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The elimination of nasal defect caused by basal cell carcinoma destruction with co2 laser: paramedian forehead flap technique.

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ABSTRACT

Basal cell carcinomas (BCC) and its destructive treatment methods can cause wide spread destruction of nose and reconstruction can be challenging. The paramedian forehead flap (PMFF) is a versatile pedicled flap with a robust vascular supply, based upon supratrochlear artery, that is well suited for reconstruction of complex or large nasal defects. The forehead skin is recognized as the best donor site for resurfacing the nasal defects. In this case report, we present a female 68 years-old patient, who 6 years ago was diagnosed with a BCC involving right side and dorsal part of the nose. After CO₂ laser ablations and aminolevulinic acid–based photodynamic therapy patient was left with a visible around 2,1 cm size defect on the right ala. Furthermore, she was complaining about breathing difficulties. To achieve a functional nose without breathing disturbances and good aesthetic outcomes was the main goal for dermatologists and plastic surgeons. So it was decided to perform PMFF procedure in 2 stages. Our patient tolerated the surgical procedures well with no surgical or anesthesia-related complications. In conclusion, reconstruction of defects created by removal of cancer is very important in successful skin cancer treatment and patient satisfaction. The forehead flap represents one of the best methods for repair of extensive nasal defects.

Keywords: reconstruction, basal cell carcinoma, nasal defect, paramedian forehead flap

Introduction

Basal cell carcinoma is the most common (predominantly affecting caucasians), slow-growing epidermal skin cancer in Europe, Australia and the U.S.A. Unfortunately, every year its incidence is increasing worldwide. The most significant aetiological factors of basal cell carcinoma appear to be genetic predisposition and exposure to sun (ultraviolet radiation) [1,2,3]. BCC rarely causes metastasis. However, a small portion of this pathology acts more aggressive, with a probability to infiltrate deep tissues and bones. Moreover, incomplete excision of BCC can cause its recurrence, so it is really important to treat this pathology well [4,5]. There are many treatment methods for BCC, ranging from topical therapy (e.g. imiquimod) and minimally invasive procedures (e.g. photodynamic therapy), as well as destructive surgical (excision) and nonsurgical (e.g. cryosurgery) therapies. The treatment is chosen considering relative risk of recurrence, location, also tumour size and individual patient comorbidities [3,6]. CO2 laser ablation is an alternative therapy for treating smaller than 2 cm, superficial and early nodular basal cell carcinomas and usually cosmetic outcomes are good to excellent (were seen in 85,8 % BCC cases treated with CO2 laser) [6,7]. Still, to improve treatment ratio and diminish recurrence rate, a combined treatment, contained of CO2 laser and photodynamic therapy (PDT) was suggested. Nevertheless, studies concluded, that single PDT treatment leads to higher recurrence rate, compared to surgical treatment [8]. Larger defects on nose and their reconstruction can be challenging for surgeons. The paramedian forehead flap (PMFF) is a versatile pedicled flap with a robust vascular supply, based upon supratrochlear artery, that is well suited for reconstruction of complex or large nasal defects. Supposedly, this type of flap may be one of the oldest flaps in use for the reconstruction of facial defects. Given the ideal quality of color and texture, the forehead skin is

recognized as the best donor site for resurfacing the nasal defects [9,10].

Case report

In this case report, we present a female 68 years-old patient, who 6 years ago started to complain about recurring lesion in nasal area. Histological examination was performed and she was diagnosed with a BCC involving right side and dorsal part of the nose. Pathological conclusion was nodular type around 1.9 cm size basal cell carcinoma (TNM stage pT1N0M0). Patient has arterial hypertension and no other co-existing diseases. At first, patient was treated with few CO2 laser ablations and aminolevulinic acid-based photodynamic therapy (ALA – PDT) sessions. After treatment patient was left with a visible around 2,1 cm size defect on the right ala. Furthermore, she was complaining about breathing difficulties. Three biopsies and histologic examination of nose tissue were performed within one year and recurrence was not detected. To achieve a functional nose without breathing disturbances and good aesthetic outcomes was the main goal for dermatologists and plastic surgeons. So it was decided to perform PMFF procedure in 2 stages, incorporating revisions at 6- to 12-month intervals. During first surgery, right side forehead flap was used. After 7 weeks second operation was performed and forehead flap was disconnected together with forehead skin plastic. In our case, to achieve good aesthetic results we needed to do third operation in which excess of tissue was removed. Our patient tolerated the surgical procedures well with no surgical or anesthesia-related complications.

Discussion

Although operative treatment of BCC has been regarded as the best option for primary basal cell carcinoma management, some patients deny surgery because of its

complications such as bleeding and infection. Fortunately there are alternative ways to treat basal cell carcinoma – ablation using CO² laser is one of them [11,12]. However, the use of this laser can cause atrophic and hypertrophic scarring due to thermal damage [13]. In this case, we reported the use of forehead flap, which is one of the oldest surgical techniques to eliminate nasal defects, and still is considered as a first line treatment method which can deliver near-normal functional and cosmetic results. It dates back to India, ~700 BC, when people had their nasal tips amputated as a punishment for a crimes and was introduced in Europe at the very beginning of XVI century. United States discovered this technique in the 1830s by J.M. Warren [14,15]. The paramedian forehead flap was first circumscribed in 1834. Compared to median flap, it is longer and allows bigger rotation degree. Now it is known as a ultimate reconstructive technique for nasal defects [16]. Unfortunately, there are some contraindications for using this surgical method – advanced age, significant small-vessel disease, history of tobacco use, active cutaneous malignancy, history of radiation therapy and medical instability [17].

The paramedian forehead flap is based on an axial blood-supply from the supratrochlear artery, which exits the orbit 1.7- 2.2cm lateral to the midline at the level of the superior orbital rim. It then travels deep to the *orbicularis oculi* and superficial to the *corrugator supercilii muscle*. Later penetrates the orbicularis and frontal muscles at the level of the brow to run in a subcutaneous and subdermal plexus approximately 2 cm from midline or approximately at the level of the medial brow. The flap includes epidermis, dermis, subcutaneous tissue, frontal muscle and associated fascia.

Preparation for surgery:

Prepared with a betadine based solution into the hairline and the entire face. Vasoconstrictive local anaesthetic was injected around the margins of the defect.

Making a template:

A template is positioned under the hairline and the proposed ap's outline is incised to periosteum. A template of the exact size and shape of the defect is a precise way to design a flap. Dried the edges of the defect and marked them with a surgical pen so there was excess ink at the edges. Used the unmarked internal surface of the foil of a suture packet, opened it up completely so that the surface area is maximized, and pressed it onto the defect so that the inked margins are transferred onto the foil. Cut the foil along the inked lines with scissors to create a template. Used gauze to determine how far superiorly the skin paddle must be taken from the forehead/scalp to cover the entire defect.

Harvesting the flap:

Injected vasoconstrictive local anaesthetic around the flap, but not directly into the flap to avoid vasoconstrictive complications. Started at the tip of the pedicle, made incision through skin and subcutaneous tissue using skin hooks to generate tension and to pull the skin up and away from the periosteum. The *galea aponeurotica* was separate as it is released from the scalp when this layer is entered. Made incision 5cm at a time down each of the lateral margins of the pedicle, ensuring to dissect down to and through *galea*. Once the tip has been mobilised, finger dissection was used in the loose galeal layer to establish a plane heading inferiorly toward the pedicle and making it easy to define the dissection plane. Therefore, deepened the dissection to a subperiosteal plane to protect the vascular

pedicle once reached the superior aspect of the brow. This was achieved by incising the periosteum with a 15 blade and then using a Freer's dissector to bluntly dissect inferiorly in this plane. Pedicle was long enough that it reaches without tension, dissection of the pedicle was done. Prior to inseting the flap, we assessed the blood supply of the flap at the tip by rubbing it with a dry swab and by assessing for bleeding.

Insetting the flap

The flap was set into the defect and its thickness assessed. Some loss of flap volume was expected to occur with healing. Flap was secured using interrupted deep dermal 4-0 Monocryl sutures and 6-0 nylon interrupted cutaneous sutures. Back side of the flap which was not used to cover nasal defect was closed with full thickness skin taken from the right thigh.

Closing the donor site

The donor site was closed using interrupted deep dermal 4-0 Vicryl sutures and 5-0 interrupted nylon. Both wounds were covered with steristrips.

Postoperative care

Sutures were removed after 7 days after the surgery.

Pedicle division

The pedicle was divided 4 weeks later, once neovascularisation has occurred and the flap has gained a local blood supply. The entire face was prepared, local anaesthetic with a vasoconstrictive agent was injected into both the brow and nasal reconstruction area. A clamp was placed on the pedicle at the intended division site, ensuring enough distal pedicle length for proper inset. The pedicle was divided. The pedicle was left 2 cm long. After 2

months the third surgery was performed, pedicle was trimmed to fit the residual defect [15,16,18,19,20].

Conclusions

Basal cell carcinoma is a dangerous illness, which, if untreated, can cause deadly results, even though it is rare. The removal of BCC lesions can cause functional and cosmetic nasal damage and the patient needs elimination of it. We suggest to reconstruct nasal defects by using the paramedian forehead flap as we consider it as the ultimate surgical method.

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