

The UCP Lowdown

Five experts answered key questions on Ultrasound Cyclo Plasty (UCP) at a symposium held during the WGC-2017 annual meeting

How does ultrasound work to treat glaucoma?

Florent Aptel, University Hospital of Grenoble, France, answered:

Most people are familiar with ultrasonography. Diffuse ultrasound energy is applied to tissue and what's scattered back is used to image it. The energy is weak; tissue temperatures barely rise. In UCP, we use something different: high-intensity focused ultrasound (HIFU), where transducers focus ultrasound energy into a focal zone. HIFU-targeted tissue undergoes a rapid and controlled increase in temperature. Unlike diode lasers, HIFU leaves adjacent tissue virtually unaffected and can treat non-pigmented tissues; it also has a more predictable energy delivery profile than lasers too.

Pre-clinical immunohistochemistry and scanning electron microscopy studies show that HIFU energy remodels the structure of the ciliary body – removal of the bilayer of epithelial cells and coagulation of ciliary stroma – but leaves untreated ciliary bodies intact. Studies using ultrasound biomicroscopy and tracer injection followed by histology suggest that UCP opens the uveoscleral pathway too.

What is it like to use and what are the results?

Ingeborg Stalmans, University of Leuven, Belgium, replied:

The UCP procedure is straightforward. Biometry is done beforehand to pick the right cone size for the patient. After

administering a single drop of pilocarpine and retrobulbar anesthesia, the cone is carefully centered around the limbus, fixed by activation of a gentle vacuum, and filled with BSS as a coupling medium for the HIFU. Pressing the foot pedal activates the six transducers of the cone one after the other to deliver ultrasound beams into the ciliary body. After 3 minutes, treatment is complete. I've participated in two multicenter studies that evaluated UCP using EYE TECH CARE's EyeOPI system: the first included 286 patients from five centers across Europe. The second was a series of patients (n=117) treated in three European centers; 80% of patients enrolled were surgery-naïve. Responders were defined as patients with an IOP lowering of $\geq 20\%$, reaching IOP < 21 mmHg.

In the first study, at 6 months, the responder rate (RR) was 60%; average IOP reductions were 31% (entire population) and 40% (responder patients). In the POAG subgroup, RR was 65%, and the mean IOP reduction was 31% (40% in responders).

In the second study, 70% of patients were responders; the average IOP decrease was 33% (40% in responders). In the POAG subgroup, RR and IOP reductions were, respectively, 77% and 34% (39% in responders). These data tally with the UCP literature in populations containing both refractory and non-refractory glaucoma.

And in other regions of the world?

Ronnie George, Sankara Nethralaya Hospital, Chennai, India, reflected on his experience of UCP:

Dr. Nilanjana Deb (Win Vision Eye Hospital, Hyderabad) evaluated the EyeOPI system in a predominantly POAG (80%) population, with 95% of patients naïve of surgery (n=69/73). One month after UCP, RR and mean IOP reduction were 85% and 40% respectively (RR, IOP reduction $> 20\%$ with potential addition of hypotensive medication). Most of the benefit was retained out to 1 year, with a mean RR of 78% and mean IOP reduction

of 33% for the responder group.

My own study in Chennai incorporated a mix of many different glaucoma types amongst the patient population (n=24): angle-closure (38%), neovascular (25%), pseudoexfoliative (8%), POAG (8%) and other (21%). After 1 month, RR was 71%, with a mean IOP reduction of 48%, and IOP reduction of 60% for responders.

So UCP seems to work in Indian eyes with similar results on IOP reduction, across different types of glaucoma.

XingHuai Sun, Shanghai EYE and ENT Hospital of Fudan, China, shared his experience of UCP:

In China, PACG causes nearly as much morbidity as POAG, so we need a quick, easy and efficient treatment method, which can be used outside of the operating room.

We performed a multicenter study in which 78 patients were treated with UCP using the EyeOPI device. The glaucoma diagnosis in patients was a mixture (PACG, 30%; POAG, 21%; neovascular, 21%; other, 28%) and patients were treated with an escalated dose of UCP.

Mean RR and IOP reduction in the responder group from baseline after 1 month were, respectively, 66% and 52%, and after 3 months, 66% and 42%. These outcomes are similar to those from published UCP studies – so ethnic background does not affect the effectiveness of the procedure, which also seems to work with same efficacy level for ACG.

What's the bottom line?

Keith Barton, Moorfields Eye Hospital, London, UK:

UCP with the EyeOPI device appears to be a quick, easy and effective procedure, with an average IOP lowering of 35%. It's effective in cases of POAG and ACG, and ethnic differences do not alter its IOP-lowering efficacy. UCP appears to be a good option for refractory glaucoma as well as for patients with high risk of surgery failure.