Phacoemulsification and intraocular lens implantation after inadvertent intracapsular injection of intravitreal dexamethasone implant

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SUMMARY

In this interventional case series, two eyes of two patients with diabetic macular oedema and one eye of a patient with complicated cataract secondary to uveitis associated with juvenile idiopathic arthritis had inadvertent injection of dexamethasone implant into the capsular bag. This was followed by successful completion of phacoemulsification and intraocular lens implantation. At 1-year follow-up, all patients maintained visual acuity of $\geq 20/40$ with absence of macular oedema.

BACKGROUND

There has been an increasing use of the intravitreal route for injection of various pharmaco-therapeutic agents for a number of ocular pathologies.^{1–4} Long-acting dexamethasone implant (Ozurdex—Allergan Inc, Irvine, California, USA) is one such sustained release agent containing 700 μg dexamethasone. Promising results have been shown in certain patients with diabetic macular oedema and posterior uveitis receiving this implant with improvement in visual acuity.^{5–6} Various complications are known to occur with intravitreal routes of injections such as endophthalmitis, traumatic cataract, retinal detachment, glaucoma and capsular or lenticular injury.^{7–8} Further surgical management after lenticular injury with dexamethasone implant has not been well reported yet in the published literature. We present three such cases where dexamethasone implant was accidentally injected into the capsular bag followed by successful completion of phacoemulsification and intraocular lens (IOL) implantation.

CASE PRESENTATION

CASE 1

A 62-year-old man with type 2 diabetes mellitus of 25 years duration was planned for phacoemulsification with IOL implantation and injection Ozurdex. He had moderate non-proliferative diabetic retinopathy and diabetic macular oedema (DME). He had previously undergone grid laser photocoagulation. Preoperative fundus fluorescein angiogram and optical coherence tomography (OCT) showed presence of DME with central macular thickness (CMT) of 353 μm . At the time of surgery, the implant was injected via the pars plana route 3.5 mm from the limbus. However, the implant inadvertently caused a posterior capsular tear and was injected into the capsular bag. Routine phacoemulsification with clear corneal incision was started. Hydrodelineation with limited

hydrodissection was performed to prevent extension of the capsular tear. The nucleus was emulsified and remaining cortex removed with irrigation—aspiration using low flow parameters. Three piece hydrophobic acrylic IOL (Tecnis 3—piece ZA9003+22.5D, Abbott Medical Optics, Santa Ana, California, USA) was implanted in the capsular bag. Postoperatively, the implant was seen lying partially in the capsular bag and partly behind (figure 1). The patient maintained visual acuity of 20/40 at 12 weeks which was maintained through 24 weeks and normal intraocular pressure (IOP). The implant was absorbed and disappeared at 5 months. DME resolved at 6 weeks and maintained at 32 weeks.

CASE 2

A 76-year-old woman with type 2 diabetes mellitus of 15 years duration was planned for phacoemulsification with IOL implantation along with dexamethasone implant. She had presence of DME with CMT of 421 μm on OCT. Preoperative FA corroborated the OCT findings. Similar to the previous case, the dexamethasone implant was inadvertently injected into the capsular bag (figure 2). Phacoemulsification began with clear corneal incision. Hydrodelineation with limited hydrodissection was performed. The nucleus was emulsified and remaining cortex removed. The implant was pushed into the anterior vitreous through the posterior capsular tear and adequate anterior vitrectomy was performed. Hydrophobic acrylic IOL

Figure 1 (Patient #1): Anterior segment photograph in retro illumination taken on the first postoperative day following phacoemulsification with intraocular lens implantation and intraoperative dexamethasone implant injection of the patient in case 1. Photograph shows a clear cornea with well-centred intraocular lens (IOL) and presence of the implant partly in the capsular bag and partly behind IOL.

To cite: Ram J, Agarwal AK, Gupta A, et al. *BMJ Case Reports* Published online: 12 December 2012 doi:10.1136/bcr-2012-007494

Figure 2 (Patient #2): Intraoperative photograph of the patient in case 2 shows that the dexamethasone implant has inadvertently breached the posterior capsule and is intralenticular in location.

(MA60AC+21.5D, Alcon, USA) was implanted into the sulcus. At 36 weeks, the patient had a visual acuity of 20/40 with normal IOP and OCT showed a normal foveal contour.

CASE 3

An 8-year-old boy was diagnosed as a case of juvenile idiopathic arthritis associated anterior uveitis with visually significant complicated cataract in both the eyes. He was on topical steroids, cycloplegics and systemic immunosuppressant in the form of subcutaneous methotrexate. On examination he had visual acuity of finger counting at 1 metre and IOP was 12 mm Hg. Quiescent anterior segment was ensured for 3 months prior to surgery. Ultrasonography of the posterior segment did not reveal any abnormality. Intraoperatively, Ozurdex was injected via the pars plana route, 3.5 mm from the limbus. During phacoemulsification, it was discovered that the implant had accidentally entered the capsular bag (figure 3). After complete aspiration of the cortex, the implant lying transversely in the capsular bag could be visualised (figure 4). It was gently pushed into the anterior vitreous through the capsular tear and adequate anterior vitrectomy was performed. A three-piece foldable acrylic hydrophobic IOL (Sensar+23.0 D Abbott Medical Optics, Santa Ana, CA, USA) was successfully implanted in the capsular bag. Postoperatively at 24 weeks, the visual acuity improved to 20/40, IOP was normal and there is no CME on OCT.

Figure 3 (Patient #3): Intraoperative photograph of the patient in case 3 shows accidental rupture of posterior capsule by the implant with intralenticular injection. Iris hooks have been used for pupillary dilation.

Figure 4 (Patient #3): Photograph of the same patient as in figure 3 taken after completion of phacoemulsification and implantation of intraocular lens shows dexamethasone implant partly in the capsular bag and partly behind in the vitreous cavity.

DISCUSSION

The technique of intravitreal injections is an evolving process especially for an anterior segment surgeon and has a definite learning curve. In this case series, intravitreal dexamethasone implant was injected prior to the phacoemulsification procedure. The currently accepted guidelines followed by various studies suggest that site of intravitreal injection should be 3.5 to 4 mm posterior to the limbus for pseudophakic and phakic eye respectively.^{9 10} Accurate measurements are achieved by the use of sterile calipers as elucidated by Eyetech trials^{11 12} as in our patients. The needle must be injected keeping the direction towards the centre of the eye.⁸ The technique of injection of dexamethasone implant is different from routine injections owing to its larger bore size of 22G needle. The implant is injected similar to Eckardt's technique¹³ of 23G trochar-cannula system for vitrectomy, that is, engaging the sclera at an oblique angle with the bevel away to create a shelved intrascleral path of around 1 mm parallel to the limbus. The direction is then changed so as to face the centre of the vitreous cavity. This technique has a learning curve and difficulty may be encountered especially by an anterior segment surgeon. Even routine intravitreal injection given inappropriately may lead to formation of traumatic cataract due to inadvertent injury to the lens.⁷ We believe that surgical accidents may be more common in such newer formulations such as intravitreal implants because of their difficult injection technique and wider bore size of the needle.

We propose that in addition, hypotony may play a role in increasing the difficulty of injecting the implant. Hypotony causes significant increase in anterior chamber depth which may increase the chances of lenticular/capsular injury during injection.¹⁴ Hypotony is more prevalent in patients with uveitis—up to the tune of 8.3% as is evident from the MUST trial.¹⁵ Digital globe massage performed after peribulbar anaesthesia can also occasionally lower the IOP enough to cause this complication.¹⁶

Thus, to conclude, it is pertinent to remember that intravitreal injections can be associated with accidental complications especially with availability of newer formulations such as implants. Our experience shows that this complication can be prevented by accurate distance and direction of injection. However, once this complication occurs, it can be overcome by performing careful phacoemulsification keeping in mind the posterior capsular rent with low flow parameters and pushing the implant carefully back into the vitreous cavity through the rent. Adequate anterior vitrectomy followed by implantation of three-piece IOL in the hands of an experienced surgeon can ensure optimal visual rehabilitation.

Learning points

- ▶ Capsular/lenticular injury is possible with the use of intravitreal implants such as dexamethasone implant.
- ▶ Recognition of the complication and further surgical management is challenging.
- ▶ A good surgical outcome with careful phacoemulsification and intraocular lens implantation is possible.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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