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Need for Lacrimal Bypass Surgery After Medial Canthal Tumor Resection: Survey of Current Practices

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Abstract

Objective: No ideal monitoring period exists before conjunctivodacryocystorhinostomy (CDCR) after excision of medial canthal tumors. This study seeks to define current clinical practices via a survey of oculoplastic and orbital surgeons.

Methods: An online survey of medial canthal tumor management was offered via email to ASPORS members. Tumors included: basal cell carcinoma (BCC), squamous cell carcinoma (SCC), sebaceous cell carcinoma (SebC), melanoma (M), keratoacanthoma (KAC), and other adnexal cancers.

Results: 87 members responded. Most surgeons follow patients at intervals no longer than 3-6 months, with monthly exams initially for SebC (17%) and M (20%). > 85% of surgeons follow asymptomatic patients for >12 months before release, with many observing >60-month periods for BCC (29%), SCC (36%), SebC (57%), M (68%), and KAC (23%). 92% of respondents defer CDCR; the majority wait >12 months for all tumors before CDCR. A majority (53%) reported at least 75% of patients developing symptomatic epiphora requiring CDCR. The majority of surgeons (73%) do not perform ancillary testing before CDCR, and 53% perform pre-operative imaging. However, 14% have experienced local or orbital tumor recurrence following CDCR.

Conclusions: SebC and M follow-up intervals trend shorter, while most respondents follow these tumors post-excision > 5 years. > 25% of surgeons follow all tumors for > 60 months. CDCR is delayed for > 12 months by > 75% of surgeons for all tumors. 8% perform CDCR at the time of excision, and 14% reported local/orbital recurrence following CDCR with 52% obtaining pre-CDCR imaging. These results support extended follow-up before CDCR combined with appropriate imaging/testing to minimize morbidity/mortality.

Key words: *Medial canthal tumor, CDCR, conjunctivodacryocystorhinostomy*

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Introduction

When considering appropriate observation periods prior to lacrimal outflow system reconstruction after tumor excision, the question is "how long is long enough?"

There are no clear guidelines for indications and timing of lacrimal bypass surgery in patients who have lacrimal drainage apparatus loss during ablative surgery for medial canthal cancers. Historically, practitioners defer performance of a primary

lacrimal bypass surgery for fear of iatrogenic tumor dissemination into the nasal cavity. The advent of modern-day radiologic studies and readily available Mohs surgery or immediate frozen section assessment of surgical margins in most centers in the United States has mitigated much of the fear of residual tumor introduction into the nasal cavity. If there is a true concern of a residual tumor, then additional adjuvant treatments, such as radiation therapy, should be considered rather than observation alone. Even if we accept the notion that delayed reconstruction is appropriate due to concerns of tumor recurrence, the question is what would be an appropriate period of observation after tumor removal before lacrimal bypass surgery can be safely undertaken.

We were unable to identify any published reports (via a PUBMED search) that describe ideal monitoring periods prior to lacrimal bypass surgery in symptomatic patients after excision of various medial canthal tumors. Factors such as tumor type, staging at time of excision, likelihood of recurrence, presence or absence of epiphora, and the ability of a given patient to appropriately follow up may contribute to the decision to perform lacrimal reconstruction at the time of ablative surgery.

This study seeks to define the current range of clinical practices via a survey of oculoplastic and orbital surgeons in order to quantify their management strategies following resection of various medial canthal tumors involving the lacrimal system.

Materials and Methods

A survey consisting of 8 questions concerning management of medial canthal tumors and conjunctivodacryocystorhinostomy (CDCR) was made available online to members of the American Society of Ophthalmic Plastic and Reconstructive Surgery (ASOPRS). Tumors surveyed include: basal cell carcinoma (BCC), squamous cell carcinoma (SCC), sebaceous cell carcinoma (SebC), melanoma (M), keratoacanthoma (KAC), and other adnexal cancers (as specified by respondents). Participation was invited via email with a direct link to the confidential online survey site. All questions allowed both quantitative and qualitative responses.

Questions included:

1. Follow-up intervals as number of months after excision,
2. Number of months to release from follow-up for asymptomatic patients,
3. Is CDCR performed at the time of primary resection?,
4. If delayed CDCR is preferred, why?,
5. How often do patients lack significant epiphora (with no CDCR indicated)?,
6. Is pre-CDCR imaging performed, and if so, what modalities are there?,
7. Is pre-CDCR ancillary testing performed, and if so, which tests are performed?, and
8. Has tumor recurrence been observed post-CDCR?

Data analysis was performed with results expressed as a percentage of respondents for each category surveyed.

Results

A total of 87 surgeons completed the online survey, representing nearly a 20% response rate. This includes both objective and subjective responses as each of the 8 questions allowed for additional free-form comments to be submitted.

Table 1 reports the follow-up exam intervals following excision of medial canthal lesions involving the lacrimal system. The majority of respondents follow patients at intervals of 3-6 months. These intervals are initially often as short as one month for SebC and M (16% and 19% respectively). Few surgeons initially allow a period longer than 6 months between exams, although nearly 17% of surgeons will see KAC at 12 months after the initial normal post-operative exams are complete. Other adnexal cancers reported by survey respondents include oncocytoma and Merkel cell carcinoma.

Table 2 describes the time to the release of follow-up exams for asymptomatic patients (with no significant epiphora) after excision of all tumor types studied. The majority of surgeons wait at least 12 months, and many report following patients for 60 months or more. This is especially true for SebC (57%) and M (68%), while BCC and KAC are often released before 18 months from epiphora observation (41% and 55% respectively). Comments on time to release from follow-up exams typically stated that surgeons "never release malignancies" and "follow up forever after malig-

nancy". This was sometimes performed by the primary surgeon, and sometimes coordinated with the referring physician or a dermatologist. The comments also reflected the reality that long-term follow-up with the primary surgeon is not always geographically feasible and would be arranged with other providers.

92% of surgeons do not perform CDCR at the time of initial tumor excision; however, 8% do proceed with surgery. The main reasons for delaying CDCR include potential violation of important tissue planes in the event of recurrence, the need to observe the evolution of significant epiphora warranting lacrimal reconstruction, and perceived improved reconstructive results if the operative site is allowed to completely heal before CDCR. Some respondents specified the need for clear margins on a permanent section (despite frozen section results) as rationale for delayed reconstruction. The vast majority of responses were related to the risk of tumor recurrence and iatrogenic tumor dissemination, with observation for epiphora and the likely success of reconstruction in the next most common factors influencing delayed CDCR.

Table 3 presents the observation periods prior to performing CDCR in symptomatic patients following excision of all tumor types surveyed. As supported by the results in table 2, most surgeons elect to follow all tumor types for at least 12 months before performing CDCR. Less than 25% of surgeons would offer CDCR before 12 months for BCC, SCC, SebC, and M (28% for KAC). The rationale for given periods of observation reinforce those reported for delaying CDCR at the time of initial tumor excision. The most common

Table 1: Follow-up exam intervals (in months) following excision of medial canthal lesions involving the lacrimal apparatus (exclusive of initial post-operative period).

	1	2	3	6	9	12	18	24	36	N
BCC	7.1%	2.4	35.7	47.6	1.2	4.8	0	0	1.2	84
SCC	8.3	6.0	54.8	23.8	1.2	4.8	0	0	1.2	84
SebC	19.0	8.3	51.2	13.1	0	4.8	0	0	3.1	84
M	23.5	8.6	45.7	14.8	0	3.7	0	0	3.7	81
KAC	7.6	3.8	21.5	50.6	0	16.5	0	0	0	79
Other	12.5	4.6	35.4	33.8	1.5	10.8	0	0	1.5	65

Table 2: Time (months) to release from follow-up if asymptomatic (no epiphora).

	1	2	3	6	9	12	18	24	36	48	60	>60	N
BCC	0%	3.6	2.4	8.4	1.2	25.3	3.6	15.7	9.6	1.2	13.3	15.7	83
SCC	0	2.4	3.6	7.2	1.2	13.3	2.4	20.5	9.6	3.6	13.3	22.9	83
SebC	0	1.2	1.2	3.7	1.2	6.2	2.5	12.3	9.9	4.9	16.0	40.7	81
M	0	1.2	1.2	4.9	1.2	3.7	2.5	7.4	3.7	8.1	16.0	51.9	81
KAC	1.3	1.3	6.6	9.2	1.3	35.5	1.3	14.5	5.3	0	6.6	17.1	76
Other	0	1.8	1.8	5.4	1.8	12.5	0	25.0	3.6	1.8	17.9	28.6	56

Table 3: Observation time (months) before performing CDCR in symptomatic patients following excision of medial canthal lesions involving the lacrimal system.

	1	2	3	6	9	12	18	24	36	48	60	>60	N
BCC	0%	1.3	10.4	18.2	2.6	50.6	2.6	7.8	0	1.3	3.9	2.6	77
SCC	0	1.3	11.3	17.5	2.5	45.0	3.8	3.8	2.5	0	7.5	2.5	80
SebC	0	1.3	8.8	15.0	2.5	41.3	2.5	2.5	2.5	1.3	10.8	5.0	80
M	0	1.3	11.5	14.1	2.6	38.5	2.6	2.6	1.3	1.3	7.7	9.0	78
KAC	3.0	1.5	14.9	20.9	3.0	43.3	0	0	0	0	7.5	3.0	67

Data as percentage of responses for given interval in months after initial surgery.
N = # respondents who answered for given tumor, BCC = basal cell carcinoma; SCC = squamous cell carcinoma; SebC = sebaceous cell carcinoma; M = melanoma; KAC = keratoacanthoma.

reason for extended observation periods prior to lacrimal reconstruction was the risk of tumor recurrence and subsequent iatrogenic spread. One respondent described an unfortunate case of BCC with resection via Mohs' technique. In that instance, CDCR was deferred by the patient who later recurred at 8 years post-resection necessitating exenteration, a case that demonstrated the need for long-term observation regardless of the lacrimal system status.

Surgeons were asked how often the lacrimal apparatus was removed without resultant evolution of significant epiphora that would indicate performance of CDCR. 53% of respondents reported that at least three out of four (>75%) patients did indeed develop significant epiphora necessitating CDCR. Only 8% of surgeons stated that such patients were never asymptomatic and always needed CDCR. The consensus of the detailed responses indicated that epiphora is less likely to be significant in the older patients who typically have less tear production, and therefore CDCR may be indicated with less frequency than the post-resection anatomy would predict.

Pre-operative imaging prior to CDCR is ordered by 53% of surgeons (47% do not order imaging). 40 respondents listed specific studies. The most common modalities include CT followed by MRI, with a PET scan specifically suggested for melanoma. Ancillary testing often including nasal endoscopy is performed by 27% of survey respondents.

Most importantly, 14% of surgeons have observed orbital or local tumor recurrence following CDCR. Recurrent tumors reported include basal cell, squamous cell and sebaceous cell carcinomas, as well as melanoma. Also observed were inverted papilloma invasive to the orbit and a lacrimal sac tumor invasive to the nose. One respondent described a case of squamous carcinoma of the lacrimal sac, which recurred 9 years after excision and radiation therapy and 8 years status post-CDCR. The confounding variable of new tumors in the same location was not addressed by the online survey.

Discussion

It is important to review the clinical behavior of the main tumor histology types studied before constructing management guidelines concerning CDCR after resection. The following is a brief discussion highlighting key points and recent advancements in the understanding of these lesions.

Basal Cell Carcinoma: Perhaps the best-studied tumor of the medial canthus is basal cell carcinoma (BCC), which reportedly represents 90% of malignant eyelid tumors in the American white population [1]. The same study reported that BCC and squamous cell carcinoma (SCC) combined have a 2% and 3% recurrence rate at 5 and 10 years respectively. Orbital invasion is more common in morpheaform tumors and "under-treated" lesions [2]. Post-irradiated medial canthal lesions are well known to recur, leading to Mohs' micrographic surgery or frozen section margin control as preferred primary excision techniques [3]. A mortality rate of 3% for BCC is attributed to tumors that were clinically neglected, that underwent radiation, or that had arisen in the medial canthus [4]. Incomplete excision of BCC has been significantly associated with the medial canthal location as well as with infiltrative and multifocal tumor types in a recent study of 362 consecutively analyzed facial lesions [5]. An additional study of 485 consecutive cases of BCC and SCC supported the medial canthal location as a significant risk factor for recurrence [6]. A common-sense approach to managing these tumors states that "if the lacrimal drainage system has been removed for tumor eradication, reconstruction of the lacrimal outflow system should not be undertaken until it is established that the patient is tumor-free" [4]. However, the time to BCC recurrence is unpredictable and may occur many years following primary resection. Other medial canthal tumors are even less predictable given their relatively rare incidence versus BCC, which limits prospective analysis.

Long-term follow-up is clearly indicated for BCC, as it is reported that while two thirds of recurrences are observed by 3 years post-op, nearly 20% happen between 5 and 10 years post-excision [7,8]. Overall, the recurrence rate at 5 years for BCC treated with Mohs' micrographic surgery is 0% for primarily excised tumors and 7.8% for recurrent tumors initially treated with non-Mohs techniques [9]. Intuitively, such recurrent tumors are complex in their subsequent management and are clinically aggressive [7,8]. Medial canthal BCC is especially dangerous, with this location comprising 60% of recurrences (5% overall recurrence rate) re-

ported in a series of 382 BCC cases [10]. This anatomical location along with tumor size represents the most important prognostic factors for tumor recurrence, with orbital invasion also reported as high risk for medial canthal BCC [7,11]. Metastatic BCC is very rare (likely much less than 0.01%), as is mortality, which is related to intracranial extension in the reported cases [7]. However, the known relatively elevated recurrence risk of medial canthal BCC suggests that delayed and cautious CDCR is warranted in symptomatic patients.

Squamous Cell Carcinoma: Compared to BCC, SCC is more dangerous with a variable (0-21%) tendency to metastasize both via lymphatic and hematogenous routes in reported series [12-14]. Tumors located at the upper lid and medial canthus have the highest mortality rates of up to 40% if inadequately treated [12]. Local recurrence rates are estimated at 23% by 5 years with metastatic rates variable between 5% and 45% at 5 years as well [15,16]. While orbital and lacrimal system invasion is a rare complication, it has been reported in up to 2.5% of all eyelid BCC and SCC combined [2]. Such complications may take years to evolve and follow a path of several interventions including surgical excision and radiation therapy.

Sebaceous Cell Carcinoma: Traditionally associated with high mortality, SebC now likely has an improved 5-year mortality rate of about 10% compared to 30% or higher in the 1960s-1970s [17,18]. Local recurrence rates at 5 years following excision range from 10%-35% [19]. Involved sites of spread and recurrence include orbital tissues and the lacrimal system, although this is usually in the context of recurrent or non-treated tumors [17,20]. The application of a sentinel lymph node biopsy for staging eyelid and periocular tumors will likely contribute to further reductions in tumor mortality for SebC and other lesions [21].

Melanoma: A review of 24 patients with eyelid M (presenting over a period of 41 years at a single institution) with between 3 and 18 years of follow-up revealed poor prognostic indicators for survival, including Clark's level > IV or a Breslow thickness > 1.5 M [22]. Factors such as age, gender, and histology do not influence prognosis, yet eyelid margin and mucocutaneous junction involvement are linked to higher mortality [22,23]. Local and regional metastases are noted even in cases of complete M excision [24] , and the published mortality rates vary from 6%-58% [23,25].

This survey had an excellent overall response rate of just under 20% (87 total respondents) from the nearly 500 surgeons who were invited to participate. We were impressed with the number of surgeons who also annotated their responses with detailed descriptions, which greatly enhanced the value of the quantitative measures. Many surgeons stressed that as these tumors often arise in older patients, the tendency towards decreased tear production in that population obviates the need for CDCR. This supports extended observation for epiphora as well as tumor recurrence before proceeding with lacrimal reconstruction. Additionally, we did not discriminate between cases where only the superior or inferior canalicular system was excised; it is reasonable that patients with a solitary functional monocanalicular system may never develop significant epiphora, as tears simply drain through the remaining uninvolved canaliculus.

Many interesting comments were also provided concerning long-term management and follow-up of these patients. Some surgeons release patients to the referring ophthalmologist or dermatologist, while others continue to see them essentially forever. Geography plays a significant role as to who sees these patients in the long term. It is not always practical for a patient to travel many hours to see the oculoplastic surgeon for a routine exam, especially with no signs of recurrence many months or years after initial excision. However, the vast majority of surgeons insist on life-long exams for SebC and M, even if it must be coordinated with a non-oculoplastic specialty provider.

The 14% of surgeons who reported tumor recurrence after CDCR made the strongest argument for prolonged observation. Indeed, their comments revealed that many of the recurrent tumors presenting post-CDCR were managed on referral from an outside source. It is also important to recognize that the 14% rate is a combined rate for all tumor types. Recurrence is certainly known to be dependent upon tumor histology and is also likely related to the type of resection, such as wide local excision vs frozen section margin control vs Mohs' micrographic surgery.

In summary, this survey revealed that current-prac-

tice follow-up intervals trend shorter for SebC and M, and the long-term follow-up period for SebC and M is at least 5 years for the majority of respondents. At least 25% of surgeons follow all tumor types for 60 months or more. In cases of significant epiphora, CDCR is delayed for at least 12 months by at least 75% of surgeons for all tumor types studied. Most interestingly, 8% perform CDCR at the time of ablative surgery, while 14% report local/orbital recurrence following CDCR and only 52% obtain pre-CDCR imaging.

These survey results reinforce the establishment of guidelines proscribing extended follow-up intervals before CDCR combined with imaging/testing in an attempt to further minimize the current low recurrence rates and associated morbidity/mortality.

Conflict of Interest Statement

The authors do not declare any conflict of interest or financial support in this study.

"The opinions presented are the author's alone and do not represent those of the United States Army or the United States Government."

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