Case Report

Retrobulbar Alcohol Injection for Orbital Pain Relief Under Difficult Circumstances: A Case Report

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Abstract

Introduction: A case is presented of a patient with severe and chronic pain in the orbital region, which was relieved by retrobulbar injection of absolute alcohol. The management of chronic pain in the orbital region has received little attention and the literature is reviewed. Clinical Picture: A 52-year-old man with adenoid cystic carcinoma of the maxillary sinus was suffering from severe pain, especially in the left orbital region. There was also pain from ocular exposure and compression caused by the tumour. Magnetic resonance imaging (MRI) revealed spread of tumour to both orbits, particularly on the left. Multiple debulking surgery and various treatment modalities offered no relief from his pain. Treatment: A single retrobulbar injection of 2 mL of absolute alcohol, was placed into the putative orbital apex. Outcome: As a consequence of the injection, he had complete resolution of his pain in the 6 months prior to his death. Discussion: Retrobulbar injection of alcohol offers effective pain relief in certain specific conditions characterised by chronic orbital pain when other treatments do not help. Conclusion: We have demonstrated that the retrobulbar technique still has a place in our armamentarium.

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Key words: Ocular pain, Orbital pain, Orbital pain management, Retrobulbar alcohol injection

Introduction

The management of pain in the orbital region, whether ocular or orbital in origin, is complex and lies at the margins of several subspecialty interests. Because of this, and because of its rarity, it has received little attention in the literature. The management of pain depends on the level of visual acuity and whether the pain is primarily ocular or orbital.[1] Chronic pain medications are usually used before the well-established neurolytic intraconal (retrobulbar) injection and end-stage surgery.[1,2]

Retrobulbar block is a widely practised technique providing orbital anaesthesia for cataract and other orbital surgery,[3] but the popularity of this block has declined due to its associated complications.[4,5] This block is increasingly being replaced by extraconal (peribulbar) and sub-Tenon's block.[6-8] Substances injected during peribulbar and sub-Tenon's block diffuse into the intraconal area, producing anaesthesia and pain relief.[9,10] Injection of steroid and other drugs, excluding neurolytic agents, has been reported via peribulbar[11,12] and sub-Tenon's routes.[13,14] Neurolytic agents are not injected through these routes because of fear of extensive tissue diffusion and backtracking along the injection route. Further, peribulbar block may not be feasible in some cases and have similar complications to retrobulbar injection.[6,15] The technique of sub-Tenon's block involves the dissection of conjunctiva and Tenon's capsule and this may not be possible in orbits, which are extensively affected by disease processes such as tumour.[16] Concerns have been raised that because of the safety of sub-Tenon's block, the retrobulbar technique is not practised and therefore, practitioners are becoming deskilled in its use.[17]

The purpose of this case report is to highlight the difficulties which can be encountered in the management of pain in the orbital region. Retrobulbar alcohol injection was successfully used in the treatment of severe orbital pain, which was resistant to chronic pain medication.

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Case Report

A 52-year-old man suffering from adenoid cystic carcinoma of left maxilla had previously undergone a left maxillectomy and multiple debulking procedures of the tumour over a 13-year period. In spite of this, direct spread of the tumour, mainly into the left orbit, had developed (Fig. 1). There was also evidence of tumour in the right medial canthus with an associated chronic dacryocystitis. The tumour caused gross proptosis and compression of the left globe with deviation down and out. The whole area was chronically infected, with a small sinus of leaking pus above the left globe and a similar but less troublesome sinus on the right in spite of repeated drainage and systemic antibiotics. There was persistent exposure keratitis of the left eye. The left eye had no perception of light but the vision was normal on the right. Magnetic resonance imaging (MRI) scanning demonstrated extensive direct spread of the tumour within the left orbit (Figs. 2 and 3). The tumour had also spread to the lungs. He was in severe and debilitating pain around the left orbit in spite of maximum doses of chronic pain medication (paracetamol, gabapentin, diclofenac, oxycontin, dexamethasone and zopiclone).

Ophthalmologists, otolaryngologists and anaesthetists discussed various options considering his limited life expectancy. The options included a moisture chamber (would not resolve his deep-seated pain), tarsorrhaphy (too proptosed and infected), further debulking and enucleation of the globe (surgically very hazardous) and neurolytic injection. The latter was felt to be the wisest, simplest and most conservative option because the relief of pain was our sole treatment aim. The patient and his wife agreed to this treatment and consented to him being photographed for research and teaching purposes.

A dilute local (0.2% lidocaine) was injected into the skin in the inferotemporal quadrant through a 27-gauge, 1.2-cm long needle (Fig. 4). A 27-gauge, 3.1-cm long needle was inserted percutaneously in the extreme inferotemoporal quadrant at the junction of lateral orbital and inferior orbital margins, with the needle aimed towards the roof of the orbit. When it was felt that the needle had passed the equator of the globe, the needle was directed upwards and inwards towards the apex to a distance of 2 cm. Two mL of 2% lidocaine was injected and the syringe was detached, leaving the needle in situ (Fig. 5). After 5 minutes, the patient reported complete pain relief. A syringe containing 2 mL of absolute alcohol was then injected through the in situ needle (Fig. 6). The needle was then removed and digital pressure with the lids closed was applied to reduce anterior diffusion of alcohol. The patient was discharged home with advice to continue his usual pain medication.

Complete relief from pain was obtained for 6 months, until a few days before the patient developed broncho-pneumonia and deceased.

Discussion

Chronic pain in the orbital region is a complex phenomenon and often multifactorial in aetiology.[18] Pain may originate from the ocular or orbital structures. Effort is directed to its aetiology by thorough investigations and diagnosis followed by well-directed treatment.[18] Ophthalmologists in general manage ocular pain themselves (e.g., rubeotic glaucoma or scleritis). However, pain that is primarily orbital in origin (e.g., myositis or tumour) may require referrals to other healthcare professionals and a multidisciplinary approach. The differentiation between primarily ocular and orbital pain is often difficult,[18] as in the case of advanced malignancy described in this report.

Understanding the nature of the pain and anatomical pain fibre distribution may be helpful.[19] Pain may be localised to the distribution of the nerve due to either compression or infiltration with the disease. However, the possibility of referred pain needs to be borne in mind. Nerve terminals originating around the face, including the eye and its adnexae, are connected to the root of the ophthalmic division of the trigeminal nerve (5th cranial nerve).[20] The root arises from the central process of the semilunar ganglion. The semilunar ganglion contains the cell bodies of the 3 divisions of the 5th nerve: ophthalmic, maxillary and mandibular nerves. The ophthalmic branch of the 5th cranial nerve provides the somatic afferent innervation to the eye and adnexae via 3 main branches: the lacrimal, frontal, and nasociliary nerves. The lacrimal nerve supplies sensory branches to the conjunctiva, the skin of the lateral part of the upper eyelid, and the lacrimal gland. The frontal nerve supplies the scalp, the forehead, the upper eyelids, and the frontal sinus via the supraorbital and supratrochlear nerves. The nasociliary nerve supplies the cornea, the skin around and inside the nose, and the lower eyelids.

The manifestation of pain in the orbital region is varied, but ophthalmologists can usually differentiate the origin of the pain by an individual's description. Orbital regional pain may be due to disease of the globe and its contents, adjacent structures in the orbit or referred pain.[18] Pain may be superficial or deep.

Superficial ocular pain originates from the cornea or conjunctiva. This pain is usually localised and may be sharp, stabbing or burning in nature. It may be associated with photophobia and blepharospasm. Local anaesthetic eye drops and simple analgesics can relieve this pain.

Deep ocular pain may originate from superficial structures such as the cornea, sclera, iris, ciliary body, other lesions of deep orbital structures and the adjacent sinuses. The pain is usually localised but may be referred. It is dull in nature,

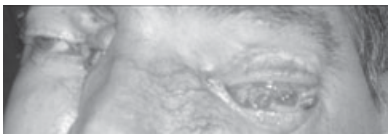

Fig. 1. Tumour involving both orbits especially left.

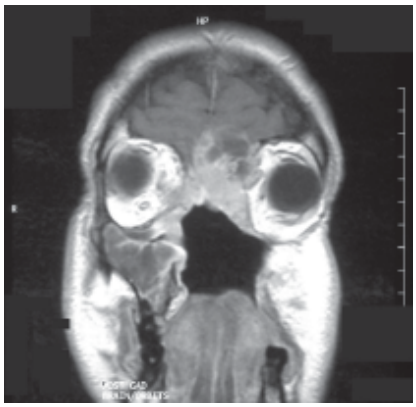

Fig. 2. Coronal MRI showing tumour replacing the ethmoids, invading orbital fat and displacing the left globe inferolaterally.

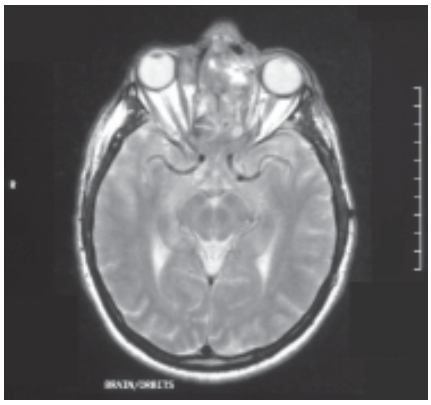

Fig. 3. An axial MRI scan taken shortly before the onset of intractable pain showing tumour replacing the ethmoid sinuses.

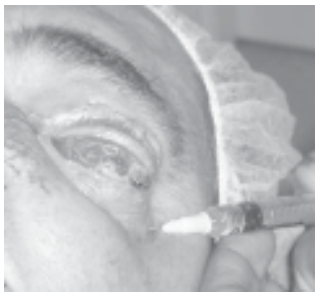

Fig. 4. A small needle inserted percutaneously for injection of dilute local anaesthetic agent.

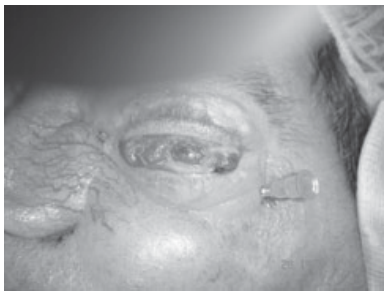

Fig. 5. A 3.1-cm needle inserted percutaneously aimed towards retrobulbar space and left in situ after test injection of local anaesthetic agent.

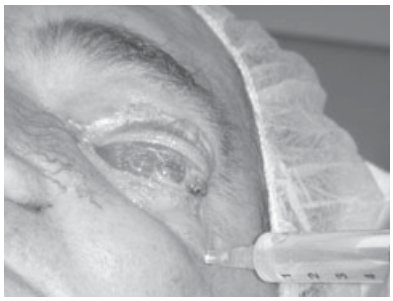

Fig. 6. Injection of alcohol into the retrobulbar space.

often severe and occasionally lancinating. Management of this type of pain is complex but involves proper diagnosis and eradication of the primary cause. Its intractable nature can lead to lassitude, debilitation and secondary psychological illness.

Many ocular and orbital conditions may manifest as chronic pain syndrome. Differentiation between ocular and orbital pain is important. This usually does not present difficulty. Clinical eye examination, ultrasound, computed tomography and MRI techniques may be required to make a diagnosis before embarking on treatment.

In cases where the direct treatment of ocular and orbital conditions is not possible, the following principles apply.[1] Pain management depends on the level of vision. It is of primary importance to preserve vision but also to alleviate pain where possible. In those with severe intractable pain in a blind or near-blind eye, relief from pain is of primary importance and globe preservation secondary.[1]

If pain is due to causes other than tumour, an escalating treatment programme commencing with simple analgesics, progressing to other drugs, is initiated.[21] Cycloplegics and corticosteroids are often useful in the long-term medical treatment of pain.[21] If the intraocular pressure is elevated, additional agents such as beta-blockers, topical or systemic carbonic anhydrase inhibitors, alpha-adrenergic agonists or osmotic agents are added.[21] Several methods of treatment are used in the same patient either concomitantly or sequentially.

Approximately 70% of patients with advanced cancer develop significant pain before death.[19] Most cancer patients respond to pharmacological measures and successful treatment based on simple principles that have been promoted by the World Health Organization (WHO) analgesic ladder.[22] Analgesic drugs should be taken by mouth regularly. The first step on the analgesic ladder is a non-opioid, such as paracetamol, aspirin or non-steroidal anti-inflammatory drugs (NSAIDS). If this is inadequate, a weak opioid such as codeine is added. The third step is the substitution of a weak opioid with a strong opioid. Inadequate pain control at one level requires progression to a drug on the next level, rather than to an alternative of similar efficacy. Adjuvant analgesics, such as tricyclic antidepressants or anticonvulsants, may be used at any stage. Cancer pain is continuous and medication must be taken regularly. In the last decade, gabapentin has been found to be useful in neuropathic orbital pain as adjuvant therapy.[23]

Retrobulbar injection of neurolytic agents such as

alcohol,[1,2] phenol[24] and chlorpromazine[25-29] have been used in the management of pain in the orbital region and is usually offered as an adjunct to medical treatment in patients who are not yet ready to accept surgery. These agents are delivered very close to the intended target nerve or ganglion. However, non-neurolytic agents such as steroids, which rely on diffusion for effectiveness have been used through other routes such peribulbar[11,12] or sub-Tenon's injections.[13,14] Neurolytic agents can only be used if it is possible to deposit the agent very close to the nerves. Techniques, which rely on diffusion, are clearly not suitable for injection of neurolytic agents. Therefore, neurolytic agents are never injected through peribulbar or sub-Tenon's injection.

Retrobulbar injection of absolute alcohol provides analgesia by destruction of nerve cells.[1] This occurs by extracting phospholipids, cholesterol and cerebroside and also precipitating mucoprotein and lipoprotein. If the injection is made into the surrounding tissue away from the nerve, all fibres of the nerve will not be destroyed. This may cause a depression in transmission of nerve impulse but a recurrence in pain is probable. If the peripheral portions of the nerve are not completely destroyed, they may regenerate and pain ensues. Hence, recurrence of pain transmission will depend on the degree and extent of nerve destruction, which depends on the accuracy of injection technique. Retrobulbar alcohol injection has no effect on the semilunar ganglion, hence the effects are localised to the orbit. The success of retrobulbar alcohol injection is variable, ranging from 20% to 87% of patients.[2] However, retrobulbar alcohol injection can lead to temporary blepharoptosis, external ophthalmoplegia, cellulitis, neurotrophic keratopathy, eyelid oedema, conjunctival chemosis and complications related to the retrobulbar injection technique itself.[30,31] Ptosis and external ophthalmoplegia may occur due to diffusion of alcohol to the motor nerves as they enter the orbit through the superior orbital fissure. Blepharoptosis and external ophthalmoplegia in combination with globe proptosis and subconjunctival haemorrhage can occur following mild retrobulbar haemorrhage. No treatment is indicated if the eye is blind, as the blood is usually absorbed in a few days. Recovery from the ptosis and ophthalmoplegia usually occurs within 24 hours.[30,31]

Retrobulbar phenol has rarely been used in the management of pain and the reported success rate is similar to that of alcohol injection.[24] Phenol destroys all nerve fibre types by protein denaturation.[19] It is not selective and will destroy both motor and sensory nerves although fibres can regenerate, so the block should not be regarded as permanent.[19] Phenol is available as 6.7% solution in water or glycerol. Aqueous solution diffuses faster and hence spreads widely. Glycerol solution diffuses slowly, hence the spread is limited.[19] Usually, 1.5 mL of 6.7% aqueous solution (1 part phenol in 15 parts of water) of phenol is used and the neurolytic effects are evident after 3 to 7 days. There are no published reports of complications following retrobulbar phenol injection but it is expected that they may occur due to the tissue-destructive effects of phenol or the retrobulbar technique. Local tissue trauma, necrosis, phlebitis and neuroma formation have been reported when phenol was injected by other routes.[19] Central nervous system stimulation can occur but depression may be associated with higher doses. Cardiovascular depression can occur as well.[19]

Retrobulbar chlorpromazine injection is another effective treatment for pain. The exact mechanism is not well understood. It is believed that chlorpromazine causes cell lysis in high concentrations, leading to irreversible changes in the ciliary ganglion and may have a membrane-stabilising effect as well.[29] Chen et al[28] reported that retrobulbar chlorpromazine injection was found to be a safe and effective form of analgesia when other medications failed and surgery was not acceptable. Chlorpromazine 1 mL to 2 mL (50 mg and 80 mg) is commonly used but a lower dose may be used to avoid a systemic effect.[28] The efficacy varies from 80% to 90%, lasting 3 months to 1 year and appears to be more efficacious with a longer duration of action compared to absolute alcohol.[28] Chlorpromazine may reduce intraocular pressure in some patients, leading to reduced analgesic requirements in glaucoma cases.[27,28,32] Complications following chlorpromazine injections include those related to the retrobulbar technique and those due to the drug. Eyelid oedema, conjunctival chemosis, ptosis, phthisis bulbi, sterile orbital cellulitis, external ophthalmoplegia, hyphaema, nausea, vomiting, brief loss of consciousness and fat necrosis have been reported.[26,28,29,32,33] Transient loss of vision may occur and this is presumably due to the membrane-stabilising effect of the drug on the optic nerve.[28-29]

The injection of lidocaine, prior to the main neurolytic injection, helps primarily by offering a diagnostic test of correct needle placement and secondarily by reducing any unpleasant and distressing pain directly caused by the neurolytic substance itself.

End-stage surgery may not be the answer if the vision is useful, the eye cosmetically normal or if the patient is psychologically not ready to accept surgery.[1] Furthermore, surgery may not be feasible due to tumour spread and risks of failure to heal.[34] If surgery is considered, this would be directed to the anatomical location of the disease. Ocular diseases might merit enucleation or evisceration of the globe.[34,35] Enucleation involves removal of the entire globe from the orbit, leaving the extraocular muscles but severing it from the optic nerve.[36] Evisceration involves

removal of the anterior segment. uveal tissues, retina and vitreous, leaving a scleral shell attached to the muscle and optic nerve.[36] This surgery is more concise than enucleation. Where the disease is primarily orbital, the entire orbital contents can be removed by exenteration. This procedure is most often considered in malignancy but presents special difficulties in post-resection reconstruction. Enucleation can provide pain relief in more than 93% of patients.[21,35] Enucleation is usually not suitable in cases of malignancy due to tumour involvement of other orbital contents.[34] As the surgical procedure may be unpredictable, general anaesthesia is required and this may increase further morbidity and mortality. Both enucleation and evisceration surgery can lead to postoperative complications such as superior eyelid sulcus deformity, enophthalmos, socket contracture, restricted implant motility and implant-associated infections and extrusion.[21,35] Therefore, medical treatment is considered first but when the eye is painful and medical treatment has failed, the eye is disfigured or malignancy involves the globe, surgical treatment is often the best option despite the risks and difficulties.

In our case, the diagnosis was known, so investigations were confined to assessing the degree of invasion of the orbit. MRI scanning had given clear multi-plane imaging of the problem. The patient had been through the WHO analgesic ladder, having graduated through NSAIDS to strong opioids with adjuvant gabapentin, and was still distressed. He had reached a point where lassitude, apathy and preoccupation with his pain had caused him to give up work and an active social life. A multidisciplinary approach was in place. He had regular contact with the MacMillan nursing service, and was in daily contact with his general practitioner. The ophthalmologist, otolaryngologist and oculoplastic surgeons had discussed orbital exenteration but had grave concerns that postoperatively, the wound might break down or that infection would rapidly lead to meningitis or intracranial sepsis. The patient himself was gravely concerned about the risks outlined to him by his surgeons. Consequently, it was agreed that a retrobulbar injection of absolute alcohol would be performed. This provided long-lasting pain relief.

Considered retrospectively, chlorpromazine or phenol might have been an alternative choice but we had no experience with these drugs. Apart from the practical consideration that the normal ocular and periocular anatomy would be destroyed, peribulbar and sub-Tenon's techniques were theoretically not suitable, as discussed previously. Retrobulbar injection was therefore the only option.

Conclusions

The use of retrobulbar injection of alcohol, phenol and chlorpromazine in the management of chronic orbital regional pain is established. The choice of chemical agent depends on its availability and operator preference. This case report highlights the usefulness of the retrobulbar alcohol injection in relieving chronic orbital pain in certain difficult albeit rare situations.

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