

Improving cataract efficiency: insights and learnings from expert practitioners

BY ROD MCNEIL

An evening surgical meeting sponsored by Théa Pharmaceuticals Ltd brought together leading experts to share insights and experience on practice strategies to enhance the efficiency of cataract surgery.

Streamlining patient flow to optimise capacity and efficiency

Qasim Mansoor, Consultant Ophthalmic Surgeon, South Tees NHS Trust Middlesbrough, discussed clinical experience and learnings adopting a high-volume cataract surgery approach (≥ 10 cases per theatre list) to optimise surgical efficiency, patient flow and service capacity.

The Royal College of Ophthalmologists (RCOphth) and Getting It Right First Time (GIRFT) acknowledge that high flow cataract principles are applicable to all but the most highly complex cases and recommend that high flow approaches should be used in all cataract surgery settings, with most case complexity deliverable in stand-alone local anaesthetic day case units.

Achieving appropriate intraoperative mydriasis is a critical factor associated with the safety and performance of cataract surgery. Intracameral administration of mydriatics is an effective alternative to the traditional topical regimen of mydriatic drops for cataract surgery, said Mr Mansoor [1-3].

Preoperative topical dilation works well for suitable patients but can be time-consuming, requires repeated drop instillation prior to surgery to ensure adequate intraoperative mydriasis, and can cause ocular surface toxicity [2]. At-home preoperative dilation is suitable in a selected cohort of patients where relatives and carers are available to provide support if needed, although instillation errors may result in inadequate pupillary dilation and delay scheduled lists.

Mr Mansoor explained that he has been using a standardised intracameral combination of mydriatics and anaesthetic (Mydrane, Laboratoires Théa) as the mainstay approach for achieving optimal mydriasis and anaesthesia during high-volume cataract surgery, across multiple hospital settings and with both standard and premium intraocular lenses (IOLs).

The James Cook University Hospital in Middlesbrough this year introduced high-volume cataract surgery, uplifting cases per list from five to 10, involving a theatre team of two anaesthetic nurses, two scrub nurses and three runners, and using an intracameral mydriasis approach.

Intracameral Mydrane, a preservative-free ophthalmic combination of tropicamide 0.02%, phenylephrine 0.31% and lidocaine 1%, is indicated for cataract surgery to obtain mydriasis and intraocular anaesthesia during the surgical procedure [4].

A phase 3 clinical trial demonstrated that intracameral Mydrane is safe and effective for initiating and maintaining intraoperative mydriasis and analgesia in routine cataract surgery:

- In Mydrane-treated patients, the rate of capsulorhexis performed without the use of any additive mydriatic treatment and with a pupil size of at least 6mm just prior to capsulorhexis was 96.8% [2].
- Intracameral Mydrane was shown to produce rapid and adequate mydriasis throughout the surgery and led to improved intraoperative anaesthesia, with lower patient discomfort during IOL insertion compared with the standard topical regimen [5].

A comparative study reported systemic exposure to tropicamide / phenylephrine was lower and cardiovascular effects were less frequent with intracameral fixed combination of mydriatics and anaesthetic compared with topical mydriatic eye drops [6]. Phenylephrine was detectable in 14.3% of patients receiving intracameral Mydrane (maximum concentration 0.59 ng/mL) compared with all mydriatic eye drop patients (maximum concentration 1.42 ng/mL).

A Cochrane review reported significantly lower intraoperative pain perception in patient groups using supplementary intracameral lidocaine

for phacoemulsification cataract surgery compared with topical anaesthesia alone [7].

Evaluation of intracameral mydriasis and anaesthesia in high flow cataract lists

Mr Mansoor described the processes underlying a high-volume cataract surgery service (e.g., 12-14 cases per four-hour theatre list) established at Teeside Newmedica Eye Hospital Middlesbrough. A unidirectional pathway helps optimise infection control and efficiency, covering preassessment area, anaesthetic room, a single theatre with two scrub practitioners, and a postoperative recovery area. Patients are usually seen preoperatively but 'same day' surgery is also available.

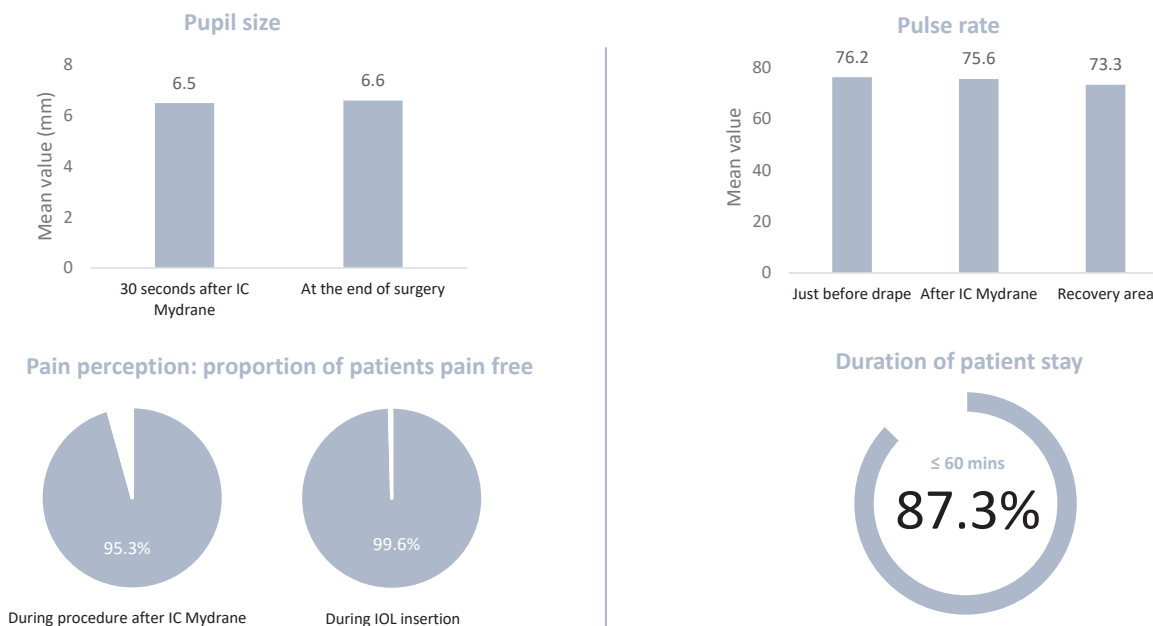
Mr Mansoor presented preliminary topline results from an observational single-centre single-surgeon study evaluating intracameral Mydrane for high-volume cataract surgery (Figure 1).

A total 232 patients / eyes (56% male, 44% female) undergoing unilateral cataract surgery were included, covering consecutive lists of 12-14 patients from June to August 2021. Patients who were dilated before surgery were excluded. Pupillary dilation, anaesthetic effect, pulse rate and patient turnaround time (from arrival to discharge) were assessed.

The majority of study participants (>60%) were aged 71 years or older. In terms of baseline comorbidities, 75.8% of patients had no baseline comorbidities and 14.2% of patients had diabetes. Most patients (95.7%) had no preexisting ocular factors likely to affect pupil dilation; 1.3% of patients had pseudoexfoliation syndrome, 1.7% had glaucoma and 0.4% had small pupils. Nuclear sclerosis (NS) grade was NS+ or NS++ in 88% of patients.

The mean pupil size was 6.5mm 30 seconds after intracameral Mydrane and 6.6mm at the end of cataract surgery, demonstrating adequate and sustained mydriasis throughout the procedure. Mean

Standardised intracameral combination of mydriatics and anaesthetic for high volume cataract lists (n=232)



IC, intracameral; IOL, intraocular lens. Data courtesy of Mr Qasim Mansoor, South Tees NHS Trust Middlesbrough.

Figure 1. Preliminary results from single-centre observational study evaluating intracameral Mydrane for phacoemulsification cataract surgery in high volume theatre lists.

pupil size across different cataract grades ranged from 5.8mm (white cataract) to 7.28mm (posterior subcapsular cataract ++). Mean pupil sizes after Mydrane administration and at the end of surgery were maintained adequate and stable regardless of patient age, axial length, or anterior chamber depth.

Pain intensity in patients undergoing cataract surgery was assessed by Visual Analog Scale for Pain (VAS Pain). The proportion of patients with no ocular pain during the procedure after intracameral Mydrane administration or during IOL insertion was 95.3% and 99.6%, respectively. Only 1.7% of patients experienced a maximum recorded VAS Pain score of five to seven. Mean pulse rates prior to drape, after intracameral Mydrane and in the postoperative recovery area were 76.2, 75.6 and 73.3, respectively. The overall duration of hospital stay exceeded one hour in just 12.7% of cases.

Study results and clinical experience confirm that a standardised intracameral combination of mydriatics and anaesthetic induces rapid, intense, and stable mydriasis during cataract surgery, explained Mr Mansoor. Moreover, audit data show that using intracameral Mydrane significantly reduces the overall patient journey, to within one hour for most patients, compared with

that required using preoperative topical mydriatics. Furthermore, the patient experience is significantly improved, with the maximum duration of dilation typically around four hours.

Mr Mansoor observed that if surgeons consider the aggregation of small multifactorial gains involving faster throughput with high flow cataract lists, intracameral mydriasis is a cost-effective approach for achieving pupillary dilation during phacoemulsification for cataract extraction.

Intracameral mydriasis and anaesthesia simplifies preoperative routines and reduces preoperative waiting times, avoids the need for topical mydriatics preoperatively and associated patient discomfort, frees nursing time for patient counselling and care, streamlines patient flow and leads to high patient satisfaction on the day of surgery, noted Mr Mansoor.

Surgical training and audit outcomes

Mr Mansoor briefly outlined outcomes from a series of supervised trainee high-volume cataract lists using intracameral mydriasis in the independent sector. These results demonstrated effective anaesthesia, fast and adequate mydriasis, and an overall patient journey within one hour. Through three months, the number of supervised

trainee-operated cases increased progressively from three cases in week one to 11 cases by week 13.

All cataract providers must offer surgical training to ophthalmologists in training if they perform more than 50 cataract cases per year, according to NHS England's service specification for cataract surgery published earlier this year [8]. Providers should manage postoperative complications or ensure arrangements are in place to manage them, and are expected to make routine data submissions on audit and training, including to the National Ophthalmology Database (NOD).

The latest RCOphth NOD Audit report for the NHS year 2020 showed a continuation in the marked trend towards improvement in cataract surgery outcomes over the past decade [9]. For all surgeons, 0.91% of operations were affected by posterior capsule rupture, approximately 50% lower than in 2010, and the visual acuity loss rate (loss of ≥15 ETDRS letters) overall was 0.42%, a decrease of 38% from 2010.

Addressing post-cataract dry eye

Alexander Ionides, Consultant Ophthalmic Surgeon, Moorfields Eye Hospital NHS Foundation Trust, discussed how best to prepare the ocular surface pre-cataract surgery and minimise postoperative dry eye.

Cataract surgery is a risk factor for iatrogenic dry eye disease (DED) and can induce or exacerbate dry eye, which can cause patient discomfort, visual disturbance, and poor surgical outcomes [10,11]. Symptoms may be combined with a reduced tear film stability and an increase in ocular surface staining, often persisting for months after uncomplicated phacoemulsification [11]. Post-cataract dry eye may be chronic in a small proportion of patients.

Dry eye induced by cataract surgery has been attributed to multiple factors, such as use of preoperative topical anaesthetics and mydriatic eye drops that contain preservatives, exposure desiccation, possible light toxicity from the operating microscope, nerve transection, elevation of inflammatory factors, goblet cell loss, and meibomian gland dysfunction [10].

Topical mydriatics have been reported to cause a higher incidence of blepharitis and drug-induced ocular surface inflammation, which may result in tear film changes leading to a higher risk of DED [12]. Topical application of benzalkonium chloride and other preservatives leads to corneal neurotoxicity, ocular surface inflammation and reduced aqueous tear production, contributing to postoperative dry eye [13].

Prevention and management of DED associated with cataract surgery

While cataract surgeons typically do not routinely prepare the ocular surface prior to cataract surgery, as it does not directly affect surgical outcomes, it may be that more important consideration needs to be given to preoperative preparation, especially important with multifocal lens implants, argued Mr Ionides.

People with preexisting DED or known risk factors need particular attention and discussion about postoperative dry eye and preoperative precautionary treatment, said Mr Ionides. Dry eye may be associated with rheumatoid arthritis, autoimmune disease, Sjögren syndrome, vitamin A deficiency, anti-cholinergic medications, pregnancy, and the menopause [14].

Mr Ionides observed that a small but persistent number of patients have a disrupted tear film following routine cataract surgery. Some people find that, while they may have had a hint of dry eye prior to surgery, after uncomplicated cataract surgery they experience persistent pain. A recent systematic review and meta-analysis reported that more than one-third of patients without preexisting DED developed DED after cataract surgery [15].

Mr Ionides further explored practical considerations for prevention, treatment and management of DED associated with cataract surgery (Table 1).

Preoperative examination involves patient history, evaluation of DED symptoms and slit-lamp examination. Additional clinical tests may be considered, including fluorescein staining, tear breakup time (TBUT), complete evaluation of the ocular adnexa, conjunctiva and cornea, and further diagnostic tests if warranted to identify subtype and severity of DED, such as Schirmer test, tear meniscometry and tear osmolarity.

Postoperatively, preservative-free artificial tears represent the mainstay therapy for all forms of DED and patients should be instructed to start treatment or continue the preoperative regimen [12]. Punctal plugs, omega-3 fatty

acid supplementation, topical steroids and antibiotic drops as well as topical immunomodulatory drugs such as ciclosporin A may also be considered. Symptoms duration may be shorter in patients using nonpreserved medications, artificial tears or topical ciclosporin A postoperatively [10].

A recent study showed that a preservative-free trehalose 3%/hyaluronic acid (HA) gel formulation (Thealoz Duo, Théa Pharmaceuticals) effectively reduced the signs and symptoms of dry eye and improved tear film stability when administered after cataract surgery [16]. In another prospective study, use of a trehalose/HA ophthalmic solution effectively reduced post-cataract surgery dry eye signs and symptoms in patients with mild to moderate DED, particularly if also administered in the preoperative period [17].

Mr Ionides added that surgeons should consider informing patients about the possibility of postoperative dry eye symptoms, which can vary in severity and duration.

Surgeons may consider offering patients practical lifestyle advice to help minimise postoperative discomfort, such as avoid or protect the eyes from factors that can dry the eyes further, wear wraparound sunglasses outdoors to protect from sun and wind, use a humidifier indoors, and limit screen time. Patients should stay well hydrated and aim for seven to eight hours of quality sleep each night.

Further studies are needed to evaluate the management of DED after cataract surgery, use of preservative-free versus unpreserved drops and the potential benefit of wider use of ciclosporin A for cases of severe ocular surface disease, Mr Ionides concluded.

Table 1. Considerations for preventing and reducing DED related to cataract surgery.

PREOPERATIVE	INTRAOPERATIVE	POSTOPERATIVE
Avoid preserved eye drops	Limit the use of anaesthetic and mydriatic eye drops	Preservative-free artificial tears
Optimise ocular surface (eyelid hygiene, artificial tears)	Avoid persistent surface irrigation	Caution with NSAIDs and epitheliotoxic antibiotics
Consider keratometric and topographic alterations as a possible indicator of DED	Prefer small incisions and short surgical time techniques	Caution with patients with premium IOLs and visual disturbances
Caution with NSAIDs and topical antibiotic prophylaxis	Reduce light microscope exposure and intensity	Choose the proper treatment to restore ocular surface
Delay surgery in cases of uncontrolled or severe DED	Caution with premium IOLs and with FLACS in DED patients	Increase frequency of follow-up visits to monitor response to DED therapy

DED, dry eye disease; FLACS, femtosecond laser-assisted cataract surgery; IOLs, intraocular lenses; NSAIDs, nonsteroidal anti-inflammatory drugs. Adapted from: Mencucci R, et al. *Ophthalmol Ther* 2021;10(2):211-23.

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KEY TAKEAWAYS

- Intracameral mydriasis simplifies preoperative routines and facilitates efficient high volume cataract surgery.
- Management of ocular surface disease before cataract surgery may help minimise postoperative complications and complaints after surgery.

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