Minimal Iris Touch Excision (MITE): a novel surgical technique for local excision of iris melanoma

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Surgical treatments of iris melanoma are aimed at complete resection with minimal manipulation or tumor disruption.1 Sector iridectomy is a standard surgical intervention for circumscribed iris tumors without seeding or involvement of the iris root. We describe a novel, minimal-touch, variation of sector iridectomy for the excision of circumscribed iris lesions performed in three patients with iris tumors suspicious for melanoma.

Surgical access for intraocular micro-scissors and forceps is obtained through four 1.1mm paracenteses; two enable radial incisions along the tumor edges, and two are obliquely angled to enable incision of the peripheral iris base (see video).

A cohesive ophthalmic viscoelastic device (Healon GV, Abbott Medical Optics) is injected to fill and stabilize the anterior chamber. Viscoelastic is also injected between the iris segment to be excised and the subjacent anterior capsule to create a surgical space to protect the lens from instrument touch.
The iris segment is grasped avoiding the tumor margins, using non-toothed micro-forceps, and gently lifted anteriorly and centrally away from the anterior lens capsule before the introduction of micro-scissors.

The sector iridectomy is performed using straight, small-gauge, micro-scissors to create radial incisions extending from the pupillary margin to the iris root on both sides of the tumor (Figure 1A,B). The base of the tumor is excised in a similar fashion via the obliquely angled paracenteses using both clockwise and anti-clockwise incisions along the iris base (Figure 1C,D). A surgical margin of ≥1mm of macroscopically uninvolved tissue is obtained. The excised tissue is positioned in the middle of the anterior chamber. A 3-step, 2.7mm clear corneal incision is created opposite the involved iris segment for removal of the tissue from the anterior chamber. Further viscoelastic is injected to ensure the anterior chamber is filled completely and to push the excised tissue toward the incision.

An intraocular lens cartridge tip, primed with a standard cohesive viscoelastic, is inserted through the main incision near the excised iris tumor segment in the anterior chamber. The iris tissue follows the flow of viscoelastic from the anterior chamber into the cartridge tip to exit the anterior chamber without touching the ocular surface or being compressed by the wound edges (Figure 1D,E). If the iris tissue does not freely flow into the cartridge tip, simply due to the pressure differential, additional viscoelastic can be injected distal to the iris tissue to encourage outward flow through the cartridge. As the iris tumour exits the eye into the lens cartridge, there may be mild shallowing of the anterior chamber and care should be taken to avoid any lens contact by maintaining the cartridge tip just inside the inner aspect of the corneal wound and injecting additional viscoelastic if needed. The specimen is then atraumatically ejected/expressed from the cartridge for histology. Irrigation and aspiration are used to remove the viscoelastic from the anterior chamber. The main corneal wound is closed with a single 10-0 nylon suture and the paracenteses sealed using hydration.

Three eyes with growing iris tumors underwent excision using the described technique (Table 1). The iris tumors were relatively small (≤1.5 clock hours).
and did not involve the irido-corneal angle. One eye had a previous sector
iridectomy of iris melanoma 15 years prior with evidence of local recurrence.
Intraoperatively, there was minimal bleeding which resolved without
intervention. If significant bleeding does occur, additional viscoelastic can be
injected to pressurize the anterior chamber as a tamponade for haemostasis.

One subject, with an amelanotic iris lesion, had malignant melanoma
extending to the surgical margins on histology and elected to not undergo
any further treatment. Another experienced transient postoperative elevation
of intraocular pressure. No significant cataract was identifiable 3 years post-
surgery in the one eye with a clear crystalline lens preoperatively. No visible
pigment was seen within the wounds of any eyes, and no patient has
developed visibly detectable local recurrence or metastasis during the follow-
up period (mean, 41 months).

Sector iridectomy is traditionally performed through a thick sclero-corneal flap
with a keratectomy created over the tumor through the corneal floor.\textsuperscript{1,2} The
limbal incision is typically quite large, encompassing five or more clock hours,
to enable extraocular delivery of the specimen without inadvertently
depositing tumor material on the wound or adjacent tissue.\textsuperscript{1} A variation of
sector iridectomy has been described in which viscoelastic is injected through
a paracentesis to prolapse the iris tumor out of a limbal wound, followed by
extraocular excision.\textsuperscript{3}

The modified technique we describe possesses several potential advantages
compared to standard methods. The technique is performed using a
“minimal-touch” principle to avoid direct handling of the involved iris tissue
and to eliminate any potential contact of the tumor with the wound edges or
the ocular surface. In addition, there is minimal compression or disruption of
the tissue specimen during removal from the anterior chamber. By utilizing
significantly smaller corneal incisions, the anterior chamber remains
formed/stable during iris manipulation, post-operative astigmatism is
reduced/minimal, and visual recovery time shortened. The use of viscoelastic
protects the endothelium and creates a space between the iris and lens to
avoid inadvertent instrument contact and subsequent cataract development.
This technique is also time efficient and requires only a single suture. By using an intraocular lens cartridge as the vehicle for tumor delivery, the risk of seeding tumor cells to adjacent ocular tissue is reduced as the specimen is removed *en masse* and intact. We have only used this technique for small tumours; however, the same technique could presumably be used for larger tumours by increasing the main wound length and diameter of the cartridge tip used for removal of the excised iris segment.
REFERENCES


**TABLE**

**Table 1:** Patient characteristics

<table>
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<tr>
<th>Age (years)</th>
<th>Gender</th>
<th>Dimensions width/height (mm)</th>
<th>Pre-Op CDVA</th>
<th>Post-Op CDVA</th>
<th>Histology</th>
<th>Surgical Margins</th>
<th>Follow-up (months)</th>
<th>Post-Op Complications</th>
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<td>64</td>
<td>Female</td>
<td>2.5 x 2.8</td>
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<td>6/6</td>
<td>Spindle cell naevus</td>
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<td>None</td>
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<td>6/7.5</td>
<td>Spindle B melanoma</td>
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<td>40</td>
<td>Transient IOP elevation</td>
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<td>1.7 x 2.2</td>
<td>6/12</td>
<td>6/15</td>
<td>Spindle B melanoma</td>
<td>Positive</td>
<td>40</td>
<td>None</td>
</tr>
</tbody>
</table>

CDVA: Corrected Distance Visual Acuity; IOP: Intraocular Pressure

**FIGURE LEGEND**

**Figure 1:** Intraoperative images demonstrating surgical steps. A,B) Radial incisions along each side of tumour. C) Counter-clockwise incision along iris base. D) Clockwise incision along iris base. E,F) The excised iris tissue segment flows into an intraocular lens cartridge tip allowing removal of the tumour from the anterior chamber atraumatically and without wound or ocular surface contact.