

## COMPLICATIONS OF LOCAL OPHTHALMIC ANAESTHESIA

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**SUMMARY-** The local anaesthesia given in ophthalmic surgery, if performed correctly has been proved to be highly successful with low incidence of complications. This review article outlines the possibility of the complication of local anaesthesia in ophthalmic surgery.

**Key words:** *ophthalmic anaesthesia, complications*

The ideal anaesthetic for ophthalmic surgery would provide globe and conjunctival anaesthesia, globe, lid and periorbital akinesia and intraocular hypotonia. However, the need for full akinesia has been brought into question by the increased popularity of topical, sub-Tenon's infusions of anaesthetics and subconjunctival anaesthesia. Complications of local anaesthesia for ophthalmic surgery can be elicited from the agents used or from the block technique itself. Complication of agent used for topical anaesthesia are very rarely associated with damage of the cornea except with cocaine.<sup>1</sup>

Systemic complications may be caused by overdose or allergic reactions. The symptoms include convulsions, unconsciousness and cardiorespiratory arrest can be a consequence of systemic complications following injection of local anaesthetic within a cuff of dura of the optic nerve or intraarterial injection.<sup>2</sup> Brainstem anaesthesia is potentially a life-threatening complication of retrobulbar anaesthesia. The symptoms include confusion, difficulty in breathing, cyanosis, dysphagia, impaired hearing, hypertension and tachycardia. Management is mainly supportive and surgery can usually proceed. Direct injection of local anaesthetics into the cerebrospinal fluid can occur by accidental puncture of dural cuff of the optic nerve as it runs towards the sclera. Injection of anaesthetic into subarachnoid space may result in sensory blockade of contralateral vision,

CNS depression, paralysis, seizures, hypotension and cardiac arrest. The upwards and inwards gaze is responsible for this complication by rotating the optic nerve in an inferotemporal direction. Retrobulbar blocks carries the highest risk of central nervous system involvement.

### Complications of ocular blocks

Retrobulbar and peribulbar block are the most frequently used techniques for ophthalmic surgery.<sup>3</sup> Retrobulbar block was first described in 1884 by Knapp.<sup>4</sup> The introduction of better local anaesthetic agents made this procedure an effective and popular choice for most ophthalmic surgeries. Peribulbar block is an alternative approach, which is believed to reduce the risk of globe perforation or traumatising the neurovascular structures.<sup>5</sup>

### Orbital haemorrhage

Orbital haemorrhage is the most common complication of retrobulbar injection, reported in 0.1% to 1.7% of procedures.<sup>6,7,8</sup> Haemorrhage may be venous or arterial. Venous haemorrhage is not serious and probably does not cause long-term visual complications. An arterial haemorrhage produces a rapid orbital swelling, subconjunctival and periorbital haemorrhage, proptosis with immobility of the eye and blood-stained eyelids. The increase of intraorbital pressure may cause retinal artery compression. Measurement of intraocular pressure is helpful in assessing the risk

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of ischemic damage of the retina and the optic nerve. In the case of retinal artery compression, mannitol, acetazolamide, urgent decompressive surgery, lateral canthotomy or paracentesis may be required.

### Globe perforation

Inadvertent globe perforation can occur during retrobulbar or peribulbar blocks.<sup>9</sup> The incidence of globe perforation is less than 0.1%.<sup>10</sup> Most commonly this involves a tangential penetration in the inferolateral quadrant and may include penetration of the inferior oblique muscle, too. Predisposing factors include previous eye surgery, globes with an axial length of >26 mm (high myopia) and poor patient co-operation.<sup>11,12</sup> Needle perforation of the globe has been reported in association with retrobulbar and peribulbar blocks.<sup>12</sup> Careful observation of the globe during needle entry may alert the surgeon to impending globe penetration by rotation of the eye toward the direction of needle entry. The so-called "wobble test" is useful in determining if the needle tip has impaled an orbital structure fixed to the eye.<sup>13</sup> In this test, when the retrobulbar needle is in the orbit, the needle is moved from side to side; any rotation of the eye suggests that the sclera, optic nerve, or an extraocular muscle may have been penetrated. Sudden loss of vision, vitreous haemorrhage, hypotonia and pain on injection may indicate globe perforation.<sup>14</sup> Needles longer than 3 cm should never be used and the needle should not be inserted more than 2.5 cm. If the cataract allows visualisation of the penetration site with indirect ophthalmoscopy, cataract surgery should be cancelled and arrangements made for retinopexy to the perforation site. If the cataract prevents adequate visualisation of the retina, some surgeons recommend that it should be removed to allow retinal surgeon to perform photocoagulation or retinal surgery. The effects of local anaesthetics injected into the globe are temporary and produce no detectable histologic damage to the retina.

### Amaurosis and optic nerve atrophy

Retrobulbar injections of local anaesthetics can very rarely cause amaurosis as a consequence of optic nerve blocked.<sup>15</sup> Optic nerve atrophy can be a consequence of damage of the optic nerve or central retinal artery with injection into optic nerve sheath or haemorrhage.<sup>16</sup> These complications may be related to or incidental to the technique of retrobulbar block. Sharp needles may cause piercing injury of the optic nerve and even rounded needles may result in tearing of neural tissues. There is often nothing

unusual during the insertion of the needle or injection of anaesthetic. The loss of vision may have been attributed to the effect of local anaesthetic blockade and the visual impairments are noticed only when the blockade is prolonged. Fundus examination reveals optic disc oedema, retinal oedema and vitreous haemorrhage and in the later stage signs of optic nerve atrophy. CT scan and ultrasonographic examination may reveal dilatation of the optic nerve either due to haemorrhage or injection of anaesthetic. The injection should be made with the globe in the primary gaze position when the optic nerve remains in its normal position behind the globe.<sup>17</sup>

### Oculocardiac reflex

Although the retrobulbar or peribulbar block can prevent the oculocardiac reflex, traction on the extraocular muscles (especially the medial rectus) or conjunctiva, or pressure on the globe can trigger cardiac arrhythmias such as bradycardia and hypotension via reflex pathway of the vagus nerve. The blocks take a minute or two to block the reflex arc and the pressure on the globe immediately after blocking can stimulate the reflex. Cardiac rhythm changes resulting from oculocardiac reflex are much less common during local than during general anaesthesia; however, cardiac rhythm monitoring is essential during local anaesthesia.

### Extraocular muscle palsy

Direct injection of local anaesthetic into any of the extraocular muscles may result in myotoxicity and muscle palsy. Diplopia can occur following inadvertent retrobulbar injection of local anaesthesia into muscles involved with ocular alignment. Extraocular muscle palsies, especially the inferior rectus muscle have been described.<sup>18</sup> They usually recover completely. Many mechanisms of injury to the extraocular muscle associated with eye surgery have been proposed. A popular one is the ocular myotoxic effect of the local anaesthetics. The highest concentrations of local anaesthetics and direct injection into the muscle should be avoided.

### Raising of the intraocular pressure

The intraocular pressure is increased after injections of local anaesthetic and thus it may cause the vitreous loss during intraocular surgery. Many techniques have been used to soften the eye prior to ocular surgery including

intermittent digital pressure, Storz Autopressor, mercury bag, or Honan ballon.

A mild degree of pain is inevitable whilst performing local anaesthesia. Severe pain, particularly on injection is a good indicator of incorrect needle placement.

The sub-Tenon's infusion is an excellent way to get paralysis of the movement of the eye. After making a small incision in the conjunctiva, 1.5 to 2.0 cc of the anaesthetic is infused through the cannula into the retrobulbar space. Good anaesthesia using long-acting anaesthetics via the sub-Tenon's route can be used instead of retrobulbar approach. Sub-Tenon's anaesthesia produces the lowest overall level of discomfort, both during the administration of the block and intraoperatively.<sup>19</sup>

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## Sažetak

### KOMPLIKACIJE LOKALNE ANESTEZIJE U OFTALMOLOGIJI

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Pravilno davanje lokalne anestezije u očnoj kirurgiji veoma je uspješno s malom učestalošću komplikacije. Ovaj članak opisuje moguće komplikacije lokalne anestezije u očnoj kirurgiji.

*Ključne riječi: očna anestezija, komplikacije*