

# Role of Hyaluronidase in Orbital Mass Excision

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## ABSTRACT

**Background:** Hyaluronidase belongs to a family of enzymes that degrades hyaluronic acid, which is a constituent of the extracellular matrix. The property of hyaluronidase to help relieve tissue adhesions has found implications in epidural neuroplasty, failed back surgery syndrome, abdominal adhesions, and in prevention of formation of adhesions postoperatively in laparoscopic ventral hernia repair. There is no previous study supporting the role of hyaluronidase in relieving the adhesions around the orbital masses and aiding in their delivery. This article intends to discuss the utility of hyaluronidase in orbital mass excision by relieving adhesions around the mass.

**Aim:** The purpose of this article is to describe the successful use of hyaluronidase intraoperatively for excision of orbital cavernous hemangioma. This patient had an orbital cavernous hemangioma of 8 years' duration.

**Materials and methods:** This report describes a patient who presented with unilateral proptosis of long-standing duration and visual diminution of 6 months' duration. Radiological imaging showed presence of intraconal cavernous hemangioma in the right orbit. The patient underwent transconjunctival orbitotomy for orbital mass excision. Intraoperatively, 5 mL of injection hyaluronidase 300 IU/mL diluted in balanced salt solution was injected around the mass for adhesiolysis using a 25-gauge cannula.

**Conclusion:** The intraoperative use of hyaluronidase helped in relieving the adhesions around the mass and helped in its easy delivery without undue manipulation.

**Clinical significance:** Hyaluronidase is helpful in adhesiolysis around the orbital masses and promotes their easy delivery. This helps in early recovery and decreased postoperative tissue edema. This is first such report implicating the role of hyaluronidase in orbital mass excision.

**Keywords:** Hyaluronidase, Orbital mass, Orbitotomy.

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## BACKGROUND

Hyaluronidase belongs to a family of enzymes that degrades hyaluronic acid, which is a constituent of the extracellular matrix.<sup>1</sup> This property of hyaluronidase helps in lowering viscosity of hyaluronan and increase tissue permeability.<sup>1</sup> This has enabled hyaluronidase to act as an adjunct with other drugs to enhance their tissue delivery as in ophthalmology with anesthetics.<sup>2,3</sup> Injection hyaluronidase is available commercially as injection of 1500 IU in powder form to be reconstituted prior to use. The property of hyaluronidase to help relieve tissue adhesions has found implications in epidural neuroplasty,<sup>4</sup> failed back surgery syndrome,<sup>5</sup> abdominal adhesions,<sup>6</sup> and in prevention of formation of adhesions postoperatively in laparoscopic ventral hernia repair.<sup>7</sup> A similar property of hyaluronidase aids in subcutaneous rehydration in pediatric and geriatric patients.<sup>8,9</sup> Hyaluronidase also aids in increasing tissue delivery of drugs, such as immunoglobulins.<sup>10</sup> There is no previous study supporting the role of hyaluronidase in relieving the adhesions around the orbital masses and aid in their delivery. This article intends to discuss the utility of hyaluronidase in orbital mass excision by relieving adhesions around the mass.

## MATERIALS AND METHODS

A 40-year-old female patient of Indian origin presented with complaints of an 8-year proptosis and a 6-month diminution of vision of the right eye. Clinical examination showed right eye proptosis with exophthalmometry value of 27 mm and deviation of the globe outward (Fig. 1A). The patient experienced restricted extraocular movements in all gazes. Best-corrected visual acuity of the patient was +0.3 log MAR and 0 log MAR in the right and left eye respectively. Intraocular pressures were 22 and 21 mm Hg in right and left eyes respectively. Relative afferent pupillary defect was present in the right eye. Slit-lamp biomicroscopy revealed normal anterior and posterior segment examination of both the eyes. Contrast-enhanced computed tomography scans of the patient showed well-defined, 28 × 26 × 25 cm, oval, and homogeneous intraconal mass (Fig. 1B). The mass showed patchy contrast enhancement suggestive of cavernous hemangioma. The patient underwent transconjunctival orbital mass excision under general anesthesia. Intraoperatively, after disinserting lateral rectus and performing blunt dissection



Fig. 1A: Clinical photograph of the patient showing proptosis

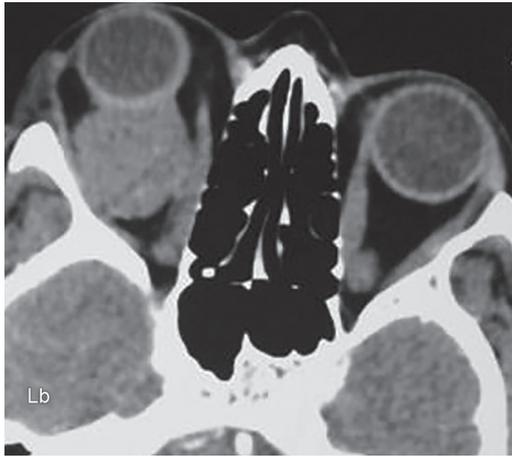


Fig. 1B: Computed tomography scan image of the patient showing well-defined intraconal orbital mass

around the mass, it was observed that there were strong adhesions around the mass. Excision of the orbital mass appeared difficult and time consuming. Considering the role of hyaluronidase in breaking intercellular adhesions,<sup>4</sup> 5 mL of 300 IU/mL of hyaluronidase available as injection Hyalase 1500 IU (Sun Pharmaceutical Industries Ltd, Mumbai, Maharashtra, India) diluted in balanced salt solution was injected around the mass using a 25-gauge cannula (Fig. 2). After 2 minutes, it was observed that the adhesions around the mass were relieved. After injecting hyaluronidase, the orbital mass could be delivered easily

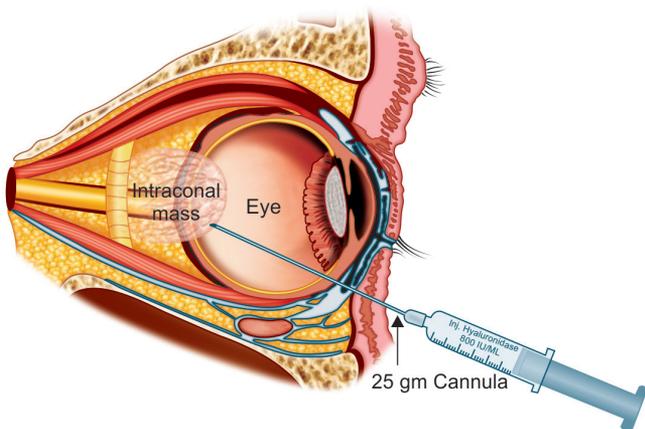


Fig. 2: Injection of hyaluronidase intraoperatively around the orbital mass

with the help of a cryoprobe. On achieving hemostasis, lateral rectus was reinserted and soft tissues were closed in layers. The surgery was otherwise uneventful. The excised tissue (Fig. 3) was sent for histopathological examination, which confirmed the presence of cavernous hemangioma. Postoperatively, there was minimal tissue edema and the patient was comfortable. Postoperatively, patient's best-corrected visual acuity recovered to +0.2 log MAR within 1 week. Proptosis and tissue edema decreased to minimal within 1 week. Extraocular movements also recovered in all gazes. The patient was prescribed tapering dose of systemic steroids for 3 weeks. At the last follow-up, patient's visual acuity in the right eye was +0.1 log MAR with normal anterior and posterior segments.

### DISCUSSION

Orbital masses could be present in three surgical spaces: Intraconal, extraconal, and intracanalicular.<sup>11</sup> Various surgical approaches have been adopted for the orbital mass excision according to their location.<sup>12,13</sup> Transcranial approach has many complications associated with it, such as visual loss, diplopia, and enophthalmos.<sup>14</sup> Classic extracranial approach (lateral orbitotomy) is useful for well-circumscribed periorbital and intraconal tumors, which are located laterally to the optic nerve.<sup>15</sup> Transconjunctival technique offers a better cosmetic approach as compared to lateral orbitotomy for orbital mass excision, and is less time consuming as compared to lateral orbitotomy.<sup>16</sup> This technique also has low risk of optic nerve damage. The major issue of concern with this technique is transient diplopia. Also, transconjunctival technique was considered unsuitable for the masses with ill-defined margins and strong adhesions.<sup>17,18</sup> The role of hyaluronidase as an adjunct with local anesthetics in ocular akinesia is well established.<sup>2,3</sup> It also reduces myotoxicity to muscles induced by anesthetic drugs.<sup>19</sup> The property of hyaluronidase to relieve tissue adhesions has found implication in epidural neuroplasty,<sup>20-22</sup> among other indications.<sup>6,7,23</sup> By decreasing the viscosity of the

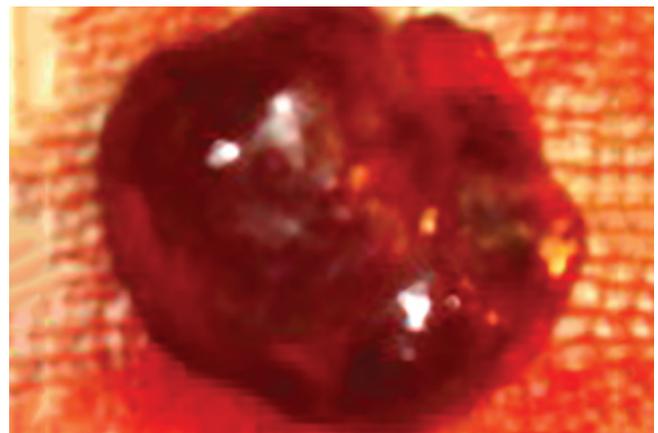


Fig. 3: Excised orbital mass

connective tissue, hyaluronidase aids in diffusion of fluid administered subcutaneously for 24 to 48 hours.<sup>23</sup> This property of hyaluronidase is underutilized in ocular surgeries. Till now, there has been no study implicating the role of hyaluronidase in orbital mass excision. This article shows that hyaluronidase can be used intraoperatively for adhesiolysis around orbital masses. This helps in minimizing undue manipulation during surgical procedures in a small surgical space, such as orbit. This helps in preventing undue damage to the surrounding structures, such as muscles and optic nerve. In the present case, it was observed that after injecting hyaluronidase around a strongly adherent orbital mass, the mass could be delivered without undue manipulation within a few minutes. With use of hyaluronidase intraoperatively for adhesiolysis around the orbital masses as implicated in this case report, the use of transconjunctival technique can be extended to even large masses having stronger adhesions with surrounding structures. This might extend use of this least traumatic technique for orbital mass excision.

## CONCLUSION

The intraoperative use of hyaluronidase is helpful in adhesiolysis around the orbital masses. This helps in minimizing the manipulation needed in the surgical procedure, decreasing the surgical time as well as the complications.

## CLINICAL SIGNIFICANCE

Hyaluronidase is helpful in adhesiolysis around the orbital masses and promotes their easy delivery. This helps in early postoperative recovery and decreased postoperative tissue edema. This is first such report implicating the role of hyaluronidase in orbital mass excision.

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