ORIGINAL ARTICLES – Clinical science

Treatment of non-resectable malignant iris tumours with custom designed plaque radiotherapy

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Abstract

***Background*—Plaque radiotherapy is the most common method of managing posterior uveal melanoma but its use for iris melanoma and iris metastases has not yet been evaluated.**

***Methods*—Fourteen patients with non-resectable iris melanoma and four with iris metastasis were treated with plaque radiotherapy. The tumour response to treatment and the local side effects of the radioactive plaque were evaluated.**

***Results*—In the iris melanoma group over a mean follow up of 26 (range 6–75) months, the tumour regressed in 13 of the 14 patients (93%) and recurred as diffuse seeding in one patient (7%). Despite large doses of radiation given transcorneally, the cornea developed epitheliopathy, abrasion, and oedema in only one case each. The major radiation side effects were localised iris vasculopathy without glaucoma in two cases, posterior synechiae in five cases, and cataract in six cases. In the iris metastasis group, tumour regression was observed in all four patients (100%) and radiation side effects were not evident over the relatively short mean follow up period of 8 (range 4–9) months. All of the 14 patients with irradiated iris melanoma have remained systemically healthy without metastasis while three of the four patients with irradiated iris metastases have died of metastases from the primary neoplasm.**

***Conclusion*—Custom designed plaque radiotherapy appears to be an effective alternative method of controlling non-resectable diffuse iris melanoma and solitary iris metastasis and has relatively few side effects.**

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The philosophy regarding the management of melanocytic iris lesions has gradually evolved towards more conservative treatment.[1–15] In general, a non-growing iris melanocytic tumour is managed by observation, followed by local resection if growth is documented. An iris melanoma that has a diffuse growth pattern and secondary glaucoma is usually managed by enucleation. To our knowledge, plaque radiotherapy has not been employed in the management of iris melanoma despite its frequent and successful use in the management of posterior uveal melanoma.[16–20] Perhaps the fear of the complications of radiotherapy on the cornea, lens, and other visually vital structures has precluded the use of radiation for the more anteriorly located tumours.

Plaque radiotherapy was initially introduced for use in retinoblastoma and later evolved for use in choroidal melanoma.[16] We have been employing plaque radiotherapy for intraocular tumours for almost 20 years and we have noticed the tolerance of the sclera to high radiation doses greater than 40 000 cGy in most cases. Even in cases of anterior ciliochoroidal tumours, the corneoscleral tissues have demonstrated a remarkable resistance to the radiation. Because of these observations, we began cautiously to employ plaque radiotherapy in selected patients with non-resectable iris melanoma who declined enucleation and in patients with solitary iris metastasis who did not wish to undergo external beam radiotherapy or chemotherapy. This report details the indications, tumour

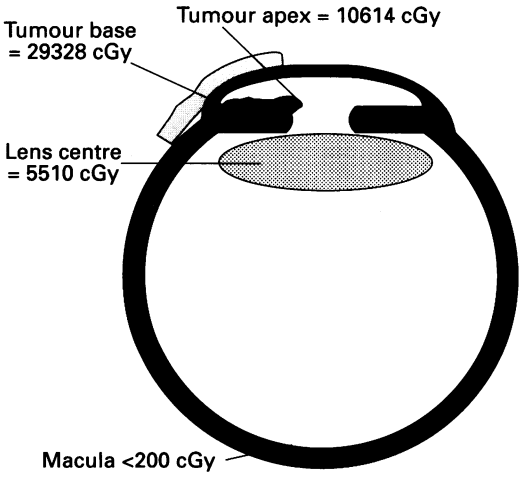

Figure 1 Schematic cross sectional diagram of a globe with a diffuse melanoma (black shading) on the anterior iris stoma treated by episcleral plaque radiotherapy (grey shading) placed on the eye over the corneoscleral limbus. The average calculated radiation doses to the various intraocular structures are indicated.

control, and side effects of plaque radiotherapy for non-resectable iris melanoma and iris metastasis.

Patients and methods

We extracted from our computerised diagnostic files all patients with iris melanoma and iris metastases who were managed on the Ocular Oncology Service at Wills Eye Hospital between 1 February 1974 and 1 August 1993. All charts with the diagnosis of iris melanoma or iris metastasis were reviewed for the methods of treatment and those patients managed with plaque radiotherapy were selected for further study. The specific patient data included age, race, sex, and eye involved. The preoperative ocular data included visual acuity, intraocular pressure, tumour diagnosis, tumour dimensions (base and thickness in mm), tumour quadrant location (superior, superonasal, nasal, inferonasal, inferior, inferotemporal, temporal, superotemporal). The tumour base was measured in two dimensions: the circumferential extent in the iris measured by arc and chord mm and number of clock hours involvement and the radial extent in the iris (anterior margin to the pupil, midzone, or iris root and posterior margin to the pupil, midzone, or iris root). The presence of tumour seeds in the anterior chamber angle and the clock hour involvement of the seeds were recorded. The method of preoperative histopathological confirmation of the diagnosis such as fine needle aspiration biopsy or open biopsy was recorded.

The specific plaque data included reason for the use of plaque radiotherapy, size of plaque, radioactive isotope, and shape of the custom designed plaque (round or curvilinear [boomerang shaped]), radiation dose and rate to the tumour base, tumour apex, corneal epithelium, corneal endothelium, and lens centre and the hours of treatment to achieve the dose (Fig 1).[20] The radiation isodose curves were designed to treat the tumour base with 2 mm of tumour-free margin on all sides and to a depth estimated from the distance of the furthest portion of the tumour from the endothelium in the dilated state. Details regarding symptoms, corneal abnormalities, anterior segment inflammation and synechia, hyphaema, hypotony, glaucoma, iris abnormalities, cataract, retinopathy, and optic neuropathy were collected at the time of plaque application, within 72 hours of plaque removal, 1 month after treatment, 6 months after treatment, and at the most recent examination. The final visual acuity and the reason for the visual loss as well as the systemic status of the patients were documented.

Results

There were 568 patients with the clinical features of iris melanoma and 41 patients with iris metastases evaluated on the Ocular Oncology Service over the time period of this study.

Table 1 Summary of the clinical features of 18 patients with malignant iris tumours treated with plaque radiotherapy

Tumour features	*Iris melanoma (n=14)*	*Iris metastases (n=4)*
Growth pattern		
Nodular	0	1
Diffuse	14	3
Circumferential iris involvement (clock hours)		
Mean	4	3
Range	2–7	2–4
Radial iris involvement (by region)		
Root	14	4
Midzone	13	4
Pupil	6	0
Tumour thickness (mm)		
Mean	3	3
Range	1–4	2–4
Tumour seeds in anterior chamber angle		
Present	12	1
Absent	2	3
Tumour seed involvement in angle (clock hours)		
Mean	6	4
Range	3–12	4
Tumour related elevated intraocular pressure		
Yes	8	1
No	6	3
Biopsy proved diagnosis		
Yes	8	4
Needle biopsy	4	4
Open biopsy	4	0
No	6	0

IRIS MELANOMA

Plaque radiotherapy was used to treat 14 (2%) of 568 patients with the clinical diagnosis of iris melanoma. The mean age of the patients was 57 years and 12 were male, two female. All patients were white. The preoperative visual acuity was 6/6 in nine cases, 6/9 in three cases, 6/60 in one case, and hand motions in one case. The mean intraocular pressure was 21 mm Hg (range 10–40 mm Hg). Secondary

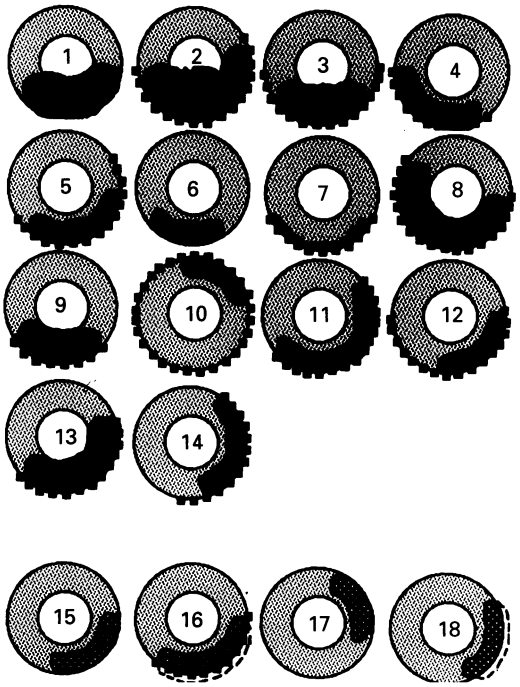

Figure 2 Schematic diagram illustrating size and location of 14 cases of diffuse iris melanoma (above) and four cases of solitary iris metastasis (below). The extent of tumour involvement is indicated by the circumscribed black pattern on the schematic iris and the extent of angle seeding is indicated by black squares at the region of the anterior chamber angle. Ciliary body involvement in two cases of iridociliary metastasis is indicated by a broken line and was included in the radiation field. (The case numbers in this figure correspond directly to the case numbers in Table 2.)

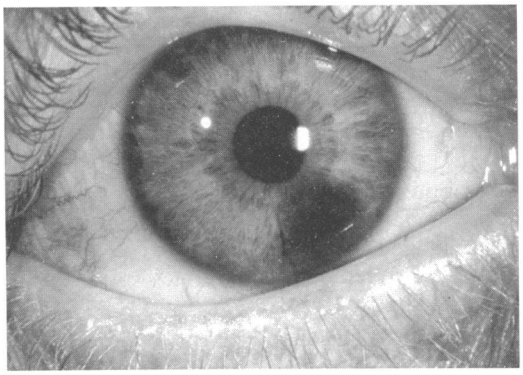

Fig 3A

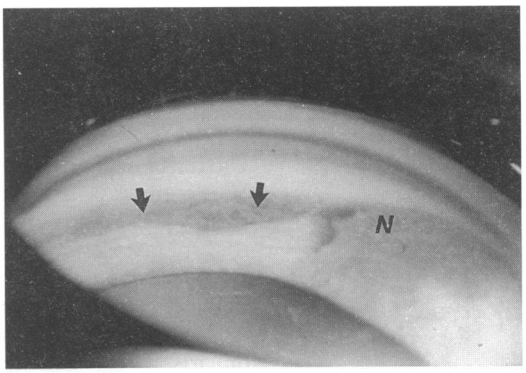

Fig 3B

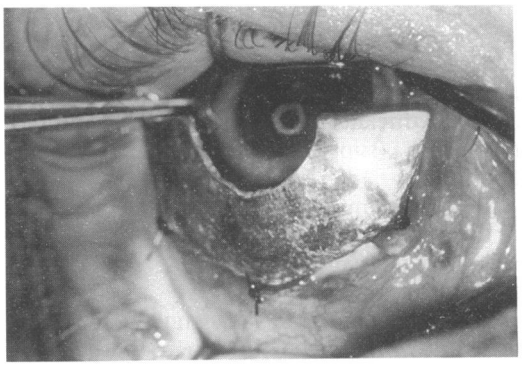

Fig 3C

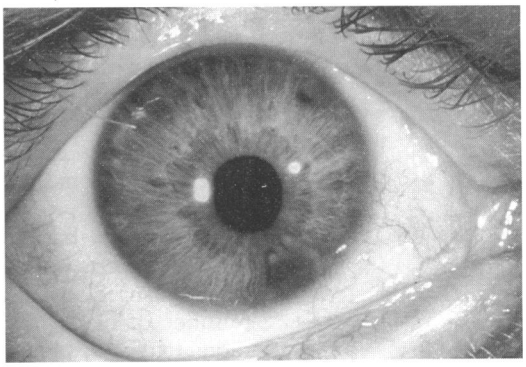

Fig 3D

Figure 3 (A) Growing tapioca iris melanoma with a nodule inferonasally and fine iris stromal seeding visualised best with biomicroscopy. (B) Extensive irregular anterior chamber angle seeding (arrows) adjacent to the tumour nodule (N). (C) Boomerang shaped radioactive iodine plaque sutured onto the eye. (D) Thirty five months after treatment the tumour and angle seeds are regressed. The anterior segment structures are without side effects

intraocular pressure elevation due to tumour involvement of the angle structures was present in eight cases (57%).

In all cases the tumour exhibited a diffuse growth pattern (Table 1). In nine cases it was elevated and multilobulated and measured up to 4 mm in thickness. In the remaining five cases the lesion assumed a relatively flat growth pattern. The mean tumour thickness was 3 mm (range 1–4 mm). The tumour involved the inferior quadrant in six cases, inferonasal in six, inferotemporal in none, temporal in one, superotemporal in one, superior in none, and superonasal quadrant in none. All tumours involved the iris root as their most posterior margin and the anterior margin extended to the pupil in six cases, midzone in seven cases, and remained localised at the iris root in one case (Fig 2).

Tumour seeding into the anterior chamber angle beyond the main tumour was present in 12 cases (86%) and the extent of angle involvement averaged a mean of 6 clock hours (range 3–12 clock hours). Confirmation of iris melanoma was made by fine needle aspiration biopsy in four cases and open biopsy in four cases.

The primary reason for plaque radiotherapy was extensive diffuse flat or multinodular involvement of the iris or angle (Figs 2–4) by growing melanoma in all 14 cases and in all

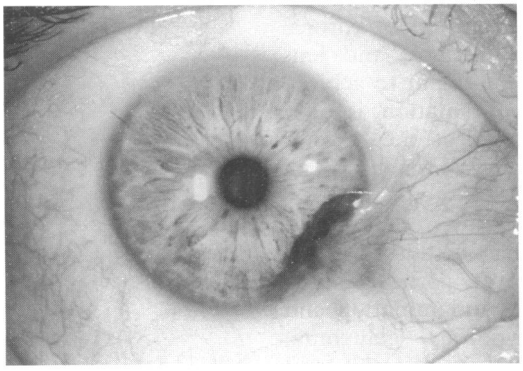

Fig 4A

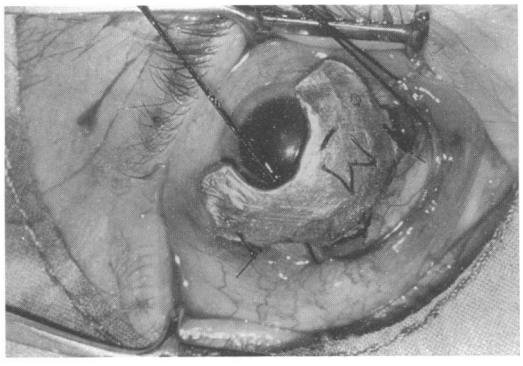

Fig 4B

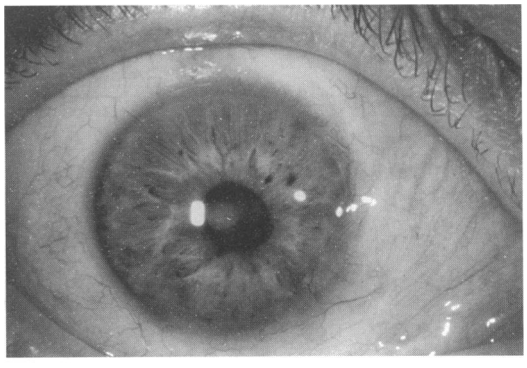

Fig 4C

Figure 4 (A) Extensive iris melanoma involving the peripheral iris and angle. (B) Treatment with custom designed radioactive plaque. (C) Regression of the tumour at 30 months after treatment. Posterior synechia developed as a radiation side effect.

Table 2 Clinical features in 18 patients with nonresectable iris malignancies treated with plaque radiotherapy

Patient No	Diagnosis	Quadrant	Isotope	Plaque shape	Treatment (hours)	Radiation dose (cGy)		Radiation problems	Tumour status (months follow up)
						Base	Apex		
1	MM	Inferior	Iodine	Curvilinear	97	30 000	10 400	None	Regressed (20)
2	MM	Inferior	Iodine	Curvilinear	100	30 000	9 200	None	Regressed (19)
3	MM	Inferior	Iodine	Curvilinear	98	41 900	9 000	CA, CO, PS	Regressed (10)
4	MM	Inferonasal	Iodine	Curvilinear	104	18 700	9 000	None	Regressed (13)
5	MM	Inferonasal	Iodine	Curvilinear	60	15 000	9 000	CS, CAT, PS, FV	Regressed (50)
6	MM	Inferior	Iodine	Curvilinear	121	30 000	9 600	None	Regressed (11)
7	MM	Inferior	Iodine	Curvilinear	102	30 000	11 200	CAT	Regressed (11)
8	MM	Inferior	Iodine	Curvilinear	100	35 000	9 000	None	Regressed (6)
9	MM	Inferonasal	Iodine	Curvilinear	86	30 000	11 500	CAT PS	Regressed (34)
10	MM	Superotemporal	Iodine	Round	132	30 000	11 200	H	Regressed (36)
11	MM	Inferonasal	Iodine	Curvilinear	98	22 000	9 000	None	Regressed (21)
12	MM	Inferonasal	Iodine	Curvilinear	71	33 000	20 000	CAT	Regressed (45)
13	MM	Inferonasal	Iodine	Round	57	35 000	9 500	CAT, PS, H, AC, FV	Regressed (75)
14	MM	Inferonasal	Iodine	Curvilinear	120	30 000	11 000	CAT, PS, H	Regressed (13)
15	Met	Inferonasal	Iodine	Curvilinear	73	22 000	6 000	None	Regressed (9)
16	Met	Inferior	Ruthenium	Round	89	37 000	9 200	None	Regressed (9)
17	Met	Superotemporal	Iodine	Round	44	7 700	4 000	None	Regressed (9)
18	Met	Temporal	Iodine	Round	65	22 000	5 000	None	Regressed (4)

The case numbers correlate directly with the case numbers in Figure 2.
MM=malignant melanoma; Met=metastasis; AC=anterior chamber inflammation; CA=corneal abrasion; CO=corneal oedema; CS=corneal spk; CAT=cataract; FV=focal iris vasculopathy; H=hyphaemia; PS=posterior synechia.

cases the only other option of treatment was enucleation which the patients preferred to avoid. In one case the patient's other eye had a visual acuity of 6/60 from childhood trauma and it was strongly preferred to save his better seeing eye with the iris melanoma. The plaque shape was custom round in two cases and custom curvilinear (boomerang shaped) in 12 cases (Figs 3, 4) (Table 2). Iodine-125 was the radioactive isotope in all 14 cases. The mean length of treatment was 96 (range 57–132) hours in an effort to give a mean dose of 29 328 (range 15 000–41 900) cGy to the base and 10 614 (range 9000–20 000) cGy to the apex of the iris melanoma. As a result of this dosimetry, the corneal endothelium received a mean of 29 328 (range 15 000–41 900) cGy and the lens centre 5510 (range 2600–9800) cGy. The radiation dose to the corneal epithelium varied greatly from a high dose directly under a radiation seed to a lower dose in the portion between seeds; therefore, calculation of a mean dose would be difficult and meaningless. The radiation dose to the optic nerve and foveola was less than 200 cGy in all cases. The radiation rate was 304 cGy/hour (tumour base), 117 cGy/hour (tumour apex), 304 cGy/hour (corneal endothelium), 61 cGy/hour (lens).

Table 3 Radiation related problems of 18 patients with malignant iris tumours treated with plaque radiotherapy placed directly over the anterior segment of the eye

Tissue effects	Iris melanoma (n=14)	Iris metastases (n=4)
Corneal effects:		
Epitheliopathy	1	0
Abrasion	1	0
Oedema	1	0
Necrosis/melt	0	0
Scleral effects:		
Necrosis/melt	0	0
Anterior chamber effects:		
Inflammation	1	0
Hyphaema	2	0
Radiation induced glaucoma	0	0
Iris effects:		
Posterior synechiae	5	0
Focal vasculopathy	2	0
Diffuse neovacularisation	0	0
Lens effects:		
Cataract*	6	0
Ciliary body effects:		
Hypotony	0	0
Retinal effects:		
Exudates	0	0
Intraretinal haemorrhage	0	0
Nerve fibre layer infarct	0	0
Macula oedema	0	0
Neovascularisation retina/disc	0	0

*Cataract extraction performed before diagnosis of intraocular tumour in one case of iris melanoma and one case of iris metastasis.

There were no immediate postoperative (0–72 hours) radiation related problems such as corneal abrasion, corneal oedema, uveitis, or hyphaema. The early radiation related problems occurred within the first 6 months, were all transient, and consisted of transient corneal abrasion in one, iritis in one, hyphaema in two (Table 3). One of the patients with hyphaema had preoperative hyphaema presumably from tumour vessels. The late radiation related problems, developing at 6 months or later, included corneal epitheliopathy in one case, localised corneal oedema in one, posterior synechia in five, focal vasculopathy and telangiectasia of the iris in two, and cataract in six cases. The corneal epitheliopathy healed with topical lubricants, the corneal oedema remained localised to the corneal periphery, and the iris vasculopathy remained stable without progression. Corneal necrosis, scleral necrosis, radiation induced glaucoma, chronic hypotony, radiation retinopathy, or radiation papillopathy did not occur. The radiation cataract was removed and an intraocular lens implant was placed without complication in two cases.

Over a mean follow up of 26 (range 6–75) months the final visual acuity was 6/6 in seven cases, 6/7·5 in one, 6/9 in one, 6/15 in one, 6/30 in one, 6/120 in one, light perception in one (Fig 5). The major reasons for vision of 6/15 or less included radiation cataract in three cases, recurrent hyphaema in one, corneal oedema with stromal vessels in one, and pre-existing chronic macular degeneration in one case. Antiglaucoma eyedrops were employed in eight cases, seven of whom had preradiotherapy tumour induced glaucoma (Fig 5B). All patients but one had tumour control and retention of the eye (Table 4). One patient developed progressive tumour seeding and glaucoma 14 months after plaque treatment and the eye underwent enucleation.

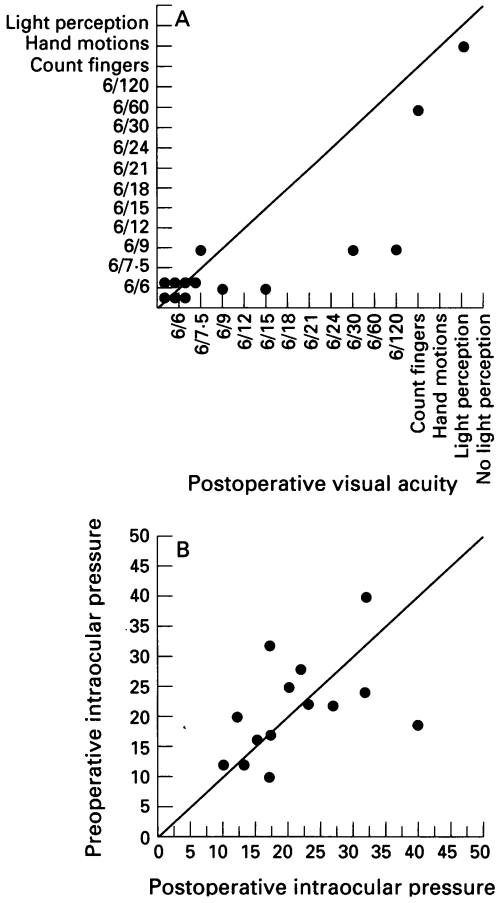

Figure 5 (A) Non-resectable iris melanoma managed by custom designed plaque radiotherapy: visual results. The diagonal line indicates no change in vision from the preoperative to the postoperative period. All points above this diagonal line indicate improved vision postoperatively and all points below this line indicate worsened vision postoperatively. In eight cases the postoperative visual acuity was the same or better than preoperative visual acuity. The six cases of worsened vision included: cataract (three), corneal oedema (one), hyphaema (one), posterior synechia (one). (B) Non-resectable iris melanoma managed by custom designed plaque radiotherapy: intraocular pressure results. The diagonal line indicates no change in intraocular pressure from the preoperative to the postoperative period. All points above this diagonal line indicate improved intraocular pressure postoperatively and all points below this line indicate worsened intraocular pressure postoperatively. Most points were located near the 'no change' diagonal line. Only one patient developed substantially elevated intraocular pressure postoperatively to 41 mm Hg from tumour regrowth.

There have been no tumour related metastases or deaths in this group.

IRIS METASTASIS

Plaque radiotherapy was used to treat four (10%) of 41 patients with iris metastasis. The mean age of the patients was 58 years and all four were white males. Fine needle aspiration biopsy was employed to confirm the diagnosis in all four cases and the primary site was adenocarcinoma of the lung in two cases, prostate cancer in one case, and cutaneous melanoma in one case. In three of four cases the patients presented with the iris metastasis before the discovery of the primary tumour and the needle biopsy was instrumental in this regard. The preoperative visual acuity was 6/6 in two cases, 6/9 in one case, and hand motions in one case. The mean intraocular pressure was 18 (range 8–31) mm Hg. Secondary tumour related intraocular pressure elevation occurred in one case.

In three cases the tumour growth pattern was diffuse and in one it was circumscribed (Table 1). The mean tumour base was 3 (range 2–4) clock hours and the mean tumour thickness was 3 (range 2·5–4) mm. The tumour quadrants involved included inferior in one case, inferonasal in one, temporal in one, and superotemporal in one. All four tumours extended from the iris root to the midzone. Tumour seeding into the anterior chamber angle was present in only one case and there were 4 clock hours of involvement.

Since the systemic evaluation by the general oncologist showed no evidence of metastasis elsewhere, the treatment preference was to use radiotherapy rather than chemotherapy. Plaque radiotherapy was selected because the metastasis was solitary in all four cases. The patient with prostatic carcinoma metastatic to the iris had already received many months of chemotherapy and hormonal therapy and was under control systemically.

The plaque shape was custom round in three cases and custom curvilinear (boomerang shaped) in two cases (Table 2). Iodine-125 was the radioactive isotope in three cases and ruthenium-192 in one case. The mean length of treatment was 68 (range 44–89) hours to achieve a mean dose of 22 000 (range 7700–37 000) cGy to the base and 6000 (range 4000–9000) cGy to the apex of the iris metastasis. The corneal endothelium received a mean of 22 000 (range 7700–37 000) cGy and the lens centre 2315 (range 440–3900) cGy. The radiation dose to the optic nerve and foveola was less than 200 cGy in all cases. The radiation rate was 323 cGy/hour (tumour base), 90 cGy/hour (tumour apex), 323 cGy/hour (corneal endothelium), 31 cGy/hour (lens).

There were no radiation related problems in this group of patients but the follow up was limited to a mean of 8 months (range 4–9 months) (Tables 2, 3). One patient was pseudophakic at the time of plaque application. The final visual acuity was 6/6 in two cases, 6/9 in one, and 6/12 in one case.

Table 4 Local tumour response and distant metastases in 18 patients with malignant iris tumours treated with plaque radiotherapy

	Iris melanoma (n=14)	*Iris metastases (n=4)*
Local tumour response		
Regression	13	4
Recurrence*	1	0
Systemic metastases		
Yes	0	4†
No	13	0
Follow up (months)		
Mean	26	8‡
Range	6–75	4–9

*The recurrence was treated with enucleation.
†The metastases were presumed to originate from the primary malignancy and not from the iris metastasis.
‡Three of the four patients with iris metastasis died of disseminated metastastic cancer and their follow up was limited.

Antiglaucoma measures were not necessary in any case. All patients had excellent tumour control and retention of the eye. Diffuse metastatic disease resulted in death from the primary cancer in three of the four patients.

Discussion

Over the past 50 years there have been several reviews on the clinical features of iris melanoma and the management of this intraocular tumour.[1-15] It is generally agreed that the classification of a pigmented iris stromal tumour into categories of iris naevus or iris melanoma can be difficult due to the overlapping clinical features of these tumours.[21-24] As a result, it is generally recommended that an iris pigmented lesion be initially observed at frequent intervals.[24] If growth is documented or if tumour seeding or secondary glaucoma ensues, then interventional treatment is suggested. In reviewing the past literature on management of iris melanoma, the conventional choices for interventional treatment included local resection or enucleation. Certainly in those eyes with small well circumscribed iris melanoma, local resection is advantageous. In those eyes with large or ill defined diffuse iris melanoma or those eyes with angle seeding or secondary glaucoma, enucleation has been advised.[25-28] In this study we have reported our results with plaque radiotherapy for large diffuse iris melanoma and we have shown that it is a reasonable alternative to enucleation in those cases.

Diffuse flat iris melanoma poses a diagnostic problem for the clinician because it evolves as a relatively flat lesion and closely resembles diffuse iris naevus. For this reason, we initially performed an open biopsy through clear cornea to confirm the diagnosis of iris melanoma immediately before plaque radiotherapy. Because of the possibility of tumour seeding through a larger incision, we more recently have performed fine needle aspiration biopsy in such cases. Our technique and results have been reported recently.[29] Diffuse iris melanoma also poses a therapeutic problem to the clinician as these tumours are usually extensive and the eyes are at risk of developing angle seeding and secondary glaucoma. The margins tend to be ill defined and local resection is not advocated in these cases. In many cases enucleation is the only alternative. In the 14 cases that we treated with plaque radiotherapy, we salvaged the eye in 13 cases (93%) and vision was preserved in most cases (Fig 5). In fact, final vision was 6/15 or better in 10 cases after a mean follow up of 26 months. As shown in Figure 5, most patients (eight cases) maintained the same or better vision postoperatively. In six cases the vision was decreased postoperatively and the visual decrease was mild ($\leq$2 lines) in three cases and moderate ($\geq$3 lines) in three cases. The reasons for mild decreased vision after plaque radiotherapy included radiation cataract in two cases and posterior synechia in one case. The reasons for moderate decreased vision included radiation cataract in one case, recurrent hyphaemia in one case, and corneal oedema in one case.

Despite large doses of radiation to the ciliary body and angle structures, the intraocular pressure remained relatively stable (Fig 5) except in one case in which the tumour became more extensive and infiltrated the angle causing worsening of the glaucoma and necessitating enucleation. In seven cases, the patients were treated with antiglaucoma drops preoperatively and postoperatively. In one additional case, antiglaucoma drops were added after radiotherapy because of slightly worsened glaucoma. Glaucoma filtering procedure was not performed, either before or after plaque radiotherapy.[28] Six patients did not require antiglaucoma measures of any type.

The cornea tolerated the high doses of radiotherapy. Only one patient developed corneal oedema and there were no cases of corneal melt. The most predictable problem after radiotherapy of iris melanoma was radiation induced cataract. This was observed to some degree in six of 13 patients with a crystalline lens. In two cases, cataract surgery and intraocular lens implant was performed after convincing tumour regression and in the remaining four cases, surgery has been postponed. Perhaps the most worrisome problem was radiation induced vasculopathy of the iris. Radiation induced iris vasculopathy was documented in two cases, but there were no cases of diffuse iris neovascularisation. The iris vasculopathy did not result in glaucoma, but it led to transient hyphaemia in both cases. Importantly, there were no cases of radiation retinopathy or optic neuropathy. The custom design of the radioactive plaque was structured to adequately irradiate the tumour and minimise radiation effects on the retina, optic nerve, and lens.

The tumour regression in the iris melanoma group differed from the iris metastasis group. In the iris melanoma group, the tumours showed slow shrinkage in the thickness and often base measurements over a several month period, similar to that observed with choroidal melanoma.[16] In patients with iris metastasis, the tumour rapidly regressed to a small remnant or disappeared with minimal residual scarring of the iris over a 1–2 month period. The use of plaque radiotherapy is theoretically advantageous over external beam radiotherapy for solitary iris metastasis because it spares excessive radiation to the orbit and remainder of the globe and the duration of treatment with plaque radiotherapy is much shorter than external beam radiotherapy. The average plaque duration for iris metastasis extended over a mean of $2^1/_2$ days compared with 5 weeks for external beam radiotherapy.

There were no cases of metastasis or death in the group of patients with iris melanoma, but we realise that the follow up is relatively short at a mean of 26 months.[30 31] Geisse and Robertson reviewed the literature on this subject and found an overall 3% incidence of metastasis from iris melanoma in 1043 reported cases.[9] The mean time between histopathological confirmation of iris melanoma to death in those 31 cases was 6·5 years (range 3 months–12 years). In 21 cases

information on the surgical procedure was available and in 13 of these cases (62%) the tumours were incompletely excised or the globe was inadvertently transected. Many of the incompletely resected tumours were diffuse iris melanoma that later came to enucleation for tumour regrowth. This emphasises the difficulty in local resection of diffuse iris melanoma and the need for complete tumour treatment with other modalities, such as plaque radiotherapy or enucleation.

In reviewing our experience with 80 histopathologically proved cases of iris melanoma, we found that older patient age, ill defined tumour margins, angle involvement with pigment or tumour, and secondary glaucoma were risk factors for metastases.[32] We also found a long delay of 68 months (mean) between iris melanoma and its metastasis. It is apparent that many of the patients in this present report had these risk factors and long term follow up will be necessary to evaluate for metastatic disease.

Our study is limited by the relatively small number of patients eligible for plaque radiotherapy treatment and with the overall short length of follow up. Considering the rarity of iris melanoma and iris metastasis, we believe that the small number is in reality a fairly good sample. We also know that most radiation complications occur within the first 12–24 months after plaque radiotherapy treatment[33]; therefore, the mean of 26 months follow up in this study may provide adequate assessment for at least the early complications. However, longer term follow up is necessary for systemic outcome. Despite the fact that the corneal complications were few, we suspect that the endothelial cell count and morphology may be disturbed. Without clinical findings we could not justify the added patient time and expense of endothelial cell testing, but this may prove useful in the future.

Plaque radiotherapy is the most common method of managing posterior uveal melanoma.[16] Reports suggest that plaque radiotherapy and charged particle radiotherapy for posterior uveal melanoma offer good tumour control and equivalent survival when compared with enucleation.[16–19] Our preliminary data suggest that the anterior segment of the eye tolerates plaque radiotherapy and treated iris melanoma and iris metastasis demonstrate convincing tumour regression. The use of this technique requires close cooperation between the ocular oncologist and experienced radiation oncologists who are familiar with treating ocular disease. We believe that plaque radiotherapy is a reasonable alternative to enucleation in the management of diffuse iris melanoma or iris melanoma with angle seeding and also an alternative to external beam radiotherapy in the management of solitary iris metastasis.

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