

# COLLAGEN CROSS LINKAGE

For the treatment of Keratoconus

## Keratoconus

Keratoconus is an uncommon condition that affects the cornea (the transparent dome at the front of the eye and its main focusing system). It is characterised by thinning and bulging of the tissue. This distortion of the corneal shape results in irregular astigmatism which causes a reduction in vision. It typically presents in adolescence. Progression is variable, but without treatment 10-25% of cases need surgery.



*The picture is of corneal tissue showing increased stiffness (top/temporarily stained yellow) immediately after undergoing cross linkage compared to non-cross-linked tissue (bottom). Courtesy of D. O'Brart.*

## Treatment

Treatment depends of the degree of ectasia (corneal bulging) and the resultant irregular astigmatism. Mild cases can be treated with astigmatic spectacles and soft toric (astigmatism correcting) contact lenses. As the disease progresses rigid (hard) contact lenses become necessary to improve vision. In the majority of patients such lenses give good vision, but are not the solution in all cases. Discomfort may limit the use of rigid contact lens wear and in advanced cases fitting may be difficult. Severe bulging and corneal scarring in advanced keratoconus can limit the visual improvement with contact lenses.

# CXL Information Sheet

## Page 2

Between 10-25% of patients require some form of surgery. The options include:

- Corneal transplantation
- Intra-corneal ring segment insert (INTACS)
- Collagen Cross Linkage (CXL)

## Collagen cross-linkage (CXL) with Riboflavin and ultraviolet light

This is a relatively new way of treating the condition and the first one which may actually stabilise the cornea and stops keratoconus getting worse. It increases the mechanical stability of the cornea and its resistance to enzymatic digestion by inducing cross linkage between collagen fibres in the cornea.

The technique is performed under topical anaesthesia (eye drops). As riboflavin does not easily penetrate, the corneal skin or epithelium is painlessly removed using a blunt spatula.

During the procedure riboflavin eye drops are applied to the eye surface every three to five minutes. Once enough has been absorbed (usually after about 30 minutes), ultraviolet light is shone at the eye for 30 minutes.

After the treatment a bandage contact lens is placed in the eye and this is worn continuously until review in outpatients. A combination of a steroid and antibiotic drop is prescribed.

# CXL Information Sheet

Page 3

## Benefits

In most patients the disease stops getting worse: clinical studies looking at results for up to 5 years after treatment have found that progression of the disease is halted in 90% of patients.

In addition, a significant proportion (between 20 and 70% in different studies) show improvement.

## Risks

Generally Collagen Cross Linkage is a safe procedure, but there are some possible complications.

Cells in the corneal tissue (keratocytes) are killed off by the ultraviolet light, but are replaced by the body and this does not seem to cause any problems. The light could also damage the endothelial layer of cells on the back surface of the cornea, and for this reason people with very thin corneas (less than 0.4 mm) may not be suitable for treatment. There has been no evidence of damage to the endothelial cells in studies so far.

UV light is potentially damaging to the lens and retina, but the riboflavin drops stop the light penetrating to these deeper structures.

There is a risk of infection as well as other non-infective inflammatory problems after treatment. In 1-3 patients out of 100, these are severe enough to cause some loss of vision, even with treatment and even with new glasses or contact lenses. However, this risk has to be weighed against the risk of the keratoconus getting worse, possibly to a stage which requires transplantation; a procedure that carries substantially greater risks than cross-linkage.

# CXL Information Sheet

Page 4

Because the treatment involves removing the cell layer on the surface of the eye, there is short-term discomfort and hazy vision after the procedure. The vision may be variable for up to 4 weeks.

Cross linkage is a relatively new treatment and all long term effects may not yet be known. Although the benefits seem to be permanent, it is possible that some patients may need repeat treatment at some point in the future.

**Jeremy Prydal**  
**Leicester Nuffield Hospital**  
**Telephone 0116 274 3718**

## **Please note**

If you undergo the procedure, the eye will be uncomfortable for a few days, with some haziness of vision and slight swelling of the lid.

Should you experience a worsening of pain, a sudden loss of vision, increased redness of the eye or increased swelling of the eyelids, you need to be examined urgently.

During normal working hours please contact Mr Prydal's secretary on 0116 274 3718. At other times ring Nuffield reception on 0116 276 9401. Also, the ophthalmologists on call at Leicester Royal Infirmary, and in Eye Casualty there provide cover and will be happy to see you.