Case report

Squamous cell carcinoma as a long-term effect after skin vascular malformation radiotherapy

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Abstract

In the past, vascular anomalies were divided into vascular malformations and vascular tumors. Radiotherapy was one of the leading methods of treatment for vascular malformations and infantile haemangiomas in the past and considered as harmless in those days. Many years later it turned out that management was not necessary and dangerous, even responsible for possible skin cancers appeared within areas exposed to radiotherapy in the future. The case report shows the presence of squamous cell carcinoma within the irradiated vascular malformation of the frontotemporal area in early childhood. The lesion was surgically removed, the defect was covered by split thickness skin graft. The histopathological evaluation confirmed the carcinoma as well as its complete resection. Assessing the adult patients with vascular anomaly one should be aware of possible radiation therapy for that malformation in the past, then the evaluation of the skin must be careful and focused on possible neoplasmatic lesions.

Key words: radiotherapy, vascular malformations, squamous cell carcinoma.

Introduction

In the past vascular anomalies were classified as vascular malformations and vascular tumors such as infantile haemangiomas [1]. This classification was adopted by the International Society for the Study of Vascular Anomaly (ISSVA). The classification is based on the histopathological presentation as well as diagnostic imaging techniques. In the past, Agervall and Kindblom described vascular anomaly as a benign vascular tumor: "broadly defined as a lesion with an increased number of newly formed blood vessels... It is present at birth or it could appear soon after" [2, 3]. The most frequent type of vascular malformations is the stork bite (erythema nuchae) which presents in 40-50% of all newborns. Vascular anomalies may appear on any part of the body, however, it most often presents on the face, forehead, limbs and chest [4, 5]. The treatment of this lesion is taken for cosmetic reasons, as well as in the case of the uncontrolled growth risk, bleeding or infection. The large size and volume of the vascular anomalies may cause hemodynamic disturbances leading to a life-threatening condition, although these cases are rare. There were different therapeutic methods proposed in the past, which were more or less aggressive. Resective surgery was performed in the past to remove these lesions but it caused scars and contractures. Usage of injections with sclerosing agents, boiling water, then cryotherapy and compressive therapy were also utilized. Radiotherapy was one of the most common ways to treat vascular anomalies in Europe until the 1960s. In those days this approach to the vascular anomalies seemed to be harmless and generally accepted as a non-invasive treatment causing no scaring [2, 6, 7]. It was advocated to initiate the therapy as early as possible to stop the evolution of this lesion because it was believed that vascular anomalies in younger children is much sensitive to radiotherapy. These suggestions had no reflection in the literature and the doses of the radiation varied in different health centers in that era [2]. Some countries recognized that method as a first choice treatment in the case of vas-

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cular malformations and haemangiomas even up until the 1970s. Today we have a lot of evidence of the carcinogenic effect of radiation, which is well-documented in the epidemiological studies [7, 8]. Radio-induced malignancies of the skin occur many years after completing the radiation therapy applied for other medical conditions such as hemangioma and they include squamous cell carcinoma [9], basal cell carcinoma [10-12], Merkel cell carcinoma [13], angiosarcoma [14], leiomyosarcoma [15], sebaceous cell carcinoma [16], soft tissue sarcoma [17] and melanoma [7].

Case report

A 48-year-old male patient presented with skin lesion located on residual vascular malformation of the right frontotemporal area (Figure 1). The surgical treatment was performed at the Division of Trauma, Burns and Plastic Surgery, Poznan University of Medical Sciences in 2007. The patient complained of discomfort in that place. He noticed the lesion 6 months ago. Suspected skin lesion was located in the center of the vascular malformation. It presented as a solid nodule 2.5 cm × 2 cm in size, pale pink color with irregular surface with two small ulcerations on the upper part of the lesion. The patient has had vascular malformation present on his face, neck and upper chest, both hands and right thigh. As a child when he was 4 years old, he underwent a course of radiotherapy to reduce the size of vascular malformation. No information regarding the dose of the radiation applied was available. A slight involution of the vascular malformation was seen after radiotherapy. As an adult, he underwent two surgical procedures to have the vascular malformation excised. The malformation was removed, then the split thickness skin graft was applied on the right part of the face, then the second operation on the left side of the face was performed. The current treatment was similar. The whole skin with vascular malformation and the lesion of the frontotemporal right area was removed, then the entire fragment of the skin was sent for the histopathological evaluation (Figure 2). The partial thickness skin graft was harvested from the right buttock using the drum dermatome. The skin graft was applied to the wound and sutured (Figure 3). The skin graft healed perfectly with no complications (Figure 4). The squamous cell carcinoma was diagnosed in the histopathological

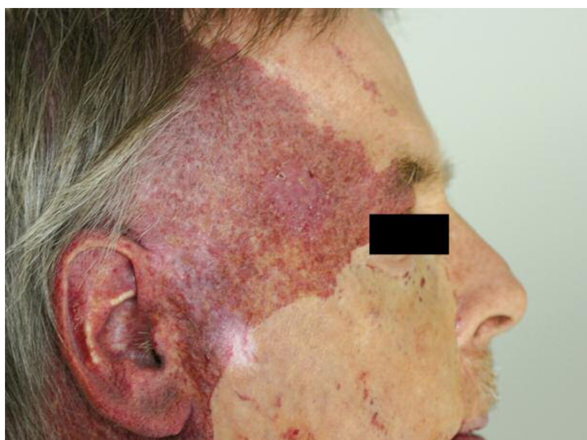

Figure 1. Residual vascuar malformation of the right frontotemporal area with a skin lesion in the middle of it

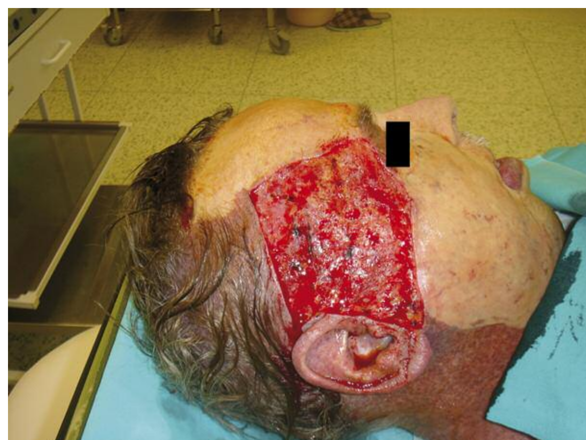

Figure 2. Patient after the excision if the vascular malformation of the frontotemporal area

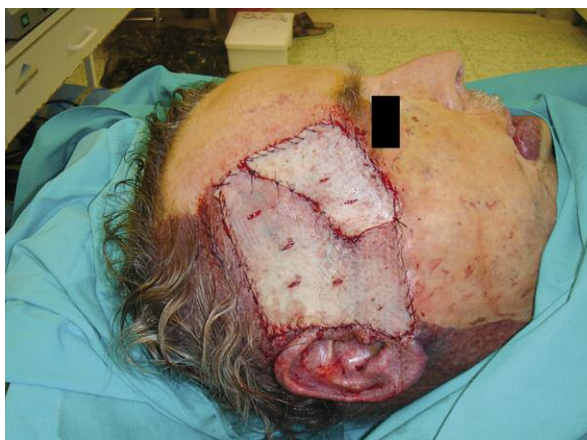

Figure 3. Split thickness skin graft applied onto the wound of the frontotemporal area

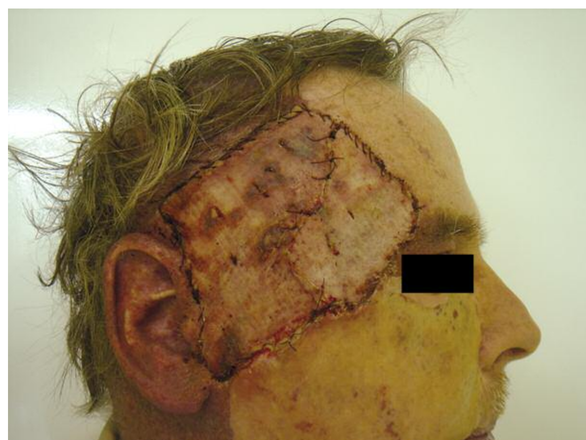

Figure 4. The outcome 2 weeks after the surgery

specimen. The excision of the carcinoma was complete. The patient was satisfied with the outcome of the surgical treatment.

Discussion

The radiotherapy is one of the most important treatment methods in modern oncology and dermatology [18-20]. It is a treatment of choice or it supports other means of therapy for a variety of malignant tumors. In the beginning of the radiotherapy era this way of treatment became the main method of treatment for vascular anomalies and continued up to the 1970s [21-23]. It was believed that radiotherapy was harmless and favorable as compared to aggressive surgical procedures. Many authors suggested starting the radiotherapy for vascular malformations and haemangiomas in younger children to achieve the best regression. Several authors compared radiotherapy of haemangiomas with untreated cases. It appeared that patients who received no therapy had their lesions involuted even better than the treated cases [24-27]. After these findings, radiotherapy for haemangiomas was ceased. From that point no treatment and only careful observation was undertaken leaving the surgery as a last treatment method in cases with unsatisfied spontaneous hemangioma regression [24]. Léauté-Labréze *et al*. reported promising outcomes of hemangioma treatment with systemic propranolol as well as recently with topical propranolol ointment, it seems to be safer than steroid therapy in the case of severe hemangioma [28, 29]. These days the first line treatment of vascular malformations is laser therapy instead of radiotherapy. Today patients come back with neoplasmatic lesions located in previously irradiated areas. The term radio-induced malignancy is used in the case of history for previous irradiation, cancer present in the irradiated area, tissue injury due to a high dose of radiation therapy, and when the time between radiotherapy and the neoplasm occurrence is [3] from 2 to 47 years [30-32]. Heikens *et al*. suggested that the risk of cancer is greater in a patient exposed to radiotherapy in childhood [33]. Some authors report squamous cell carcinoma (SCC) as a late complication after radiotherapy for hemangioma [23], moreover, some patients developed radiodermatitis with SCC [34]. There were cases of malignant melanoma in previously irradiated areas, these situations were rare but it seems that other factors may increase the risk of neoplasmatic transformation such as smoking cigarettes, chemotherapy, age at exposure [35, 36]. Basal cell carcinoma may develop after radiotherapy for a port wine stain rather than after other methods of treatment such as argon or pulsed dye laser therapy [37].

There are other serious consequences of radiotherapy applied for vascular anomalies apart from skin cancer. The mammary gland is sensitive to radiation-associated carcinogens particularly in patients who were exposed to radiation in childhood [38]. The breast cancer risk occurs even thirty years after irradiation [39] and Lundell *et al*. expands the estimated risk up to 50 years [40]. Malignances after radiotherapy were found in the central nervous system, thyroid and other endocrine glands [41-43]. There was assessed progeny of irradiated women in their young age and the significant higher numbers of neural tube defects were observed [44]. Nowadays in the era of lasers, radiotherapy for hemangioma was abandoned, however, some authors appreciate this method in life- or function-threatening hemangiomas [45].

Basal and squamous cell carcinoma as an effect of radiation therapy for vascular anomalies may reveal an atypical clinical appearance, become difficult to diagnose or to be misdiagnosed. One should pay special attention in reviewing adult patients with vascular anomalies, especially in the case of additional skin changes with a past history of radiation therapy. Careful examination is recommended in these cases not to bypass possible radio-induced lesions [36]. The increased cancer-related mortality was observed in patients who underwent radiotherapy for skin vascular anomalies and they should be followed up later on [6].

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