A reliable frozen section technique for basal cell carcinomas of the head and neck

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Basal cell carcinomas (BCCs) of the head and neck treated by conventional techniques of surgical excision, curettage, cryotherapy and radiation therapy have recurrence rates of up to 42%. Mohs micrographic surgery (MMS) decreases the recurrence rate but can be expensive, delay definitive reconstruction and is limited in its availability.

The authors report a series of 50 patients with head and neck BCCs treated by a surgeon-directed 'en face' frozen section technique that immediately evaluates the entire peripheral and deep margins during BCC resection, and potentially offers a more efficient and equally effective alternative to MMS.

Patient demographics, pathology results, operative time, technique and outcomes are all reported. With a mean follow-up of three years, there was only one recurrence (1.7%). Mean total operative time was 1 h 47 min. The authors conclude that this surgeon-directed 'en face' frozen section technique does not require any specialized training, enables more rapid and reliable results than standard frozen section techniques that are currently used, and provides outcomes equivalent to MMS in the surgical treatment of head and neck BCCs.

Key Words: *Basal cell carcinoma; Carcinoma; En face; Frozen section; Mohs surgery; Treatment*

Une technique fiable d'examen extemporané du carcinome basocellulaire de la tête et du cou

Les carcinomes basocellulaires (CBC) de la tête et du cou traités par les techniques classiques d'excision clinique, de curetage, de cryothérapie et de radiothérapie ont un taux de récurrence pouvant atteindre 42 %. La chirurgie micrographique de Mohs (CMM) réduit le taux de récurrences, mais elle peut être coûteuse, peut retarder la reconstruction définitive et n'est pas très utilisée.

Les auteurs présentent une série de 50 patients ayant un CBC de la tête et du cou, traités par une technique d'examen extemporané dirigée par un chirurgien sur place, qui permet d'évaluer immédiatement l'ensemble des bords périphérique et profond pendant la résection du CBC, ce qui pourrait se révéler plus fonctionnel et tout aussi efficace que la CMM.

La démographie des patients, les résultats pathologiques, la durée de l'opération, la technique et les résultats sont tous présentés. Après un suivi moyen de trois ans, une seule récurrence a été observée (1,7 %). L'opération durait en moyenne 1 h 47. Les auteurs concluent que la technique d'examen extemporané dirigée par le chirurgien sur place ne nécessite pas de formation spécialisée, permet d'obtenir des résultats plus rapides et plus fiables que les techniques d'examen extemporané standards actuellement en usage et donnent des résultats équivalents à ceux de la CMM pour le traitement chirurgical du CBC de la tête et du cou.

Basal cell carcinoma (BCC) is the most common skin cancer worldwide and represents 75% of cutaneous malignancies (1). The mortality rate from BCCs is <1% and metastases rarely occur (0.0028% to 0.5%) (2-6). Achieving clear margins, particularly with the more aggressive histological subtypes of BCC and in recurrent tumours, can prove challenging. In these scenarios, the visible clinical margin frequently underestimates the true extent of the tumour. This phenomenon is often referred to as subclinical tumour growth with fingerlike extensions. It is particularly common in the danger zone of the face (H zone), where BCCs often behave more aggressively and recur more frequently (7,8).

Before reconstruction, it is imperative that the entire BCC be removed with negative pathological margins. Incomplete resection of primary and recurrent tumours can lead to substantial morbidity and even mortality (9). The majority of BCCs can be treated using standard techniques including conventional surgical excision, curettage, cryotherapy and radiotherapy. The recurrence rates for each of these techniques has been reported to be 3% to 42% following surgical excision (10-12), 3% to 9% with curettage (13,14), 4% to 17% following cryotherapy (10) and 7% to 10% after radiation (15).

Mohs micrographic surgery (MMS) or frozen section have been recommended for difficult tumours such as recurrent tumours, tumours located in anatomically sensitive areas, aggressive histological subtypes, perineural invasion or large tumours >2 cm in size (7). Cure rates with MMS has proven better than with other treatment modalities, with low overall five-year recurrence rates of 0.6% to 3% for primary BCC, and 6% to 10% for recurrent BCC (16-19). Disadvantages of MMS include the fact that it can be very time consuming, expensive and the reconstruction may be deferred if the Mohs surgeon is not comfortable with more involved reconstructive procedures.

We evaluated the effectiveness of a surgeon-directed 'en face' frozen section technique that immediately evaluates the entire peripheral and deep margins during BCC resection and potentially offers a more efficient and equally effective alternative to MMS.

METHODS

Patients

The study group comprised 50 patients who were treated by a single plastic surgeon (TH) in a tertiary centre. Fifty-three BCCs were evaluated. All tumours excised from the face over a five-year period (2002 to 2006) were retrospectively reviewed. The indications for 'en face' frozen section were recurrent tumours, tumours located in anatomically sensitive areas, aggressive histological subtypes, perineural invasion or large tumours >2 cm. The 'en face' method is a technique that permits examination of the entire tumour margin (20). The sections for the 'en face' method are cut very thin to enable maximal tissue preservation.

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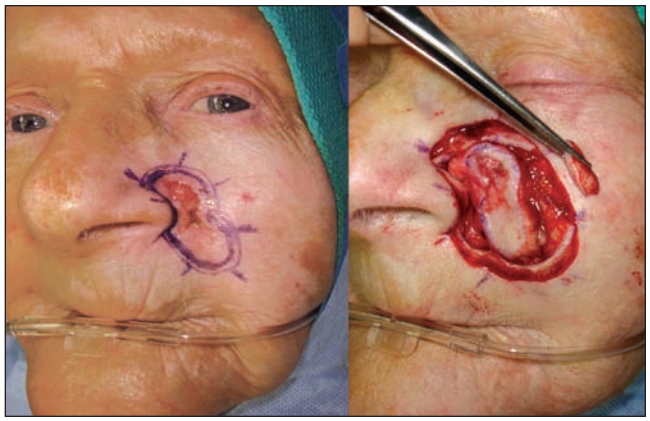

Figure 1) *A 1 mm margin is divided into small units under loupe magnification that would fit onto a standard frozen section mounting block*

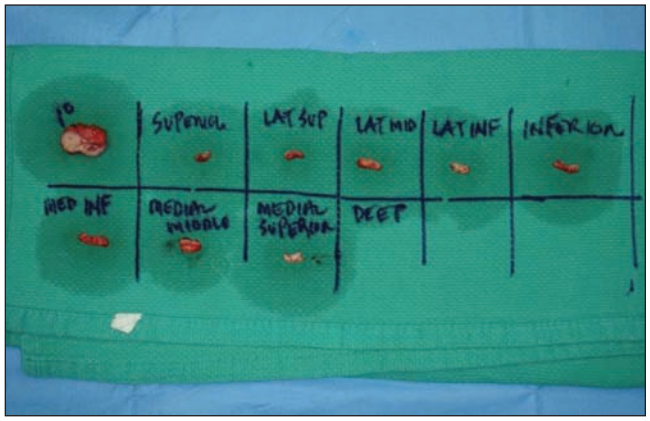

Figure 2) *These labelled units would represent the entire circumference around the tumour in addition to the deep margin*

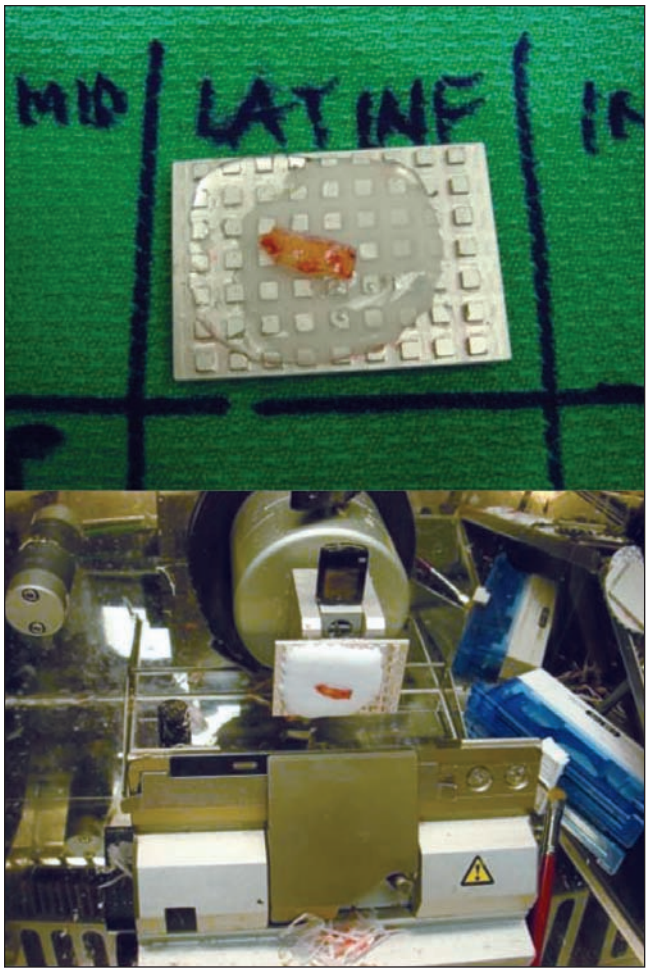

Figure 3) *Each specimen is mounted by the surgeon with its outer margin facing the cutting surface of the block*

Technique

Under 4.5× loupe magnification, a surgical pen was used to mark the visible and/or palpable outer limit of the tumour. An additional 1 mm border was then marked beyond this. Following standard local anesthesia with 1% xylocaine and 1:200,000 epinephrine, both lines are incised to a depth below the perceived depth of the tumour. This resulting 'margin' is divided into small units that fit onto a standard frozen section mounting block (Figure 1). These units are then labelled according to their orientation in relation to the tumour. These labelled units represent the entire circumference of the tumour as well as its peripheral deep margin (Figure 2). The surgeon then mounts each specimen with its outer margin facing the cutting surface of the block; therefore, the resulting slices or sections represent the outermost surgical margin. Having the surgeon mount the specimen with the pathologist present allows the accurate orientation of the specimen and eliminates any confusion with labelling, particularly in larger tumours with multiple units (Figure 3). The deep margin of the primary tumour is evaluated by the surgeon 'bread loafing' the main specimen into ≥2 sections depending on its size. If there is any concern about the deep margin, additional tissue can be removed from the tumour bed and evaluated using the same 'en face' frozen section mounting technique. A laboratory technician processes the specimens using the standard frozen section staining and mounting techniques. The pathologist and the surgeon examined the frozen section slides. If suspicious sites or evidence of tumour were seen on the slide, further tissue was excised only from that particular area of positive margin. This procedure was repeated until the area was free of tumour. Each frozen section examination generally took ≤15 min for smaller tumours and up to 30 min for larger tumours with multiple units. Reconstruction was performed immediately in all patients.

RESULTS

Fifty-three BCCs in 50 patients were treated by a single plastic surgeon (TH) in a tertiary centre. There were 27 men and 23 women, whose age ranged from 40 to 95 years. Forty-four tumours were primary and nine were recurrent; mean follow-up was three years. The preoperative tumour size ranged from 0.5 cm × 0.4 cm to 4 cm × 4 cm; 50.9% of the tumours were located on the nose (Figure 4). BCC subtypes were recorded in 21 of the 53 tumours: nine nodular (42.8%); eight morpheaphorm (38%); three superficial (14.2%); and one sebaceous (4.7%). Mean operating time, including resection and reconstruction, was 1 h 47 min. The resulting surgical defects were reconstructed with local flaps in 82%; full thickness skin graft in 15%; and primary closure in 3%. Intraoperative re-excisions due to positive frozen section margins were necessary in 36% of cases. Ultimately, permanent pathology results were consistent with the frozen section evaluations in all patients (100%). There was a single recurrence (1.7%). The time between the excision of the primary lesion and the diagnosis of the recurrence was 13 months. The original tumour was on the nasal tip and was 1.1 cm × 1.1 cm. The recurrent tumour presented as a small nodule adjacent to the previous excision and was treated by simple re-excision with no further recurrence.

DISCUSSION

Studies investigating treatment safety margins of skin cancer provide recommendations ranging from 2 mm to 10 mm (21-23). We believe the use of ocular magnification and bright surgical operating room lighting play seminal roles in determining an accurate surgical margin. However, most of these studies did not indicate whether these

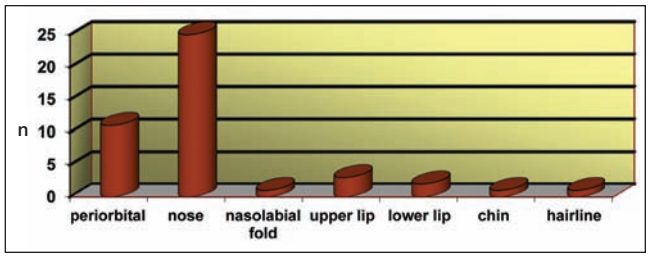

Figure 4) *Anatomical distribution of basal cell carcinoma in the head and neck area*

adjuvants in clinical decision making were used, and it is likely in many of them they were not. Regardless, maximal tissue preservation is important in certain cosmetic and functional areas such as the eyelid, lip and nose and, therefore, larger safety margins that sacrifice a certain amount of noninvolved tissue are impractical and MMS or frozen sections are considered to be the treatment of choice.

The surgeon-directed 'en face' method of frozen sections described herein offers certain benefits over standard frozen section techniques and MMS. The standard frozen section technique typically involves only two sections through a single specimen at its horizontal and longitudinal axis. This technique assumes tumour growth only follows a perfectly spherical or elliptical pattern and may lead to false-negative results (Figure 5). Research data from studies examining subclinical extension using microscopic control of complete lateral and deep margins has shown that an asymmetrical subclinical growth pattern with one or multiple extensions appears to characterize the majority of BCCs (24-26). Standard frozen section techniques have been found to be accurate in only 72% of cases (27). The surgeon-directed 'en face' technique described herein differs from standard frozen section techniques in that it evaluates the entire peripheral and deep margins. We also believe that the surgeon mounting the specimens and communicating directly with the pathologist significantly reduces the time in processing the frozen sections. In addition, the frozen section pathology results are accurate in that they correlated with the final pathology results in all cases.

MMS is often considered the gold standard for excision of difficult BCC in the head and neck (7,28). Based on a systematic review of the literature, the overall five-year recurrence rate for MMS has been between 0.6% to 3% for primary BCC, and 6% to 10% for recurrent BCC (16-18). However, the need for MMS has been questioned because of many disadvantages related to this procedure. A single Mohs cycle, excluding the excision itself, takes approximately 45 min and, therefore, is extremely time consuming (29). The results of cost analysis in many studies showed that the mean costs of MMS were significantly high, mainly due to longer surgery time and high costs of pathological examination (30). Because special training for MMS is required, the number of surgeons capable of performing MMS remains low and the technique is not available in every centre. Furthermore, reconstruction may be delayed if a Mohs ablative surgeon is not a reconstructive surgeon. Using the described 'en face' frozen section technique, we were able to achieve success equivalent to MMS with regard to successful tumour ablation in a timely fashion. In addition, all patients were able to have both their tumour resection and reconstruction performed in a single sitting.

CONCLUSION

Surgeon-directed 'en face' frozen section technique is a quick and reliable technique for ensuring negative tumour margins for difficult BCC tumours where maximal tissue preservation is required. The procedure can be performed by any surgeon where frozen section pathology services are offered. The use of the surgeon-directed 'en face' technique eliminates the inadequacies of incomplete tumour evaluation associated with standard frozen section techniques and offers an equally effective, yet faster and more universally available option to MMS.

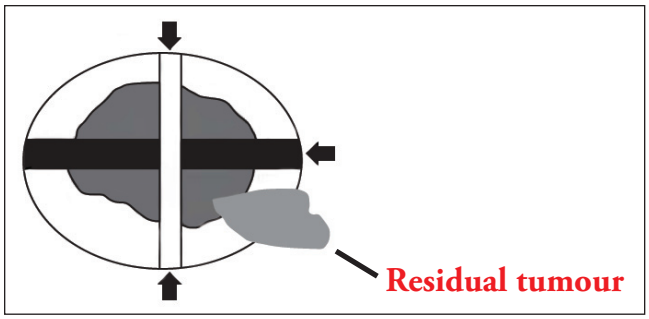

Figure 5) *Standard frozen section technique. A roughly elliptical excision is represented with the tumour (gray area) in the centre. The specimen is sectioned by removing two cross-sectional strips at right angles to one another (black horizontal bars and white vertical bars). This technique assumes tumour growth only follows a perfectly spherical or elliptical pattern and may lead to a false-negative result*

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