The evaluation of parameters used in the detection of progressive keratoconus and the evaluation of different protocols for corneal crosslinking

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BACKGROUND

There is no consensus on the definition of progressive keratoconus (KC). As no reference equipment exists that can detect progression in an exact way, the accuracy of measurements must be evaluated to define changes in magnitude at which progression can be detected.

Corneal crosslinking (CXL) by isotonic riboflavin is the standard treatment for progressive KC. This method causes reduction in corneal thickness and endothelial cells can be exposed to harmful UV-irradiation. CXL by hypo-tonic riboflavin does not reduce corneal thickness and CXL by iontophoresis does not need epithelial debridement and there is thus no risk for infectious keratitis. These three methods are investigated in a randomised clinical study.

The treatment of advanced progression KC is challenging due to the reduced thickness of the cornea and risk of endothelial damage. Adding atonic sterile water during CXL increases thickness above safety margins.
HYPOTHESIS

The measurement accuracy of intra-day measurements by corneal topography/tomography are not affected by disease severity.

The measurement accuracy is not affected by obtaining measurement between days.

The “Belin ABCD progression display” will not show progress based on multiple intra-day or inter-day (3 days apart) measurements and the “Belin ABCD classification system” will not change KC-grade based on intra-and inter-day measurements.

Adding sterile water does not affect the outcomes of CXL.

CXL by hypotonic riboflavin or by iontophoresis are non-inferior to CXL by isotonic riboflavin.

PRELIMINARY RESULTS

KC disease magnitude affects the measurement accuracy and should be considered (1). The intra-day manuscript is ready for submission. The randomised clinical study is 35% complete. The addition of sterile water during CXL does not appear to affect outcomes (2).

SIGNIFICANCE

Inclusion criteria should be based on disease severity. Today, patients with lower disease magnitude are under-treated and thus exposed to the risk of deterioration vision and higher disease magnitude over-treated and thus subjected to treatment associated side-effects.

Progressive, advanced, KC can be effectively treated by CXL with the addition of sterile water. The CXL-RCT will reveal the effectiveness of treatment by different CXL-protocols.