm spot size, and fluence of 12 J/cm². The patient was instructed to apply topical mupirocin ointment frequently for prevention of bacterial infection and protection of the wound. The patient was recovering well until 3 weeks after the procedure, when a few small "wart-like" lesions developed on the laser-treated areas. Eight weeks after the first laser treatment, the patient returned for the second laser session. Physical examination revealed many flat-topped, small and confluent brownish papules on the previous laser irradiation site; however the lesions appeared only on the upper part of the treated tattoos (Fig. 1). A 3-mm punch biopsy was taken on one typical verrucous papule. Histologic section showed hyperkeratosis, papillomatosis and acanthosis (Fig. 2). Parakeratosis was absent or minimal. Upper epidermis showed slight hypergranulosis and a few koilocytes. The dermis showed scattered black pigments and a mild perivascular lymphocytic infiltration. Final diagnosis of verruca plana was made. Topical imiquimod 5% cream (Aldara Cream, 3M Pharmaceuticals, St. Paul, MN, U.S.A.) was prescribed to be applied to the affected sites three times per week at bedtime. After 2 weeks of therapy, near complete clearing of the flat warts occurred following crusting of the individual lesions.

DISCUSSION

Several different tattoo-induced conditions have been described. Tattoo-induced reactions are mainly divided into 3 groups: 1) Allergic/granulomatosis/ lichenoides reactions, 2) Inoculation/infections, 3) Coincidental le-

Fig. 1. Multiple skin-colored to slight brownish, flat-topped, confluent papules on the tattoo sites 8 weeks after Q-switched laser treatment.

Fig. 2. Hyperkeratosis, acanthosis and papillomatosis with intradermal tattoo deposits (Hematoxylin & Eosin, ×100).

sions.³ Inoculation or infective diseases include local bacterial infections and transmission of hepatitis B and C, syphilis and human immunodeficiency virus, while inoculation of HPV during tattoo placement, especially verruca plana on tattoo is rarely reported.³ The source of the virus can be tattoo instrument (using by infected material), contamination of the ink, or patient with a previously unnoticed verrucae in the area of the tattoo with subsequent traumatic spread.² There are many reports of both common and flat warts inoculated during tattoo placement.^{1,2,4-8}

It is of note that in the present case, lesions developed only on the upper part of the treated tattoos. This may explain with the possibility that the infection was related with the contamination of the black ink or tattoo needles used for the placement of the upper part of the tattoos. It can be hypothesized that in this patient epidermal barrier disruption due to Q-switched laser treatment likely allowed for local spread of HPV inoculated during tattoo placement prior to the laser treatment. Incubation period of HPV in the skin is not known with certainty; however, a postinoculation period of 2 to 6 months is generally accepted by some researchers.⁹ The ability of latent virus to induce warts has been confirmed in experimental animals by activation with mild skin irritation causing wart formation.¹⁰ Alterations in cutaneous and systemic immunity may occur as a result of the laser-induced inflammation and damage, including changes in the production of cytokines by keratinocytes and other skin-associated cells, alteration of adhesion molecule expression and the loss of antigen-presenting cell function within the skin.⁴ It has been reported that HPV-induced lesions on tattoos may present histologically similar findings as seborrheic keratosis rather than those of conventional warts.⁵

Tattoo has become increasingly popular among young people. Unfortunately many tattoos are being placed by using non-sterilized equipment. People interested in tattooing should be informed on its related infections and complications during and following tattoo procedure. It is

important for the laser surgeons to know that inoculated HPV during tattoo placement can cause clinically overt activation of verruca after laser tattoo removal although not recognizable at the time of the laser irradiation. The author thinks that information on this risk should be informed to the patient before laser treatment of the tattoos.

REFERENCES

1. Jung JY, Shin HS, Won CH, Cho S. Facial verruca plana that developed after semipermanent tattooing. *Ann Dermatol* 2009; 21:92-4.
2. Karadag AS, Bilgili SG, Onder S, Kosem M. A case of verru plana on tattoo. *J Pak Med Assoc* 2014;64:840-2.
3. Jacob CI. Tattoo-associated dermatoses: a case report and review of the literature. *Dermatol Surg* 2002;28:962-5.
4. Brajac I, Loncarek K, Stojnić-Sosa L, Gruber F. Delayed onset of warts over tattoo mark provoked by sunburn. *J Eur Acad Dermatol Venereol* 2005;19:247-8.
5. Valerón-Almazán P, Bastida J, Rivero P, Vilar J, Dehesa L, Díaz-Cascajo C, et al. Human papillomavirus-induced lesions on tattoos may show features of seborrheic keratosis. *Arch Dermatol* 2011;147:370.
6. Sáez M, Rodríguez-Martín M, Sidro-Sarto M, Cabrera de Paz R, Rodríguez-García F, Fagundo-González E, et al. Multiple verrucae vulgaris in a young woman's tattoo. *J Eur Acad Dermatol Venereol* 2006;20:356-7.
7. Miller DM, Brodell RT. Verruca restricted to the areas of black dye within a tattoo. *Arch Dermatol* 1994;130:1453-4.
8. Ragland HP, Hubbell C, Stewart KR, Nesbitt LT Jr. Verruca vulgaris inoculated during tattoo placement. *Int J Dermatol* 1994;33:796-7.
9. Chen T, Frieden IJ. Development of extensive flat warts after pulsed dye laser treatment of a port-wine stain. *Dermatol Surg* 2007;33:734-5.
10. Amella CA, Lofgren LA, Ronn AM, Nouri M, Shikowitz MJ, Steinberg BM. Latent infection induced with cottontail rabbit papillomavirus. A model for human papillomavirus latency. *Am J Pathol* 1994;144:1167-71.