REVIEW
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Cataract surgery and Fuchs' dystrophy

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ABSTRACT

In this article, Fuchs' endothelial dystrophy is discussed. The symptoms and early treatment are analysed, as well as the hereditary nature of the disease. Surgical approach is thoroughly analysed and the advantages and disadvantages of a potential combined procedure (partial keratoplasty and cataract surgery) are discussed.

KEY WORDS: Fuchs' dystrophy, cataract surgery, Descemet's membrane endothelial keratoplasty, Descemet's stripping automated endothelial keratoplasty

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INTRODUCTION

Fuchs' endothelial dystrophy is a non-inflammatory dystrophy involving the endothelial layer of the cornea [1]. The endothelium, which is a monolayer of cells that keeps the cornea clear by pumping out excess fluid that could cause corneal swelling.

In the initial stages of Fuchs' endothelial dystrophy, a progressive accumulation of focal excrescences (known as guttae) is observed, as well as thickening of Descemet's membrane. The normal attrition rate for endothelial cells is 0.6% per year [2]. In patients with Fuchs' endothelial dystrophy this rate is much higher. As a result, the remaining cells can no longer pump out the excess fluid and oedema occurs [3]. What should be noted is that Fuchs' endothelial dystrophy is defined as the accumulation of corneal guttae with stromal oedema [3]. The pathogenesis of the disease is unclear. Some possible factors may be sex hormones, inflammation, and endothelial cell apoptosis [4].

The disease usually affects both eyes and causes a gradual decline in vision due to corneal oedema and clouding. As the disorder progresses, swelling of the cornea can cause blisters on the front of the cornea known as epithelial bullae. This condition is known as bullous keratopathy. The damage to the cornea in Fuchs' endothelial dystrophy can be so severe as to cause corneal blindness [1]. Some common symptoms are: glare and sensitivity to light, eye pain, blurred vision, poor vision upon awakening that may improve later in the day, and foreign body sensation. The diagnosis of the disease is made via biomicroscopy and other modalities ophthalmologists have, such as corneal pachymetry, confocal microscopy, and specular microscopy.

The progression of the disease can be divided into four stages [5]. In stage one, the patient experiences no symptoms and there are a few to moderate corneal guttae. The vision in this stage is unaffected. In stage two there is mild to moderate loss of vision but there is still no pain. In the clinical examination, moderate to numerous corneal guttae are observed and there is mild corneal oedema. The vision is mildly reduced. In the third stage, there is moderate to severe loss of vision and pain. Clinically, confluent corneal guttae are observed, as well as moderate to severe corneal oedema and epithelial bullae. In the final stage (four), there is severe loss of vision but the pain is reduced. Fewer epithelial bullae are observed as well as subepithelial scarring.

Fuchs' dystrophy is often inherited in an autosomal dominant manner [6]. This means that there is a 50% chance for a person to develop the disease if one of the parents has it. Consequently, there is no way of preventing the disease and its progress. The treatment of the disease begins when the patient starts noticing fluctuation in vision. The early treatment usually involves hypertonic saline

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drops and/or ointments. The hypertonic saline helps to evaporate fluid off the cornea, leading to a minimisation of oedema.

As the disease progresses there may be a need for surgical treatment. The most popular surgical procedure is currently Descemet's membrane endothelial keratoplasty (DMEK) or Descemet's stripping automated endothelial keratoplasty (DSAEK).

SURGICAL TREATMENT

When performing cataract surgery on a patient with Fuchs' dystrophy, one should be extremely cautious. The patient should be thoroughly informed about the possibility of corneal decompensation after surgery. When the Fuchs' dystrophy is mild, there is no need for endothelial keratoplasty [7]. The cataract extraction should be performed when the nucleus is still soft, so there is no need for high-energy ultrasound. The endothelium should be protected with the use of viscoelastic.

In severe Fuchs' dystrophy there is an indication for combined cataract and DSAEK surgery[7]. When performing DSAEK, there is change in the intraocular lens (IOL) calculation. There are studies [8] that report a slightly hyperopic swift in eyes undergoing such surgeries. In patients with severe Fuchs' the IOL should not be hydrophilic because it can become opacified from the air used during DSAEK. In combined cases the use of viscoelastic is not indicated because it reduces the possibility of the graft attaching to the cornea. Insert IOL, inflating the bag with BSS. If viscoelastic is used, then it has to be washed out thoroughly. Extra capsular cataract extraction remains a viable option but has more complications than phacoemulsification and creates more astigmatism.

It has been reported by many studies [9, 10] that the visual acuity of patients who undergo DMEK or DSAEK significantly improves. Partial corneal transplant procedures are preferred by surgeons, instead of full-thickness corneal transplants. The reasons are the following: a. because the eye surface is kept intact, thus remaining more resistant to injury and infection, b. there is minimal change in refraction because only the endothelial layer (~5% of the cornea) is replaced, c. suture-related problems are significantly reduced, and d. visual recovery is significantly faster.

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