EndoArt®

Redefining Corneal Edema Care

Leading European Corneal Surgeons share their Insights and Real-World Experiences with EndoArt®

the Ophthalmologist

EyeYon MEDICAL

Since receiving CE approval (under MDR) to be used as an endothelial prosthesis in patients with chronic corneal edema, EndoArt® has been introduced across selected European centres over the past two years.

Early peer-reviewed publications have reported its safety profile and performance in patients where conventional methods had failed. Importantly, although most implants were performed in highly complex “last resort” cases with low visual potential, in some cases, patients achieved visual acuity of 6/9. **EndoArt®** is a synthetic, biocompatible endothelial implant positioned as an alternative for patients at high risk of graft failure or rejection, where conventional keratoplasty offers limited or unsatisfactory outcomes.

For individuals with repeated graft failure, chronic corneal edema, or coexisting risk factors such as glaucoma, prior vitrectomy, or anterior chamber IOLs, treatment choices have traditionally been limited and often suboptimal. EndoArt® offers a new approach by removing the reliance on donor tissue and eliminating immunological rejection, expanding the therapeutic options for some of the most challenging cases.

To examine its early clinical role, The Ophthalmologist spoke with seven experienced European corneal surgeons. Each shared his experience and perspective on EndoArt®, offering practical insights on outcomes, patient selection, and surgical refinements that may guide its broader integration into corneal edema treatment practice.

Tubed Eye Patient:
Prof. Björn Bachmann (Germany)

“Patients who have undergone glaucoma surgery frequently develop corneal endothelial decompensation but are at an increased risk of rejection episodes following endothelial keratoplasty. While rejection rates after Descemet Membrane Endothelial Keratoplasty (DMEK) are significantly lower in patients with normal risk compared to DS(A)EK, this immunological advantage does not apply to patients with a history of glaucoma surgery. In particular, patients after glaucoma drainage device implantation have a transplant failure rate exceeding 50% within a few years, even when the tube does not come into contact with the corneal endothelium.

Over the past two decades, we have treated many glaucoma patients who have required multiple re-DMEK procedures. EndoArt® offers the fundamental advantage of eliminating the risk of rejection. We use this device in patients with limited visual potential who nonetheless suffer significantly from corneal endothelial decompensation and the associated edema. The best outcomes have been seen in patients without a tendency toward inflammatory reactions or membrane formation. The implantation works best when the iris-lens diaphragm is intact, and the posterior corneal surface is regular. For patients meeting these criteria, we aim to offer a stable, long-term solution.”

Tissue Shortage Patient:
Prof. David Lockington (UK)

“As EndoArt® is an artificial endothelial device, it fills a large medical, surgical, and logistical gap for my patients with complex corneas who may not be suitable for further tissue transplantation and are suffering from painful bullae or visual impairment. Repeated transplants carry greater lifelong incidences of inflammation and graft rejection/failure, including steroid-related risks of glaucoma and infection. Surgically, complex corneas can have very poor visualisation for performing safe endothelial keratoplasty (and limiting transplant endothelial cell loss). But EndoArt® can be easily manipulated into place and secured without concern.

In the UK (and elsewhere), demand for corneal transplantation greatly outweighs tissue availability. EndoArt® offers an immediate, off-the-shelf solution to long wait times and the hope of relieving pain and better vision sooner. Increasingly, what was intended as a temporising intervention until human tissue became available has become a quicker, semi-permanent solution in patients with complex edematous corneas who may not be able to wait many months for DMEK tissue.”

Silicone Oil Eye Patient:
Prof. Peter Szurman (Germany)

“We began using EndoArt® in 14 complex cases, more than half being trauma cases with revisional surgeries, silicone oil exchange, and a decompensation of the cornea. We know that the combination of penetrating keratoplasty in aphakic eyes with silicone oil leads to a survival rate of less than 10% in these eyes after one year. Without an iris lens diaphragm, especially, this has a bad survival rate for corneal transplant. However, by implanting an EndoArt® implant, you get a clarifying of the cornea within 20 minutes. It quickly blocks the influx of fluid, and the cornea gets less hazy, so you can perform vitreoretinal surgery.

Nobody had thought to use EndoArt® in combination with silicone oil, but it can be perfectly employed in these situations. In anterior segment surgery, you have alternatives, but in these complex vitreoretinal cases with opaque cornea, there was no viable alternative until EndoArt®.

One thing I would add is that if the posterior surface of the cornea is irregular, you need to use three to six sutures instead of the usual one suture to firmly attach the EndoArt®.”

Regraft Patient:
Prof. Alain Saad (France)

“In a case where multiple keratoplasties have failed, repeating another regular keratoplasty or human graft has an extremely high probability of failing again. This is where EndoArt® has a special place. Because it is an artificial tissue, there is no risk of immune rejection.

The second advantage of EndoArt is the reduced post-operative steroids treatment, which is ideal in glaucoma patients, possibly steroid responders, who might severely increase their IOP post keratoplasty with the usual extended post-operative steroids treatment.

I also use EndoArt as a temporary treatment for patients on the waiting list for the DMEK procedure. Currently, in our department at the Rothschild Foundation Hospital in Paris, we have around 300 patients waiting for potential donors to have their DMEK performed. In some advanced cases, long wait time might decrease the final best corrected visual acuity because a chronic severe corneal edema can lead to corneal fibrosis. An EndoArt can prevent such a complication while waiting for a DMEK graft.

Low Visual Potential Patient:
Mr. Romesh Angunawela (UK)

“A patient with iridocorneal endothelial (ICE) syndrome, where a previous DS(A)EK had failed after 12 months (the eye also had an aqueous drainage tube), was keen to improve her vision. Given the high likelihood of tissue failure in an eye with ICE syndrome, she chose to have EndoArt® on the basis that the device could not be rejected or fail due to ICE cellular behaviour or glaucoma related complications.

EndoArt® offers a solution that will, in theory, survive the evolving anterior chamber microenvironment of an eye with ICE syndrome, and hope to the patient where other surgeries have failed and are likely to fail. Once the EndoArt® is attached, these eyes are more comfortable as bullous keratopathy resolves. The absence of a corneal tissue transplant can also mean that there is less reliance on long-term use of drops, which is easier for the patient. Some patients will perceive subjective visual improvement.”

The complicated Eye Patient:
Prof. Diane Bernheim (France)

“A 78-year-old patient with a history of pseudoexfoliative glaucoma and cornea guttata in his left eye underwent combined phaco DMEK surgery, followed by many filtering surgeries, and implantation of a Paul valve. He also presented with cystoid macular edema (CME) and epiretinal membrane (ERM). All these anterior segment surgeries and ocular hypertension were responsible for cell loss in the DMEK graft, leading to decompensation.

I chose to perform EndoArt®, given the patient’s limited functional prognosis and the risk of limited endothelial graft life. The advantage of EndoArt® in this case is the absence of cell loss, rejection, and the reduced use of long-term corticosteroids, thus limiting the rise in ocular tension. The implantation was performed without difficulty. I sutured the graft with three stitches. In the immediate postoperative period, detachment occurred despite the initial tamponade with an air-SF6 gas mixture. I reinjected the patient twice (he was highly active, a mountain trail runner!). A paracentral fold persisted, so I performed a new injection with an additional stitch. At 1.5 months, the patient still presented with a graft fold, so I removed three of the four stitches during the fourth injection, and this action allowed for a lasting bond.”

Non-Donor Candidate Patient:
Prof. Sorcha Ní Dhubhghaill (Belgium)

“A 26-year-old patient from Morocco was born with congenital glaucoma. She lost an eye at an early age, and her remaining eye went through multiple surgeries, including full-thickness corneal transplantations that had been rejected twice. My working language is Dutch, and her languages were French and Arabic, so we worked hard to communicate. We discussed immunosuppression, but the patient, with one child, did not want to risk infertility and the side effects.

She was very receptive to the EndoArt® option. The biggest advantage was that there was no requirement for immunosuppression and a chance for long-term improvements. Given the singular ocular chamber, we fixated the EndoArt® with an anchor suture so that when it was inserted, it would not fall to the posterior chamber. I suggest fixating the suture like the tail of a kite. Pulling the implant through using the suture can cause a cheesewire and drop the graft. Once in, the graft was lifted with air and fixated with three corneal sutures. I removed three months postoperatively.

A year postoperatively, the patient is doing well – she can see more shapes, colours, and, most importantly, her daughter's face. We are working with aphakic contact lenses to improve vision and are winning modest gains each time. Her central pachymetry reduced from over 1000 µm to 550 µm, but we still recommend regular evaluations to ensure the cornea does not dehydrate too much.

The patient and I overcame an initial cultural barrier. Now she can see me when we talk, and she smiles – and that does not need to be translated!"

A Transformative Advance

EndoArt® is redefining approaches for corneal edema care in complex and high-risk eyes. The experiences presented highlight its versatility and the opportunity for patients who previously lacked viable treatment. As clinical adoption grows and surgical techniques continue to advance, EndoArt® has the potential to redefine the management of corneal endothelial disease.

EndoArt® Patients Profiles