SHORT COMMUNICATION



# Basal Cell Carcinoma Arising within a Bacillus Calmette-Guerin Scar: Case Report and Literature Review

Kinga TYCZYŃSKA[1], Marta SZEPIETOWSKA[1], Piotr K. KRAJEWSKI[2] and Jacek C. SZEPIETOWSKI[2]*
*[1]Student Research Group of Experimental Dermatology, Department of Dermatology, Venereology and Allergology and [2]Department of Dermatology, Venereology and Allergology, Wroclaw Medical University, Chalubinskiego 1, PL-50-368 Wroclaw, Poland. *E-mail: jacek.szepietowski@umw.edu.pl*
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A wide range of risk factors have been described for basal cell carcinoma (BCC). Skin type and exposure to ultraviolet (UV) light are well-known factors, but authors also report possible impact of other factors, such as skin trauma caused by surgical incisions, sharp or blunt injuries, deep abrasions, puncture injuries, burns, chickenpox, and scarring (1–3). To date, there are very few reported cases of BCC arising in scar tissue, and even fewer reports of BCC after bacillus Calmette-Guerin (BCG) vaccination (4, 5). We report here an unusual presentation of BCC in a post-BCG vaccination scar. In addition, a literature review of similar cases is presented.

## CASE REPORT

A 58-year-old Caucasian woman was referred to the dermatosurgery unit for diagnosis and surgical treatment of a nodular lesion that had developed in a BCG scar on her left arm. The patient had fair skin (Fitzpatrick type II) and, according to her medical history, she had intermittently and intensively exposed herself to ultraviolet (UV) radiation in childhood and adolescence. She had had BCG vaccination in early childhood, in compliance with Polish vaccination guidelines. Initial changes in the BCG scar were noted approximately 6 years before admission (52 years after BCG vaccination).

Clinical examination revealed a nodular, eroded lesion, 10 mm in diameter, covered with overlying scab with no signs of bleeding. Dermoscopic examination revealed arborizing vessels, ovoid nests and signs of atrophy (**Fig. 1**). A clinical diagnosis was made of BCC in BCG scar and the lesion was excised completely. Histological examination revealed nests of basaloid cells with peripheral palisading, without signs of granulomatous infiltrate, which confirmed the diagnosis of nodular BCC. Moreover, signs of collagenous scar tissue with retraction spaces and elastosis were observed (Fig. 1C).

## DISCUSSION

Basal cell carcinoma is the most frequent skin malignancy worldwide, comprising more than 75% of cutaneous cancers (1). BCC usually affects fair-skinned adults over 50 years of age. There are some genetic conditions, such as xeroderma pigmentosum (XP) or basal cell naevus syndrome (BCNS), which predispose to an earlier occurrence of BCC, even before the age of 20 years. The mean lifetime risk of developing BCC is approximately 30% (2, 6). The incidence of BCC is twice as high in men as in women. Nevertheless, detailed epidemiology of BCC varies greatly among different geographical latitudes, and the real data is impossible to estimate due to the large number of unregistered cases (2, 6).

The main risk factor for BCC is exposure to UV light (particularly UVB). Literature underlines that, not only cumulative UV dose and skin type (Fitzpatrick I and II), but also exposure intensity and sunburns (especially in childhood and adolescence), may promote the development of BCC. Outdoor sunbathing or use of sun-beds significantly increases the risk of occurrence of BCC. Other, often-described, risk factors include a positive family history of BCC, genodermatoses, ionizing radiation, polycyclic aromatic hydrocarbons, arsenic exposure, and immunosuppression (1–3, 6). Moreover, it has been observed that cutaneous trauma, such as surgical incisions, sharp or blunt injuries, deep abrasions, puncture injuries, burns, chickenpox and vaccination scars, may predispose to the development of BCC (3). Some authors suggest that chronic irritation and misplacement of epithelial cells contribute to carcinogenesis. Moreover, an imbalance of cytokines and growth factors may play an important

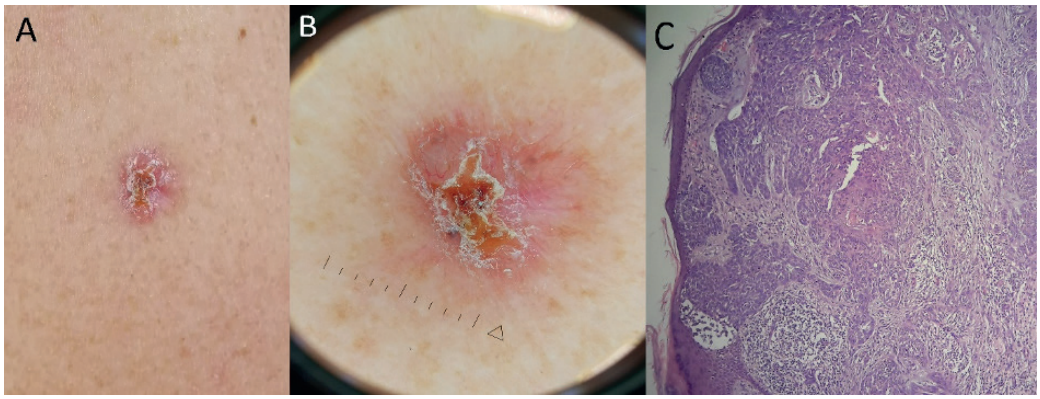


**Fig. 1.** (A) Erythematous nodule covered with crust localized on patient's arm. (B) Arborizing vessels, grey ovoid nests and signs of scar visible on dermoscopy. (C) Basaloid nest with collagenous scar tissue and elastosis.

role in the formation of BCC in scar tissue. However, the exact pathomechanism of BCC secondary to trauma is not yet fully understood (3). The incidence of BCC in scar tissue has been reported as 0.5%, but its development in post-vaccination scars is even less common. The literature describes only a few cases of BCC in a BCG scar (5, 7–12), all of which are described in **Table I**.

Vaccination against tuberculosis was introduced in the first half of the 20th century (13). In 1963, Ben-Hur et al. (7) reported 2 cases of post-vaccination BCC. A 40-year-old farmer was diagnosed with BCC approximately 5 years after BCG vaccination. On admission, the vaccination site was 15 mm in diameter, ulcerated and covered with crusts. The second patient was a 36-year-old housewife, who noticed a small, hyperkeratotic lesion at the site of the scar 12.5 years after BCG vaccination (7). Similarly, Nielson et al. (8), in 1979, described a 52-year-old Norwegian woman with a positive history of superficial melanoma. At the injection site, examination revealed a 12×15 mm, sharply delimited, eczematous, infiltrative lesion. She was diagnosed with BCC approximately 10 years after vaccination (8). In 1992, Braithwaite et al. (9) reported a particularly rare case of a woman who, at the very young age of 25 years, noticed that a vaccine scar had become larger, red and scaly. Histological examination revealed an ulcerated multifocal BCC with a small granuloma in the subjacent dermis (9). In 2008, Smith et al. (10) reported 2 cases of BCCs arising in travel vaccination scars. One of these was 62-year-old woman who had received 4 doses of BCG. Approximately 17 years after the last vaccination, an erythematous, scaly, non-healing patch began to develop on her left upper arm (10). The next example of BCC arising from a BCG scar was reported by Polat at al. (5) in 2009. In this case, the cancer was identified more than 50 years after vaccination-induced skin trauma. Particularly noteworthy in this case is the history of very limited exposure to UV light, which is especially unusual for BCC diagnosis in a patient with Fitzpatrick type III skin classification (5). In 2012, 2 similar case reports were published (11, 12). The first case was reported by Kluger et al. (11) and described a 59-year-old man who had undergone tuberculosis immunization 40 years previously. The examination revealed an erythematous, slightly scaling, sharply demarcated lesion without ulceration or secretion. The lesion was restricted to the scar. The second case was reported by Sari et al. (12) and concerned a 53-year-old man admitted with a 20×35 mm, irregularly pigmented, exophytic lesion on his right deltoid region. The diagnosis was performed after 22 years from BCG vaccination. In both cases the histological appearance was consistent with the diagnosis of BCC (11, 12).

In conclusion, BCC arising in a BCG scar is an extremely rare phenomenon, but any changes noticed in a post-vaccination scar should raise suspicions of malignancy. The above-mentioned case represents typical risk factors for BCC development. Nevertheless, the available literature includes patients, who, despite their young age or the absence of intense exposure to UV light, developed BCC in BCG scars. This proves the necessity of maintaining oncological vigilance even in the least probable cases.

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**Table I. Basal cell carcinoma (BCC) in Bacillus Calmette-Guerin (BCG) vaccination scars**

| Case No. | Publication | Age (years) | Sex | Large diameter (mm) | Clinical presentation of the lesion | Time from BCG vaccination to admission (years) | Time from BCG vaccination to the first noticed change (years) |
|---|---|---|---|---|---|---|---|
| 1. | Ben-Hur et al., 1963 (7) | 40 | M | 15 Ø | Ulcer covered with crust | 5 | 1.5 |
| 2. | Ben-Hur et al., 1963 (7) | 36 | F | 15 Ø | Slightly raised yellowish-red, covered with fine scale | 13 | 12.5 |
| 3. | Nielsen et al., 1979 (8) | 52 | F | 12×15 | Sharply demarcated, eczematized, infiltrated area | 10 | ca. 9.5 |
| 4. | Braithwaite et al., 1992 (9) | 31 | F | 30x20 | Crusting, scally, red lesion | 18 | 12 |
| 5. | Smith et al., 2008 (10) | 62 | F | Unknown | Erythematous, scaly, non-healing patch | 19 | 17 |
| 6. | Polat et al., 2009 (5) | 55 | M | 20×15 | Nodular lesion with an eroded centre and greyish-coloured, pearly appearance | Childhood vaccination | ca. 50 |
| 7. | Kluger et al., 2012 (11) | 59 | M | Restricted to the vaccination scar | Erythematous, slightly scaling, sharply demarcated lesion without ulceration or secretion | 40 | ca. 39,5 |
| 8. | Sari et al., 2012 (12) | 53 | M | 20×35 | Irregularly pigmented, exophytic lesion | 22 | Unknown |
| 9. | Current case | 58 | F | 10 Ø | Nodular lesion covered with scabs without secretion or bleeding | 58 | 52 |

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