ORIGINAL ARTICLES

The treatment of periocular basal cell carcinomas by radiotherapy

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Abstract

Experience in the treatment of periocular basal cell carcinoma is described. Excellent local control rates and minimal morbidity have been achieved in a series of 128 tumours occurring in 127 patients with a minimum 3 year follow-up.

The role of radiotherapy in the management of skin cancer is well established,¹ but the management of basal cell carcinoma of the eyelid is controversial. There is a reluctance among some ophthalmologists to refer patients for radiotherapy because of the fear of serious complications and a high failure rate. This is undoubtedly due to the calamities attendant on the use of radiotherapy in the early part of this century. An analysis of a series of 127 patients treated by a standard 5-day course of outpatient superficial radiotherapy reveals a 100% local control rate with a minimum 3-year follow-up. The minor complication rate was low and there were no serious complications. The cosmetic result was generally good and probably better than surgery could have achieved, particularly when lid reconstruction would have been required for larger lesions. A review of the literature indicates comparable results. Radiotherapy provides a safe simple outpatient alternative to surgery. Anaesthesia and highly skilled reconstructive surgery can be avoided in an often elderly group of patients.

Materials and methods

We report on a series of 127 patients referred to the Sussex Radiotherapy and Oncology Centre, Royal Sussex County Hospital, Brighton between 1974 and 1988. One hundred patients were previously untreated, eight had histologically incomplete excisions, and 19 had frank post-surgical recurrences. The diagnosis was not considered in doubt by the referring clinician or radiotherapist in the eight remaining cases.

Table 1 shows the regional distribution of the tumours and Table 2 the age distribution. Table 3 shows the size distribution of the lesions.

All our patients were treated with a standard fractionation regimen and each lesion was treated with a dose of 3400 cGy given in five consecutive daily fractions of 680 cGy using a 90 keV beam. A minimum margin of 0.5 cm around the visible lesion was employed and the underlying eye was

Table 1 Basal cell carcinoma. Distribution of 128 lesions in 127 patients

Site	Number	Percentage
Upper lid	1	<1
Lower lid	79	61.8
Medial canthus	36	28.1
Lateral canthus	12	9.3
Total	128	100.0

Table 2 Basal carcinomas of eyelids and canthi. Age incidence of cases

Average age	62.5
Youngest	40
Oldest	94
52 of 127 patients (40.6%) were older than 75 years	

Table 3 Size of lesion by largest diameter

Size	<1 cm	1 cm	1.5 cm	2.0 cm	2.5 cm	>3.0 cm
Number of lesions	40	37	24	19	7	1

protected with a lead internal eyeshield (Figs 1 and 2).

The majority of lesions were 2.0 cm or less in diameter and ideally suited to this particular treatment schedule. Lesions more than 3.0 cm would require more protracted treatment courses in order to achieve the best tumour control with acceptable morbidity. Table 4 shows how our

Figure 1 Showing treatment set-up and shielding of contralateral eye when irradiating a lesion at the medial canthus.

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Figure 2 Acrylic coated lead internal eyeshield employed to protect the eye.

local control and recurrence-free rates compare with other radiotherapy series. Figure 3 illustrates a typical pre- and post-treatment result.

Complications

In 1948 Duke-Elder and Parsons stated that, for eyelid tumours, excision should be the rule and radiation the exception,⁵ however, by 1974 these views had profoundly altered and they considered⁶ that 'excision or radiotherapy are probably equally effective when efficiently carried out.' It is undoubtedly the fear of radiation complications that is the main reason for preferring surgery to radiation therapy. In our series complications of treatment have been minimal and are listed in Table 5.

Moderate skin changes and epilation are viewed as equivalent to a surgical scar and are not considered as complications. Ectropion is often present before treatment and epiphora is frequently seen at presentation with lesions of the medial canthus. Two of our patients developed canalicular stenoses following treatment of lesions involving the lower punctum and canaliculus which would have required excision of these structures had surgery been undertaken. Mustarde^{7,8} has stated that in reconstructive surgery of the medial canthus it is possible to remove the lacrimal passages completely without epiphora, which is only likely to occur in the presence of conditions causing excessive tear formation such as a high wind, excessive exposure of the conjunctiva, and inflammatory conditions involving the lid margin, conjunctiva, cornea or lacrimal sac. Keratinisation of the

Table 4 Local control

Series	No irradiated	Treatment failures	No of recurrences controlled by re-irradiation	NED 4 years or longer
Brighton	128	0		93/93 (100%)
Hahnemann ²	444	20	2	426/444 (95.9%)
RMH ¹	630	39		590/630 (94.3%)
PMH ⁴	1062	53		1009/1062 (95%)

RMH=Royal Marsden Hospital.
PMH=Princess Margaret Hospital, Toronto.

Fig 3A

Fig 3B

Figure 3 Tumour before radiotherapy (A) and after treatment (B) showing excellent tumour response and good cosmetic result.

tarsal conjunctiva occurred in 7% of cases. It is potentially a much greater problem when the centre of the upper lid is affected as the keratin plaque may abrade the cornea and patients may require a haptic contact lens to protect the cornea.

Despite the above list of potential complications the results from radiotherapy are excellent both in terms of tumour control and cosmetic result as shown in Table 6.

Prevention of complications

Patients who have an eyelid tumour irradiated invariably develop a radiation reaction in the treated area. While this reaction ultimately subsides the related bulbar conjunctiva and the cornea may be affected despite the presence of a lead contact lens during treatment. Antibiotic

Table 5 Complications of treatment

Complication	PMH	RMH	Brighton
Lid necrosis	—	2.9%	—
Epiphora	27%	—	2.5%
Keratinisation	21%	5.6%	7%
Cataract	11%	0.8%	—
Corneal ulceration	—	1.6%	—
Ectropion	36%	—	<5%
Skin atrophy	64%	—	16%

Table 6 Cosmetic result

	PMH		Brighton	
	1 year	5 years	1 year	5 years
Excellent	323	107	115	86
Good	23	23	4	2
Fair	19	7	3	1
Poor	23	1	—	—
Not known	117	367	6	39

Table 7 Surgical series

	No treated	Frozen section	Recurrence rate	Local control
Doxanas ¹¹	165	39	0	100%
Payne <i>et al</i> ¹²	273	0	7/126 42/199	94.5% 79%
Collin ⁹	261	0	3/176 after primary surgery	at 6/12 95.8% 6 dead
Chalfin ¹³	53	53	0	100%
Frank ¹⁰	165	165	3	97.8%

eyedrops are routinely employed to avoid any infection, particularly in those cases where an internal eyeshield has been employed.

Discussion

The results of treatment in our series reveal no recurrences thus far in a group of patients who have been treated in identical fashion with meticulous attention to the treatment set-up. For small lesions of T1 category, of which there were 101 in our series, we would argue that radiotherapy is the treatment of choice. However it is also this group^{7,8} who are suitable for an operation not requiring major plastic reconstruction. However our remaining patients, many of whom were elderly, would have required plastic reconstructive procedures with all that that entails in terms of availability of the requisite surgical skills and the surgical risks to the elderly frail patient.

Table 7 records some of the major surgical series. In three of these frozen section control of the margins was undertaken adding considerably to the duration of the procedure. In Collin's series⁹ 71.2% of patients had either a flap or a graft procedure, yet 96% of the lesions were T1 by stage and eminently suitable for local radiotherapy; Frank,¹⁰ in her series employing frozen section control, used flaps or grafts in more than 50% of cases. The results of both radiotherapeutic and surgical treatment are similar but, in view of the complexity of the surgical procedures that have to be employed even for small radiocurable tumours, we would submit that radiotherapy when performed with meticulous attention to the tumour margins and with every care taken to minimise morbidity is the treatment of choice for the majority of basal cell carcinomas of the eyelid, though surgery has an important role in the management of upper eyelid lesions and extensive tumours at the medial canthus whose deep margins may be assessable only at surgery. These tumours if they recur may spread deeply into the orbit and sinuses necessitating exenteration for cure.¹⁴ The patients' interests are best safeguarded by ensuring close collaboration between ophthalmologists, plastic surgeons, radiotherapists, and dermatologists so that therapeutic approaches based on a partisan approach are avoided if possible. Each tumour must be judged on its merits and the most appropriate modality for each patient carefully decided.

Recurrence after previous radiotherapy

should be treated surgically as the risk of radiation necrosis is excessive. However Lafontan *et al*^{15,16} using interstitial radiotherapy techniques have successfully treated radiation failures, but this technique is not readily available and requires considerable expertise.

The rare lesion in the middle third of the upper eyelid constitutes a relative contraindication to radiation due to the probable risk of tarsal keratinisation and the risk of corneal damage and we do not routinely irradiate these lesions. However if a lesion on the upper lid is sufficiently large to require an extensive plastic procedure then radiotherapy becomes an attractive alternative, as keratinisation does not invariably ensue and a contact lens may suffice to protect the cornea adequately. If the eyelid tumour is related to a damaged or abnormal cornea the risk of further damage to the cornea from irradiation changes in the eyelid should lead one to consider surgery as the favoured treatment. The advanced basal cell carcinoma with bone involvement is rarely eradicated by radiotherapy and is best treated by a course of radical radiotherapy followed by radical surgery.

Conclusion

Our data show meticulously planned superficial radiotherapy to be a highly effective treatment for periocular basal cell carcinoma with excellent control rates and minimal morbidity in often elderly patients. We do not dismiss surgery but regard surgery and radiotherapy as complementary modalities.

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