The National Centre for Stereotactic Radiosurgery

Sheffield Teaching Hospitals NHS
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Sheffield Ocular Oncology Service
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To Suture or Not To Suture? The Effect of Globe Immobilisation Technique on Clinical Outcomes in Stereotactic Radiosurgery for Uveal Melanoma

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Introduction

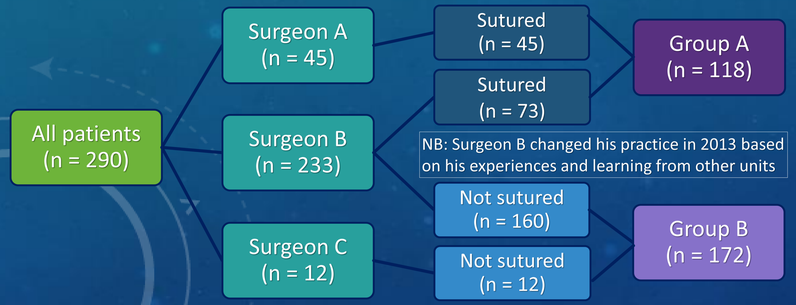
Stereotactic radiosurgery (SRS) is an effective treatment for uveal melanoma, offering excellent rates of local tumour control and eye preservation. Its efficacy relies upon accurate localisation of the tumour, which is challenging in the mobile eye. Various methods of globe immobilisation have been used; common practice is local anaesthetic block (retro- or peribulbar) with or without suturing of the extraocular muscles. Suturing is used to limit posterior globe movement during anaesthetic reabsorption. Some studies have shown that the addition of muscle suturing to the anaesthetic block provides better immobilisation of the globe, as measured by pre- and post-procedure imaging. However, controversy exists regarding the clinical relevance of this observation, and ocular oncologists differ in their choice of immobilisation technique.

Aim

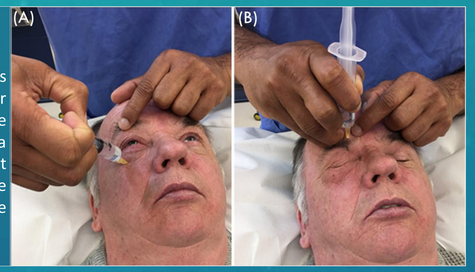
To compare clinical outcomes between patients who underwent extraocular muscle suturing during globe immobilisation and those who did not.

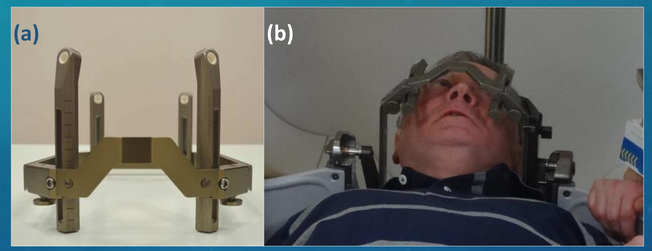
Methods

We performed a retrospective review of all cases that underwent gamma knife stereotactic radiosurgery for uveal melanoma over a 10 year period (May 2008 to May 2018) at our national centre. All patients received either local anaesthetic block plus muscle suturing (Group A) or local anaesthetic block alone (Group B) to induce globe akinesia. An example of the peribulbar anaesthetic injection technique is shown in images (A - inferotemporal) and (B - superionasal). The decision as to suture or not depended on surgeon preference (see flow chart below). Outcomes assessed were primary treatment failure, tumour recurrence, secondary enucleation and death rate.

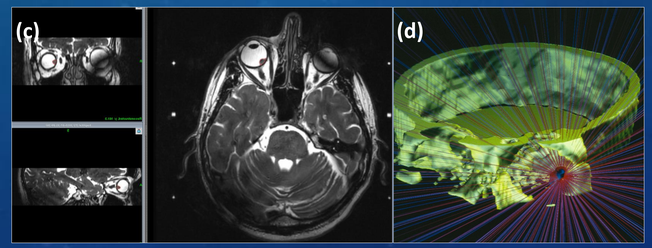


Ocular Immobilisation:
Local anaesthetic is injected by the ocular oncologist to induce total globe akinesia either with or without extraocular muscle suturing, as in these images.





Gamma Knife Stereotactic Radiosurgery:
Once the globe is immobilised, the patient has a Leksell stereotactic frame (a) attached under local anaesthetic to the skull (b). The tumour is imaged using magnetic resonance imaging (c), and treatment planning occurs to localise the radiation to the tumour. The gamma knife uses a focused array of intersecting beams of gamma radiation (d) from multiple sources and takes around 30 minutes.



Results

In our cohort of 290 eyes; 118 patients were in group A (sutured) and 172 patients were in group B (not sutured). There were no cases of primary treatment failure in either group. With a minimum of 24 months follow-up, only 3 patients experienced tumour recurrence (1 in group A and 2 in group B). There was no significant difference between the two groups with regards to recurrence rate, enucleation rate and all-cause death rate, though there was a trend towards a higher secondary enucleation rate in group B. All secondary enucleations were performed due to complications of radiotherapy (e.g. painful blind eye due to rubeosis) and not local recurrence. This is therefore not related to eye movement and immobilisation technique.

Patient demographics and outcomes by suture status:

* indicates statistically significant difference between the two groups $p<0.05$.

	Total	Sex		Mean Age (years)	Mean Follow Up (months) [Range]	Tumour Recurrence	Secondary Enucleation	Death
		M	F					
Sutured (Group A)	118	78	40	65	92* [28 - 148]	1	7	23
Not Sutured (Group B)	172	103	69	68	53* [27 - 112]	2	14	34

Discussion

In this retrospective cohort study, patients were not randomised; globe immobilisation was performed as per the surgeon's preference. The longest-serving surgeon has always sutured, and the most recently appointed surgeon has never sutured, skewing the follow-up duration between the groups. The length of follow-up was therefore significantly longer in group A (92 months cf. 53 months, $p<0.001$). It is possible that further recurrences and enucleations could be identified with longer follow-up , meaning that significant differences in clinical outcomes could occur. However, at this time, no significant difference in clinical outcomes has been identified in association with immobilisation technique.

Conclusion

Our retrospective review suggests that although extraocular muscle suturing may enhance globe immobilisation in absolute terms, this does not translate to altered clinical outcomes.