Central Retinal Artery Occlusion

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ABSTRACT

Injecting steroid crystals into orbital inflammatory lesions produces a prolonged, high level of drug activity at the target tissue. This technique appears helpful in controlling orbital inflammations in problem cases while reducing the chance of steroid related systemic side effects. We report a patient who experienced central retinal artery occlusion from steroid particles injected into an orbit inflammatory mass. The mechanism of this complication and methods to reduce the chance of central retinal artery embolization are discussed.

When an orbital inflammatory pseudotumor fails to respond to a short course of high dose oral steroids or when the inflammation recurs, a prolonged course of oral steroids may be required for satisfactory control of pain and inflammation. As the duration of steroid treatment lengthens, the chance of complications increases.

Injecting steroid crystals into a lesion can greatly enhance the therapeutic anti-inflammatory effect by producing a higher peak drug level that is prolonged in the lesion. Intralesional steroids concentrate the drug in the target tissue while relatively sparing the rest of the body from steroid side effects.

One of us (REW) has used intralesional steroids to treat orbital inflammatory masses outside the extraocular muscles. The injection of long-acting steroid crystals into an inflammatory mass has appeared to be more effective than oral steroids in problem cases. Similar results have been reported by Krohel, Carr and Webb.

We regretfully report a catastrophic complication in one patient who had effective resolution of a chronic orbital inflammatory lesion after intralesional corticosteroids. The steroid crystals injected into the inflammatory lesion embolized the central retinal artery causing a permanent decrease in visual acuity.

CASE REPORT

A 24-year-old black male with history of two previous orbitotomies for orbital inflammatory pseudotumor was examined for recurrent pain and diplopia. The patient had been treated with oral prednisone 80 milligrams per day on several occasions for four to six months. Because the patient had enlargement of a right orbital mass documented by CT scans, an orbital biopsy was performed to rule out malignant degeneration of an inflammatory mass into a lymphomatous lesion.

The mass was exposed via a lateral orbitotomy. Biopsy specimens sent for frozen section and cell smears suggested a benign chronic inflammatory lesion. Subsequent immuno-histologic typing and permanent sections confirmed the diagnosis of a benign lesion (Figures 1 & 2). The mass was debulked from the superior orbit and from around the trochlea. Intralesional aristocort 40 mg/ml was injected into the firm rubbery lesion which could not be safely removed from

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Supported in part by a grant from Research to Prevent Blindness, Inc.

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around vital orbital structures.

Postoperatively, the patient had no pain or motility restriction, but his vision was reduced to hand motion in the right eye. On fundus examination, the right central retinal artery was occluded with multiple white emboli; a cherry red spot could be seen at the macula surrounded by retinal edema (Figure 3). A fluorescein angiogram documented the multi-focal, embolic retinal vascular occlusion which was interpreted to have occurred from steroid particles entering the arterial circulation.

The patient’s vision in the right eye after three years has improved to 20/100. The retinal artery circulation has returned except for ghost arterial vessels in the superior temporal arcade.

The patient has had complete clinical resolution of the pseudotumor with no further proptosis, orbital mass, pain, or restriction of motility. Despite the poor vision in the right eye, the patient has expressed relief to return to work daily without the chronic pain and diplopia encountered with active orbital inflammation.

DISCUSSION

Our patient suffered a central retinal artery occlusion (Figure 3) from the injection of steroid crystals into an orbital inflammatory lesion. Apparently the crystals can enter the arterial circulation under pressure exceeding systemic arterial pressure. Crystals are forced up the arterial tree until injection pressure is released. Then the crystals shower downstream occluding any end-arteries such as the central retinal artery.

Intralesional steroids have been used effectively to treat juvenile capillary hemangiomas,2 chalazia,3 and orbital inflammatory pseudotumors.1 However, each of these procedures has been associated with central retinal artery occlusion.4-5 In fact, injecting particulate matter anywhere in the mid-facial region seems to carry some hazard for central retinal artery occlusion.6-9

Several techniques have been suggested to reduce the chance of central retinal artery occlusion when injecting particulate matter into the mid-facial area. First, aspiration should be attempted prior to injecting to determine if the needle is within a vessel. However, with extremely small vessels, this may not be reliable. Secondly, a larger syringe will produce less pressure, for a given amount of force on the plunger, than a smaller syringe. Thirdly, injecting slowly reduces the chance of forcing the crystals up the arterial tree. Some inflammatory pseudotumors, however, require considerable pressure to inject into the substance of the mass. Fourthly, injecting in a line, as opposed to a single spot, may reduce the chance of injecting up the arterial stream as the needle constantly moves. Fifthly, selection of a steroid preparation with smaller particle size may reduce the chances of arterial occlusion should embolization occur.

None of the techniques listed above can completely
eliminate the risk of arterial embolization. Considering the difficulty of intentionally injecting into the small arterioles in the eyelid, the question must be raised if other factors are involved.

With inflammatory orbital pseudotumor, the vessels are frequently affected by the inflammatory process (Figure 1). Could the interstitium of the pseudotumor (Figure 2) be contiguous with the arterial circulation such that crystals under pressure enter the arterial systems? Some factor, as yet unappreciated, may increase the likelihood of intra-arterial embolization in the highly vascular mid-facial area as opposed to random placement of a needle within an arteriole.

The rare occurrence of central retinal artery occlusion does not mean that intralesional steroids are contraindicated in the mid-facial region. Our patient was so relieved from the suffering of inflammatory orbital pseudotumor that he considered the benefit to outweigh the complication. The Collagen Corporation* has estimated the occurrence of central retinal artery occlusion from injecting collagen into the dermis to be less than one in a million. We believe this complication to be extremely rare, but its severity dictates that we alert other practitioners to this possible risk and possible methods to reduce the likelihood of this malocurrence.

REFERENCES