

# Subepidermal Basal Cell carcinoma Following Laser Treatment of Congenital Capillary Malformation: A Case Report

Krešimir Bulić<sup>1</sup>, Ivana Ilić<sup>2</sup>, Eva Brenner<sup>3</sup>, Luka Bulić<sup>4</sup>, Mia Lorencin Bulić<sup>5</sup>

<sup>1</sup>University Hospital Centre Zagreb, Zagreb, Croatia; <sup>2</sup>Department of Pathology and Cytology, University Hospital Centre Zagreb, Zagreb, Croatia; <sup>3</sup>University of Zagreb, School of Medicine, Zagreb, Croatia; <sup>4</sup>School of Medicine, University of Zagreb, Zagreb, Croatia; <sup>5</sup>University Hospital Dubrava, Zagreb, Croatia

## Corresponding author:

Mia Lorencin Bulić  
University Hospital Dubrava  
Gojko Šušak avenue 6, Zagreb,  
Croatia  
[mia.lorencin@gmail.com](mailto:mia.lorencin@gmail.com)

**ABSTRACT** While basal cell carcinoma is the most common type of skin cancer in humans, its subepidermal presentation is extremely rare. The risk factors for basal cell carcinoma development are well-known, but it remains unclear in which setting the tumor restricts itself to the dermal compartment. We present the fifth known case of subepidermal basal cell carcinoma. However, this particular presentation is unique due to arising beneath a capillary malformation. The patient had previously undergone multiple laser treatments which yielded no success. Initially, the vascular malformation was removed and sent for histopathological diagnosis. After the discovery of basal cell carcinoma, wide surgical resection was performed. The patient had no recurrence up to the last follow-up at 18 months postoperatively. This case demonstrates a new presentation of a very rare condition, but also highlights the importance of histopathological examination and the need for future research on any possible association between laser therapy and carcinogenesis.

**KEY WORDS:** case report, subepidermal basal cell carcinoma, capillary malformation, laser treatment

## INTRODUCTION

### Basal cell carcinoma

While we may well think we know much about basal cell carcinoma (BCC), it continues to pose an important public health problem. It is the most common malignant tumor in Caucasians and accounts for 75% of all skin cancers, with growing incidence rates worldwide due to climate change-related increase in UV exposure as well as population aging (1). Although its metastatic potential and mortality rates are low, its aggressive growth can cause major tissue damage requiring extensive surgical treatment (2). It is known that BCCs arise from epidermal cells. However, some authors have reported evidence that BCCs

arise from stem cells within hair follicles and touch dome epithelia, whereas others have reported BCC stem cells to be located in the interfollicular epidermis and infundibulum (3,4).

### Capillary malformations

Congenital vascular malformations are a common reason for referral to specialist dermatological care. Different genetic mutations have been shown to lead to errors in vascular morphogenesis, most commonly in the capillaries (5). Capillary malformations (CM) can be asymptomatic or cause functional deficits and psychological distress, depending on their size and location. Facial CMs are generally aesthetically sensitive and can lead to disfigurement and stigma-

tization. The main course of therapy in patients with CMs is laser treatment (6).

### Use of laser treatment in capillary malformations

Laser treatment has become a workhorse therapy in dermatology for a wide range of conditions. Continuing advances in laser technology have enabled the development of many vascular-specific laser systems using the principle of selective photothermolysis (7). Laser treatment is effective in up to 70% of CM cases and it has been proven to significantly reduce psychological distress in patients (6,8). In terms of adverse effects, it has the lowest complication risk among recognized CM treatment options (6).

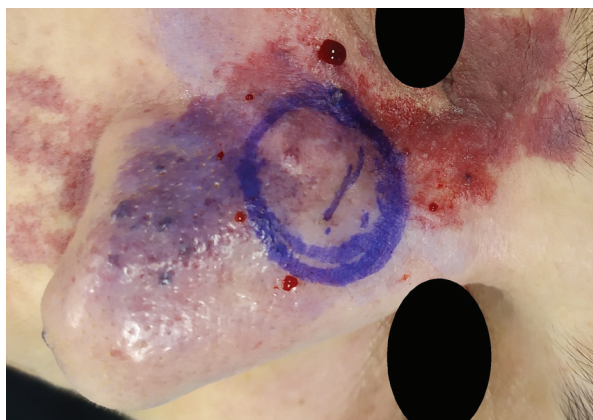
## CASE PRESENTATION

### Patient history

A 49-year-old woman presented with a slow-growing, painless subcutaneous nodule on the right paranasal region of her face, measuring approximately 10×10 mm. The patient noted no changes in the overlying skin, which had been affected by a congenital capillary malformation. The malformation involved part of her right upper and lower eyelid, the right side of the nose, and part of her right upper lip and cheek. The patient disclosed that the malformation had been treated by laser therapy multiple times, but could not provide details of the treatment. Laser treatment had resulted in a moderate regression of the CM, but did not provide a satisfactory result.

### Diagnostics and treatment

As the initial clinical appearance was that of an atheroma, the patient was scheduled for removal under local anesthesia. However, the tissue removed at the operation did not resemble an atheroma, and the



**Figure 1.** Preoperative marking of excision margins and extirpation scar (center line).

histopathological report described a tumor built from nests of atypical epithelial cells of basaloid appearance with peripheral palisading of cells and numerous mitoses. In some nests, there were cystic areas filled with inhomogeneous basophilic content, and some showed areas of keratinization. Stromal desmoplasia and moderately abundant lymphoplasmacytic infiltrate were present in the surrounding dermis. Tumor tissue was present at both lateral resection margins, while the base of the resection was clear. The diagnosis of basal cell carcinoma was established, and wide surgical resection of the area ensued, including the overlying epidermis with resection margins of 1 cm from the previous scar (Figure 1).

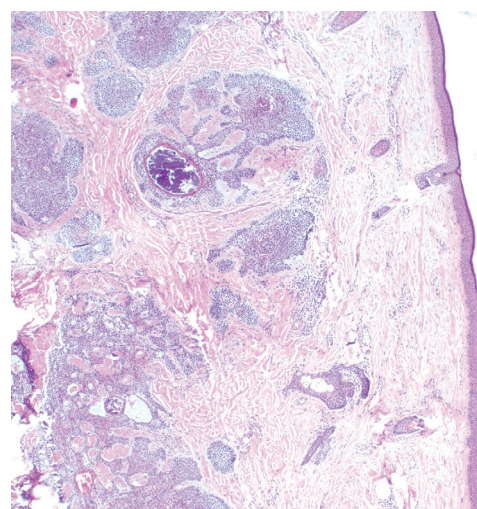
The postoperative defect was left to heal by secondary intention. Histopathological report described the entire resected epidermis as normal – no tumor tissue was found in the epidermis. There were nests of atypical epithelial cells of basaloid appearance with peripheral palisading in the dermis (Figure 2). The resection margins were clear. The diagnosis was confirmed as subepidermal basal cell carcinoma.

### Postoperative status

The wound healed without complications, and the final outcome was satisfactory, with considerable contraction of the defect (Figure 3). The latest follow-up was 18 months after excision, and the patient had no signs of recurrence.

## DISCUSSION

Subepidermal BCC is an extremely rare entity, with only four cases described in literature so far (9-12). These cases, as well as ours, stress the fact that histopathological examination of a subcutaneous



**Figure 2.** Histopathology slide showing BCC nests in the dermis with intact epidermis, hematoxylin and eosin ×4.



**Figure 3.** Postoperative result.

mass should always be considered and can result in an unexpected diagnosis. While there are several well-known etiologies of BCC, such as ultraviolet light exposure, fair pigmentary characteristics, immunosuppression, and genodermatoses, there is still much to be elucidated about its molecular pathogenesis. This extends to unclear circumstances under which the mutated cells restrict to the dermal compartment. Considering the extremely low number of cases reported, there are also no strict guidelines for treatment of this particular type of BCC, and long-term follow-up should be performed.

Firstly, it has been noted that CMs themselves increase the risk of the development of BCC, which is explained through the mechanism of least resistance. On a related note, CMs present difficulties in diagnosing BCC, which was also evident in our case, and can lead to a later diagnosis of the condition (13). Secondly, the treatment of CMs has to be taken into account. It has been proposed that BCC could arise from different origins, depending on the carcinogenic agent involved. Although this case does not establish a link between laser therapy and occurrence of subepidermal BCC, we believe it is an interesting idea worth noting and exploring. Moreover, advances in laser technology have led to laser therapy being cleared for use in a broad array of different indications, from tattoo removal, non-invasive body contouring, periodontitis, and onychomycosis to gastrointestinal pathologies and neurosurgical procedures. Therefore, any possible link between laser therapy and oncogenesis should be explored in further research. Another idea worth considering is that the BCC might have originally had both epidermal and dermal components within the CM. In line with this hypothesis, the laser treatments could have played a role in restricting the BCC to the dermis, rather than taking part in its oncogenesis.

### References:

1. Peris K, Fagnoli MC, Garbe C, Kaufmann R, Bastholt L, Seguin NB, Bataille V, *et al.* Diagnosis and treatment of basal cell carcinoma: European consensus-based interdisciplinary guidelines. *Eur J Cancer.* 2019;118:10-34.
2. Dessinioti C, Antoniou C, Katsambas A, Stratigos AJ. Basal cell carcinoma: what's new under the sun. *Photochem Photobiol.* 2010;86:481-91.
3. Peterson SC, Eberl M, Vagnozzi AN, Belkadi A, Veniaminova NA, Verhaegen ME, *et al.* Basal cell carcinoma preferentially arises from stem cells within hair follicle and mechanosensory niches. *Cell Stem Cell.* 2015;16:400-12.
4. Youssef KK, Van Keymeulen A, Lapouge G, Beck B, Michaux C, Achouri Y, *et al.* Identification of the cell lineage at the origin of basal cell carcinoma. *Nat Cell Biol.* 2010;12:299-305.
5. Rozas-Muñoz E, Frieden IJ, Roé E, Puig L, Baselga E. Vascular Stains: Proposal for a Clinical Classification to Improve Diagnosis and Management. *Pediatr Dermatol.* 2016;33:570-84.
6. Lee JW, Chung HY. Capillary Malformations (Portwine Stains) of the Head and Neck: Natural History, Investigations, Laser, and Surgical Management. *Otolaryngol Clin North Am.* 2018;51:197-211.
7. Sheehan-Dare RA, Cotterill JA. Lasers in dermatology. *Br J Dermatol.* 1993;129:1-8.
8. Gupta G, Bilsland D. A prospective study of the impact of laser treatment on vascular lesions. *Br J Dermatol.* 2000;143:356-9.
9. Sheen-Chen SM, Chou FF, Eng HL, Chen WJ, Cheng YF. Subcutaneous basal cell epithelioma presenting as a breast lump: an unusual and perplexing lesion. *Eur J Surg.* 1996;162:425-7.
10. Voris T, Quinn R, Elahi M, Alani H. Subcutaneous basal cell carcinoma: A case report. *Can J Plast Surg.* 2003;11:85-6.
11. Salih AM, Kakamad FH, Rauf GM. Basal cell carcinoma mimicking pilonidal sinus: A case report with literature review. *Int J Surg.* 2016;28:121-3.
12. Rouhani N, Ponnambath N, Rashid M, Josty I. Subcutaneous basal cell carcinoma. *Clin Exp Dermatol.* 2018;43:592-3.
13. Sideris E, Relic J. Capillary malformation as a locus minoris resistentiae for the development of basal cell carcinoma. *Australas J Dermatol.* 2021;62:232-5.