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Outcomes of Mohs Micrographic Surgery for Periocular Squamous Cell Carcinoma

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Abstract

Periocular cutaneous Squamous Cell Carcinoma (cSCC) accounts for 5% to 10% of all eyelid malignancies. Periocular cSCC carries a low mortality rate but can be destructive to local tissues, which can be devastating if neglected. Due to the unique function and anatomy of the eyelids, Mohs Micrographic Surgery (MMS) is gold standard for treating cSCC to preserve healthy tissue and reduce rates of local recurrence. In this study, we reviewed 34 patients who underwent MMS for periocular cSCC in the North of England after a minimum period of 24 months post-surgery to assess recurrence rate and therefore success of MMS. Two patients (5.9%) had local recurrence of periocular cSCC, which is comparable to the literature. Median time elapsed since MMS was 60 months. A variety of oculoplastic surgical techniques were utilized in the repair of the Mohs defect. One patient (2.9%) developed a significant post-operative complication following repair of their Mohs defect.

Introduction

The functional and anatomical considerations in the eyelid and periocular region make cancer in these tissues unique in terms of classification, treatment and prognostication [1,2]. Eyelid carcinomas display a wide spectrum of behaviors, from indolent Basal Cell Carcinoma (BCC) to aggressive, metastasizing Merkel or Cutaneous Squamous Cell Carcinoma (cSCC).

Periocular cSCC has an incidence of between 0.09 and 2.42 cases per 100,000 population, accounting for 5% to 10% of all eyelid malignancies [3]. They tend to occur in elderly, fair-skinned individuals, and risk factors for cSCC include cumulative ultraviolet exposure, immunocompromise, radiation exposure, chronic inflammation or scarring, xeroderma pigmentosum and albinism. cSCC has low metastatic potential and high survival rates of >95% at 3 years if treated early [4,5].

Periocular cSCC has varied clinical appearances, but frequently presents as a tender erythematous, hyperkeratotic lesion commonly involving the lower eyelid that progressively enlarges and may ulcerate [6]. Lesions tend to bleed easily and can form cutaneous horns. Although cSCC carries a low mortality rate, they can often be destructive to local tissues, which can be devastating periocular if neglected.

Locally advanced cSCC may invade the lacrimal system, orbital soft tissue, orbital bone, perineural tissue, orbital apex, base of skull, paranasal sinuses, and globe [1]. cSCC can metastasis *via* lymphatic channels and less frequently by hematogenous spread. Periocular lymph drains into pre-auricular, intra-parotid, submandibular and cervical lymph node basins [1]. Periocular cSCC spread via lymph channels and perineural invasion both represent independent prognostic factors in terms of metastasis and survival [7,8]. Careful history taking and prompt investigation of symptomatic perineural spread along with examination of regional lymph nodes is mandatory when assessing these patients. Distant metastatic sites can include the brain, liver, and lung. Therefore, early diagnosis, systemic assessment, disease morphology characterization, accurate staging and timely treatment of periocular cSCC is vital to minimize local ophthalmic tissue destruction, sight loss and mortality risk.

Conventional surgical excision with standard histologic assessment of clearance margins can offer a high cure rate for cSCC. Due to the nature of cutaneous spread, excisional margins are required. Generally, cSCC require a substantial 4 mm to 10 mm margin depending on its size and subtype [9]. Completeness of excision is improved by accurate marking preoperatively. In the periocular region wide margins often cannot be afforded, which is why Mohs Micrographic Surgery (MMS) has become a more favorable treatment modality when available. MMS allows

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examination of 100% of the surgical margin resulting in reduced rates of local recurrence [10]. As a secondary benefit some patients may have smaller surgical defects allowing simpler reconstruction with improved aesthetics and a reduced likelihood of complications. In our unit MMS is undertaken by fellowship trained dermatologists with a substantial proportion of the reconstructions being undertaken by oculoplastic surgeons. Although time-consuming compared to wide margin excision, in regions with complex functional anatomy such as the eyelids and adnexa, MMS has become the gold standard for treatment.

In this article we describe the success and outcomes of MMS and subsequent oculoplastic reconstruction for periocular cSCC in the North East of England. Primary outcome measure of success is defined as no recurrence of cSCC after minimum 24 months' time elapsed post-surgery of MMS for periocular cSCC. Secondary outcome measures include describing the surgical techniques utilized for reconstruction following MMS, surgical complications should they occur and analysis of disease characteristics.

Methods

Retrospective analysis of periocular cSCC treated with MMS between 2013 to 2020 at the Royal Victoria Infirmary, Newcastle-upon-Tyne, England, UK. Before 2013, the details of MMS were recorded in patients paper notes which are stored in the records department, making access and inclusion in this study difficult.

In this study, the histological subtype, differentiation and growth pattern were examined. Furthermore, patient demographics, disease characteristics, primary or recurrent cSCC, tumor size and Mohs defect size for each patient was assessed. Oculoplastic reconstruction technique and post-operative complications were also recorded.

Results

A total of 34 patients underwent MMS with histologically confirmed periocular cSCC between 2013-2020 in the North East of England. All had a minimum 24 months' time elapsed since MMS. Two patients (5.9%) had local recurrence of periocular cSCC. Median time elapsed since MMS was 60 months. Not all 34 patients had a minimum 24 months clinic follow up, however only patients within the local area were included in the data set. So, it is assumed that if there was recurrence, they would have been referred back into the same local hospital service.

A variety of oculoplastic surgical techniques were utilized (Table 1). Only 1 (2.9%) patient had a significant post-operative complication.

Mean age was 75 years, with a slight predilection towards males (18/34, 53%). Anatomical location of periocular cSCC was varied, the most frequent being lower lid (16/34, 47.2%). Local tissue invasion was histologically confirmed in one patient (2.9%). Perineural spread was present in 4 patients (11.8%). There were 2 patients with recurrent periocular cSCC treated with MMS (5.9%), the vast majority were primary periocular cSCC (94.1%) (Table 2).

The 32 (94.1%) tumors were deemed no special type on histology with a further 2 acantholytic and 1 crateriform. In addition, 25 (73.5%) tumors were moderately differentiated with 9 (26.5%) deemed well differentiated. The growth pattern was infiltrative in 21 (61.8%) cases and pushing in 13 (38.3%) cases. Median tumor size was 12 mm × 9 mm and median Mohs defect size was 20 mm × 14 mm. Figure 1 displays maximal tumor and Mohs defect sizes, including first quartile, median and third quartile data (Figure 1).

Table 1: Ophthalmic surgery technique.

Ophthalmic surgery technique	Number
Direct Closure	9
Myocutaneous sliding flap	7
Non-specific lid reconstruction	6
Free skin/tarsus graft	5
Tarsoconjunctival flap advancement (Hughes)	3
Bilobe flaps	2
Cheek rotation flap (Mustarde)	1
Lateral rhomboid flap	1

Table 2: Summary of disease characteristics.

Disease feature/characteristic	Number	Percentage of patients
Lower lid	16	47%
Upper lid	12	35%
Medial canthus	3	9%
Lateral canthus	3	9%
Perineural spread	4	12%
No perineural spread	30	88%
Ulcerated	8	24%
Well defined	4	12%
Ill defined	7	21%
Lymphatic spread	1	3%
Local tissue invasion	1	3%
Primary cSCC	32	94%
Recurrent cSCC	2	6%

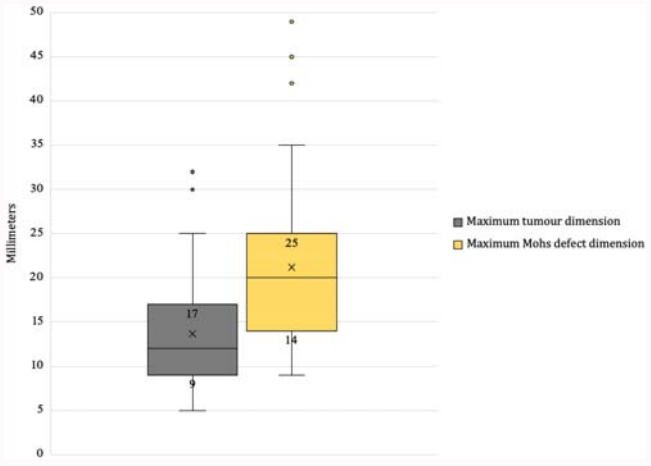

Figure 1: Maximum dimension size of tumour and Mohs defect.

Discussion

Our recurrence rate following MMS for periocular cSCC is comparable to literature, at 5.9% (2/34). Two other series of comparable size and follow up recorded similar recurrence rates for periocular cSCC following MMS; Weesie et al. 4.3% (2/46) and Malhotra et al. 3.6% (2/56) [11,12]. Median follow up in these studies were 46 and 73 months respectively. Given the small numbers of this

specific diagnosis whilst using strict study parameters, any recorded recurrence following MMS greatly affected the overall recurrence rate. Including a greater number of cases would likely produce a more valid recurrence rate.

Of the 2 patients that had recurrent periocular cSCC following MMS, the characteristics were as follows. The first was a 74-year-old male with an ill-defined, upper lid recurrent SSC, measuring 7 mm × 6 mm. Typically, recurrent cutaneous cSCC has a greater risk of further recurrence even following MMS. In one study examining 1,263 patients, recurrence rate was 2.6% for primary cSCC and 5.9% for previously recurrent cSCC [13]. The second case of recurrence in this study was an 89-year-old female with a 10 mm × 8 mm lower lid primary cSCC. Interestingly, both tumors which recurred were relatively small and showed no evidence of perineural invasion.

Only a single patient developed a significant postoperative complication following repair of their Mohs defect (1/34, 2.9%). This patient underwent a lateral brow reconstruction with bilobed flaps, they subsequently developed necrosis of a flap lobe. However, this required no further surgical modification and the patient made a satisfactory cosmetic and functional recovery.

Conclusion

In the literature, periocular cSCC recurrence following MMS occurs between 3.6% to 4.3%. In this study we found periocular cSCC recurrence following MMS in the North of England is 5.9%, which is comparable to the literature. Oculoplastic reconstruction technique following MMS for periocular cSCC is varied depending on anatomical location of lesion, Mohs defect size and the surgeon operating. Significant oculoplastic surgical complications following MMS is very low, occurring in 2.9% of cases (1/34) in this study.

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