Radiotherapy of periocular basal cell carcinomas: recurrence rates and treatment with special attention to the medical canthus

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SUMMARY Basal cell carcinomas of the eyelids, especially those in the medial canthal area, may cause extensive local destruction. Recurrent tumours are more aggressive and become progressively more difficult to treat; this is especially true for postirradiated recurrent, medial canthal, basal cell carcinomas. Tumours in this area should thus be treated by a technique which allows tissue sampling in order to gauge the adequacy of the treatment, with the goal being complete extirpation of the tumour. Excision monitored by frozen section control or Mohs’ surgery is our recommendation based on a retrospective analyses of 631 eyelid basal cell carcinomas, half of which were primary tumours and half recurrent.

Of all malignant eyelid lesions 90% are basal cell carcinomas. The lower lids are the primary area of involvement in over 70% of cases, followed in relative frequency by the medial canthus, upper lid, and lateral canthus.1 Characteristically, basal cell carcinomas are non-metastasising tumours which have, however, a great tendency to recur. Medial canthal lesions, which account for the second most common site of this tumour in its primary form, can spread deeply into the orbit and sinuses, eventually requiring exenteration for cure. A recurrence in this area can thus be especially devastating.

In treating eyelid tumours the considerations are many and varied. The usual principles of cancer surgery, to obtain an adequate margin of normal tissue about a malignancy, may partly give way to anxiety about cosmetic appearance and preservation of lacrimal and lid functions and their overall effects on the globe.

Periocular basal cell carcinomas are treated by a wide variety of methods and medical practitioners. Surgical excision, cryosurgery, curtailage-electrodesiccation, radiotherapy, and Mohs' surgery all have their proponents and all are said to have five-year cure rates better than 90%.2,3 Many studies have shown that a lesion which has had prior treatment, regardless of what treatment, has a greater incidence of subsequent recurrence than a primary tumour.4,5 The observation has been made by previous investigators that basal cell carcinomas which have received radiation therapy as their primary form of treatment recur at a higher rate and become more aggressive subsequently than tumours treated by different means.6,11

Because of our clinical impression that many recurrent medial canthal lesions we were treating had previously received radiation therapy, and because we found these tumours to be more aggressive and destructive, we decided to perform a retrospective study of eyelid basal cell carcinomas and to study the previously radiated lesions.

Materials and methods

A retrospective analysis of 631 consecutive cases of biopsy proved basal cell carcinomas of the eyelids was performed. Approximately half were primary lesions and half had been previously treated. Fifty five cases (59 lesions) were of recurrent tumours whose primary form of treatment had been radiation therapy. The majority of these patients had definitive treatment performed by Mohs’ operation (PR),
conventional surgery (BS), or a combination of these. The following parameters were examined: (1) patient’s sex and age, (2) location of lesion, (3) time from previous therapy to recurrence, (4) recurrence rate after definitive surgery. The average follow-up time was 6-1 years. Neither the original size of the tumours (in recurrent cases) nor the methods, dosage, or exact techniques of radiation were available for comparison in all charts.

**Results**

Overall for the 631 lesions a five-year cure rate of 98·1% for primary tumours and 93·6% for recurrent tumours was achieved. See Tables 1 and 2.

In the group of 55 patients (59 lesions) that had received radiation therapy as the primary form of treatment there were 25 males with an average age of 63-3 years (range 35–85 years) and 30 females with an average age of 62-5 years (range 37–86 years). The average time from radiation therapy to recurrence was 5-3 years (range 6 months–20 years). The radiation dose given these patients averaged close to 4000 rads (range 1000–6000 rads) and treatment was fractionated over 6–29 sessions. Again, data on the exact specifics of radiation techniques were not available in all the charts.

The location of these postirradiated recurrent lesions was as follows: 42 medial canthus, 4 lateral canthus, 8 upper lid, 5 lower lid. After definitive surgery 7/59 lesions recurred again (11·9%); all seven were located in the medial canthus, and three of these patients have required exenteration. Medial canthal lesions were further studied. There were 243 tumours located at this site: 127 were primary, untreated tumours. In this group there have been six recurrences (4·7%). One hundred and sixteen lesions had received previous therapy. Eleven recurrences were seen in this group (9·5%). The group of 116 medial canthal basal cell carcinomas that had received some prior therapy was further analysed. Seventy four lesions in this group had been treated by methods other than radiation therapy, and four recurred (5·4%). In the 42 radiated medial canthal tumours there were seven recurrences (16·7%).

The following cases are representative.

**Case 1.** Fig. 1 shows a recurrent previously irradiated basal cell carcinoma in the lower lid to medial canthus area.

Note the surrounding telangiectasis characteristic of a radiodermatitis. Fig. 2 shows the extent of surgery required to achieve a tumour free field. The

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**Table 1** Basal cell carcinomas five years after definitive surgery

<table>
<thead>
<tr>
<th>Eyelids, all sites</th>
<th>Recurrence rate</th>
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<tbody>
<tr>
<td>Primary lesions (n=318)</td>
<td>1·9% (n=6)</td>
</tr>
<tr>
<td>Prior treatment (n=313)</td>
<td>6·4% (n=20)*</td>
</tr>
</tbody>
</table>

*p=0·008.

**Table 2** Basal cell carcinomas five years after definitive surgery

<table>
<thead>
<tr>
<th>Medial canthus (n=243)</th>
<th>Recurrence rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary lesions (n=127)</td>
<td>4·7% (n=6)</td>
</tr>
<tr>
<td>Prior treatment (n=116)</td>
<td>9·5% (n=11)*</td>
</tr>
<tr>
<td>Prior treatment (n=116)</td>
<td>9·5% (n=11)*</td>
</tr>
<tr>
<td>No radiation (n=74)</td>
<td>5·4% (n=4)</td>
</tr>
<tr>
<td>Radiation (n=42)</td>
<td>16·7% (n=7)†</td>
</tr>
</tbody>
</table>

*p=0·22. †p=0·09.
lacrimal system had to be sacrificed but the globe was saved.

Case 2. Fig. 3 shows a recurrent postirradiated medial canthal basal cell carcinoma. This tumour is fixed to the underlying bone and distorts the canthal anatomy. To get to an area devoid of cancer cells not only was an exenteration required (the medial rectus and conjunctiva were also infiltrated with tumour) but part of the patient’s nose and frontal bone had to be sacrificed (Fig. 4).

Discussion

The clinician has a much better chance of totally eradicating a tumour by treating it aggressively in its primary, virgin state. The chance for successful long term cure after recurrence is considerably less. Irrespective of the mode of treatment, recurrence rates for primary lesions range from 1 to 8%. Kopf and associates\textsuperscript{12} in a study of curettage-electrodesiccation treatment of primary basal cell carcinomas found a 94% five-year cure rate but noted this was considerably less for head and neck (including eyelid) tumours. Eyelid basal cell carcinomas treated by radiation therapy are reported to have a 92–95% five-year cure rate.\textsuperscript{13–15} These figures closely approximate the 94% cure rate achieved by Fraufelder and associates\textsuperscript{7} in their cryosurgical treatment of eyelid basal cell carcinomas. In this report one notes that lesions less than 10 mm in diameter had a 2% recurrence rate, while for tumours greater than 10 mm in diameter the recurrence rate increased to 9–5%. Concerning conventional surgery, Aurora and Blodi\textsuperscript{16} found that 23% of cases had incomplete tumour excision. Gooding et al.\textsuperscript{14} have shown that in cases of marginal extension of tumour one-third will recur. Chalifin and Puterman\textsuperscript{1} have noted surgical recurrence rates ranging from 0 to 20%, reflecting what they believe to be differences in surgical technique. These authors recommend excision under frozen section control as the primary form of treatment. Doxanas et al.\textsuperscript{17} reported that out of 126 cases of surgically excised tumours without frozen section monitoring of margins a recurrence rate of 5–5% was seen. For 39 other cases in which frozen section control was employed no recurrences were noted. Bart and his associates\textsuperscript{18} found a 93–2% cure rate for 486 cases of primary basal cell carcinoma treated by surgical excision with primary closure. Concerning chemosurgery, Robins\textsuperscript{8} has found a 98–2% five-year cure rate for primary basal cell carcinomas treated by this method.

For previously treated tumours the cure rate decreases and recurrences of up to 25% have been reported.\textsuperscript{8,20} A 16% recurrence rate for previously treated eyelid basal cell carcinomas versus a 10% recurrence rate for primary tumours was reported by Payne et al.\textsuperscript{21} Dizon and associates\textsuperscript{22} reported on 12 patients with 20 recurrent eyelid basal cell carcinomas: eight of these 20 lesions were located in the medial canthus, which is about double the normal rate one would expect for primary medial canthal lesions. Menn et al.\textsuperscript{1} studied 100 recurrent, retreated basal cell carcinomas and found that almost 50% recurred again following treatment. According to Kaplin and Zarem\textsuperscript{23} 86% of all primary basal cell carcinomas occur on the face, but 94–5% of all recurrent lesions are found there, especially in the nasal and periorbital areas. Mora and Robins\textsuperscript{10} in a study of 848 cases of basal cell carcinoma found that location at the centre of the face, including eyelids, accounted for over one-third of the total number seen.
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and that these tumours were more invasive, more destructive, and more difficult to treat than those at other sites.

Concerning medial canthal lesions, McGregor in a study of 88 basal cell carcinomas of the inner canthus treated by cold steel surgery found a recurrence rate of 3-6%. Aurora and Blodi found that extensive basal cell carcinomas were 1-5 times more frequent in the inner canthus and that radiotherapy as compared with excision gave a higher recurrence rate. Cobett reported a 20-5% re-recurrence rate after surgical excision for primarily irradiated lesions. Abraham and co-workers noted a 10% recurrence rate for radiated medial canthal basal cell carcinomas versus a 7-4% recurrence for surgically treated tumours. Taylor and Barisoni also found a lower recurrence rate for surgically excised basal cell tumours as opposed to those treated by other methods, including radiation, in which a 17% recurrence rate was found. The periorbital region was found to be the area with the highest recurrence rate by these investigators.

The medial canthus is an area of complex anatomy which requires thorough familiarity and skill in order to perform adequately the required tumour debulking and reconstructive procedure. Clinicians not so versed in these operations might shy away from treating cancers in this area and refer the patients for radiotherapy, which they might regard as allowing for better cosmetic results. This may explain why the majority (42/59=71.2%) of the radiated lesions were medial canthal. Perhaps also the medial canthal tumours were the larger ones, further instilling fear in the prospective surgeon. If this latter point were true, then a size difference alone can perhaps account in part for a higher recurrence for medial canthal lesions.

The possible reasons why tumours recur are essentially three: (1) inadequate therapy, with part of the tumour being left behind; (2) multicentricity of origin, with new crops of tumour cells at different areas; and (3) the therapy given induced new tumour formation. All these factors have to be considered, but for radiation therapy the last is the more likely possibility as compared with the other treatments. Hirshowitz and Mahler postulate a tumour-host relationship which may be weakened by radiotherapy, thereby breaking down barriers to tumour spread. Ceilley and Anderson believe that any previous therapy, but especially radiotherapy, may disturb the protective barrier offered by the periosteon and allow for bony cancerous involvement. Perhaps also radiation effects on the skin cause fibrotic changes and irregular dermal planes which allow easier egress for tumour micrometastases.

Conclusion

The data we have presented, though not statistically significant, are certainly suggestive of a trend. We believe they support the view that recurrent lesions are more aggressive and have a higher re-recurrence rate than primary lesions, and that previously irradiated tumours recur at a higher rate than lesions treated by other methods.

As noted previously, we do not have the original sizes of the tumours nor the exact techniques of radiation for all patients studied; these factors can obviously influence the results. We therefore do not want wholeheartedly to condemn radiation therapy, but do consider that medial canthal basal cell carcinomas, because of their higher recurrence rate and greater propensity to invade the orbit, should be treated in such a way that tissue can be sampled to assure adequacy of therapy, such as by Mohs' operation or excision monitored by frozen section control.

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References

14 Bart RS, Kopf AW, Petratos MA. X-ray therapy of skin cancer.


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