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Case Report

Successful Craniotomy for Advanced Basal Cell Carcinomas with Cranial Bone Invasion and Dura Mater Infiltration - Unique Presentation in a Bulgarian Patient

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Abstract

BACKGROUND: Basal cell carcinomas (BCC) located in the sun-exposed regions are a serious therapeutic challenge. Therefore early diagnosis and adequate therapy should be of a high priority for every dermatologic surgeon.

CASE PRESENTATION: We are presenting a patient with multiple BCCs, located on the area of the scalp, who had been treated several years ago with electrocautery and curettage after histopathological verification. However, the last few years the tumours have advanced, infiltrating firstly the tabula external and a year later the tabula interna of the cranium. A computed -tomography (CT) imaging and radiography of the skull were performed to reveal the definite tumour localisation, needed for planning an one - step surgical intervention. Both of the instrumental examinations confirmed the existence of osteolytic tumour lesions. Craniotomy with precise removal of the BCCs infiltrating the cranial bone in all of its thickness was performed. Partial resection of dura mater was also performed also because intraoperative findings established the involvement of the dura. Histopathological verification revealed bone and dural invasion with clean resection margins. The bone defect was recovered with hydroxyapatite cement. Reconstruction as the shape of the skull was carefully modified and adapted to its initial size and form. Layered closure of the skin and soft tissues were performed after the complete removal of the BCCs. The postoperative period had no serious complications.

CONCLUSION: Precisely managed therapy of BCC is curative in most of the cases as it ensures good prognosis for the patient.

Introduction

Basal cell carcinoma (BCC) is non - melanocytic skin epithelial tumour arising from the basal layer cells of the epidermis [1]. In the last few years, world statistics show rapidly increasing incidence rate as the lifetime risk is reaching nearly 30% [2]. Although BCC does not demonstrate significant metastatic tendency, its local destructive and infiltrative nature, as well as its tendency to receive turns, is into a serious medical problem, which should not be neglected [3]. Since exposure to UV - radiation is the main etiological factor of BCC, prevalent locations of the lesions are the face and the head, and scalp is the most commonly affected area [4]. Behind the acronym “SCALP” stands its five structural layers - skin, subcutaneous tissue, aponeurosis, loose areolar tissue, and periosteum. In cases of highly progressive local invasion, the tumour process infiltrates galea aponeurotica, periosteum, calvaria, superficial and deep layers of dura mater and the underlying brain [5] successively. At this stage, the

invasion of deeper tissues compromises treatment opportunities for achieving an optimal therapeutic result; it reflects on the long-time survival of the patient and increases healthcare costs as well [6].

Therefore, precise diagnostic approach and accurate therapeutic strategies are mandatory for prevention of any further complications which at a later stage could be fatal.

Case report

We present a 68 – year - old patient with multiple primary infiltrative BCCs in the scalp area initially treated 14 years ago with superficial contact X-ray therapy, end does 60 greys, followed by electrocautery (x2) several years later (Figure 1a). He presented to the dermatologic policlinic for diagnosis and therapy of two newly - formed pigmented lesions located in the left parietal region. Also, two chronic non - healing ulcerative wounds were observed in the same area which had occurred 6 years ago according to anamnestic data. An uncomfortable, itchy, burning sensation in the region was reported as a subjective complaint (Figure 1a - d). Somatic and neurological status as well as paraclinical assessment and chest X-ray examinations did not show any abnormalities. Profile radiography of the skull detected two osteolytic zones with irregular borders in the parietal region; no structural changes were observed.

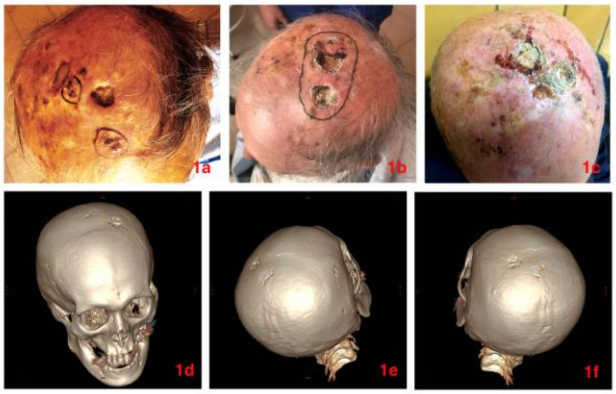

Figure 1: a) Clinical suspicion of 2 pigmented basal cell carcinomas, located next to the area of 2 ulcerated lesions. The ulcerated lesions are histologically confirmed as basal cell carcinomas; b) One year later wide expansion of the ulcerative lesions is observed with the addition of pain and bleeding; c) 4 months later 2 hyperkeratotic tumor formations with blood/yellow discharge have appeared; d - f) CT - examination of the lesions revealed progression in depth and involvement of tabula interna of the tumor process (one year earlier CT - examination detected tumor infiltration only in tabula external)

Cranial computed - tomography (CT) examination performed in June 2017 revealed two deformities in the form of tumour-mediated osteolysis, affecting the diploe of the tabula externa on the left parietal and parasagittal areas. Several months later, in November 2017 second cranial CT examination detected progression of the infiltrative process as two zones of osteolytic changes, affecting the tabula externa and the diploe of tabula interna (Figure 1d - 1f).

Complete excision with removal of periosteum and partial removal of the tabula externa was performed in collaboration with the neurosurgical team (Figure 2a, 2b). Intraoperative findings showed tumour infiltration of the parietal bone and the superficial layer of dura mater. This neoplastic formation was surgically removed in maximal safety margins. Thermal ablation of dura mater was performed as the tabula interna remained intact (Figure 2c - 2e). Hydroxyapatite cement was used for reconstruction of the cranial bone defect (Figure 2f - 2g). After meticulous haemostasis and layered soft tissue suturing, the surgical wound was covered with a sterile Bactrigrass dressing. The patient was referred to the plastic surgery department for reconstruction of the skin defect.

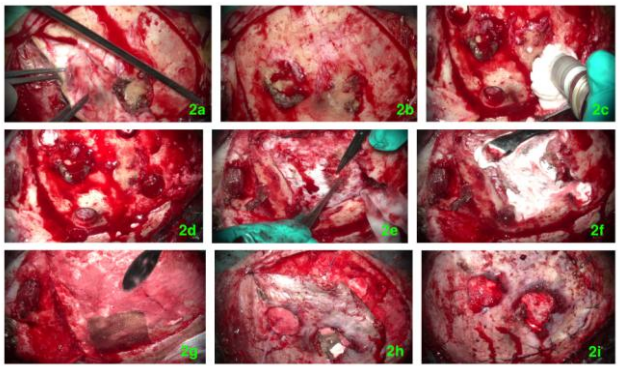

Figure 2: a) Careful dissection of the skin around the tumor with a wide margin of surgical safety; b) Skin defect as a result from complete dissection of the skin around the area of the tumors; c) In the 4 corners of a provisional rectangle surrounding the tumors 4 defects are situated via high-frequency drill with a set of specific heads. Dura mater remains intact. Severe bleeding was stopped with an electric knife; d) Clinical finding after locating of additional bone defects in the calvarium region; e) Careful removal of the cranial parts infiltrated by a tumour as well as part of dura mater with neoplastic involvement. Haemostasis; f) Applying hydroxyapatite bone cement for reconstruction of the cranial defect; g) Precise adaptation of the cement before hardening; h) Layered soft tissue closure after the surgical removal of the lesions; i) Postoperative status after adaptation

Histological examination revealed basal cell carcinoma invasion with clear surgical margins.

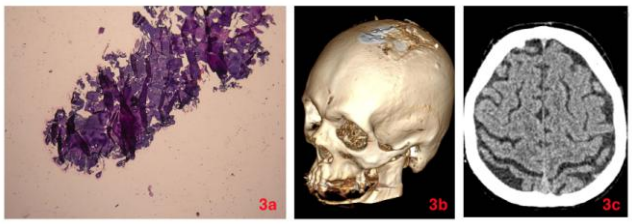

Figure 3: 3a – Histopathological data of basal cell carcinoma infiltrating the bone. Unsuccessful pathologic sample; 3b – Routine postoperative CT-imaging of the patient is showing relatively good adaptation of the cement to the normal cranial structure; 3c – Early postoperative CT of the patient. Inapparent finding. CT 3 days after surgical approach with cranial bone resection because of postoperatively reduced sensitivity of the right part of the body, suspected for ischemic insult

Discussion

We present to the dermatological and oncosurgical community a clinical case of a patient with basal cell carcinoma who developed recurrent neoplastic lesions with the progressive invasion of the skull due to incorrect treatment. The main principle for treatment of any malignant lesions including BCC is radical surgical elimination insufficient field of surgical safety [7].

As it is stated in the National Comprehensive Cancer Network (NCCN), the aim of treatment for BCC is the elimination of a tumour with maximal preservation of function and physical appearance [8]. The therapeutic strategy should be individualised to every patient according to the size, location and depth of a tumour as well as comorbidity and additional examination findings [9]. However, in any case, there is a simple rule of great importance that should always be followed when it refers to surgical management, and it is the definitive requirement of radical surgical approach. Any ignorance of this principle is a potential triggering factor for neoplastic development [10]. For this particular reason in most cases radical surgical excision with histopathological evaluation and regular dermatological follow up is the first line treatment for BCC [11]. In cases of more difficult to treat lesions, Mohs micrographic surgery is considered an eligible and reasonable option [12].

There are various alternative non - surgical methods for the treatment of BCC [13]. Radiation therapy is a standard therapeutic option for patients with contraindications for surgery, but it can also be used as adjuvant therapy [14]. However, according to the Guideline recommendations on BCC, it is not recommendable as first-line treatment if surgical excision is possible [15]. Curettage and cautery, as well as cryosurgery and laser ablative therapy, show variable recurrence rates and may be considered as a good treatment only for low-risk BCC [16]. Local therapy with chemotherapeutic and immune - modulating agents such as topical Imiquimod 5% or Fluorouracil may be indicated in some cases of small and superficial BCC [17]. Topical photodynamic therapy is another option, appropriate for superficial and thin nodular BCC in patients with large or multiple lesions and those in sites of high cosmetic importance [18].

A Hedgehog (Hh) pathway inhibitor (Vismodegib, Sonidegib) can be used for locally advanced BCC in patients with contraindications for surgical or radiation therapy as well as for post-treatment recidives and metastatic forms of BCC [19].

Unfortunately, according to the anamnestic data of our patient it can be concluded either that he had been treated several times with an inadequate treatment modality or that the electrocauterisation was not performed in enough margins.

Although BCC in the area of the head is commonly seen, the risk of involvement of the skull and dura mater is extremely rare with an estimated incidence of 0.03% [20]. According to a PubMed search, there are only 13 cases of BCC of the scalp with intracranial tumour invasion described in the world literature till now. Local excision of the scalp in combination with craniectomy with dural resection (if needed) is the standard surgical treatment in such cases [21]. It is followed by reconstruction of the bone defects (cranioplasty) using fascial graft for dura mater, and bone cement (calcium hydroxyapatite) and titanium mesh for the skull [22]. Skin and soft tissue defects are reconstructed using island flaps, rotational flaps or free tissue transfer [23][24]. Depending on the depth of tumour invasion, curettage of the tabula externa is a less traumatic therapeutic option which does not need any further osteoplasty. It is indicated in limited cases where the tumour process has superficial spreading and evolves only part of the cranium's thickness [25]. Both surgical techniques require clear surgical bone margins [26]. Surgical management of BCC is a serious challenge for the operating team in cases of neglected patients or histopathological subtypes of BCC with aggressive behaviour, represented as rapid growth into large sizes [27].

It is important to keep in mind that an infiltrative tumour process can be inapparent for a long time which reaffirms that every lesion should not be evaluated but removed concerning all principles of the good oncosurgical practice [28]. Precisely managed therapy of BCC is curative in most of the cases as it ensures good prognosis for the patient [29]. However, it shows high recurrence rate with risk of extensive invasion if there is not complete surgical removal [30].

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