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Perspective

Examining the Role of Dehydrated Corneal Tissue in Modern Keratoplasty

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DESCRIPTION

Deep Anterior Lamellar Keratoplasty (DALK) is a corneal transplant technique that selectively replaces the anterior layers of the cornea while preserving the recipient's healthy endothelium. This method is used in cases of corneal diseases that do not affect the innermost endothelial layer, such as keratoconus, stromal scars and dystrophies. By sparing the endothelium, DALK reduces the risk of graft rejection compared to full-thickness Penetrating keratoplasty (PK), making it a preferred option for patients with specific corneal conditions. The use of dehydrated corneal tissue has emerged as an advanced technique to facilitate DALK, offering several potential advantages in terms of storage, availability and handling.

This article delves into the procedure, advantages, challenges and outcomes of DALK using dehydrated corneal tissue, focusing on its application in ophthalmic surgery and its impact on corneal transplantation.

DALK is designed to address corneal pathologies that affect the stroma and anterior layers while leaving the posterior segment, particularly the endothelium, intact. Traditional full-thickness transplants, such as penetrating keratoplasty, involve the replacement of all corneal layers, including the endothelium, which can lead to a higher incidence of graft rejection. DALK, on the other hand, selectively replaces the diseased anterior layers, preserving the recipient's endothelium and reducing the risk of immune-mediated rejection. A progressive condition in which the cornea thins and bulges into a cone shape, distorting vision. Inherited disorders that lead to the accumulation of abnormal material within the corneal stroma, affecting vision. Scarring due to trauma, infection, or previous surgeries that impairs transparency and visual acuity. By preserving the healthy endothelium, DALK minimizes the risk of endothelial rejection, which is a significant concern in penetrating keratoplasty. The potential for long-term graft survival is also improved, as the patient's native endothelium, which remains untouched, continues to function normally. Dehydrated corneal tissue has emerged as a valuable tool in corneal transplantation, offering several advantages over fresh or cryopreserved tissue. The process of dehydration involves removing water from the corneal stroma, allowing the tissue to be stored for extended periods without the need for specialized freezing or preservation methods. This feature makes dehydrated corneal tissue an attractive option for ophthalmic surgeons, especially in areas where access to fresh donor tissue may be limited. One of the primary benefits of dehydrated tissue is its prolonged shelf life. Unlike fresh donor corneas, which must be used within a limited window of time, dehydrated corneal grafts can be stored for several months at room temperature. This increases availability, particularly in regions with limited access to donor tissue banks. Dehydrated tissue is lightweight, compact and easy to transport, reducing logistical challenges associated with tissue storage and transportation. The handling process is also simplified, as the tissue can be quickly rehydrated before surgery, minimizing preparation time in the operating room. Dehydration of corneal tissue reduces the risk of contamination and infection, as the tissue is processed in a sterile environment. This ensures a safer graft for transplantation, lowering the potential for postoperative complications related to infection. In regions where eye banks are not readily available, or where the infrastructure for maintaining fresh donor corneas is lacking, dehydrated tissue provides a viable alternative for corneal transplantation.

The ease of storage and transport makes it possible for surgeons in remote locations to perform DALK procedures without the constraints of time-sensitive fresh tissue. Before transplantation, the dehydrated tissue must be rehydrated to restore its natural thickness and flexibility. This process is typically performed by immersing the dehydrated corneal graft in a sterile solution for a specified period. Once rehydrated, the tissue regains its original properties and can be used in the same manner as fresh donor tissue. The rehydration process is straightforward and can be performed quickly in the operating room. Careful monitoring of the rehydration period is necessary to ensure that the tissue is fully restored to its functional state before transplantation. If the tissue is not adequately rehydrated, it may result in improper graft adherence or complications during the surgical procedure.

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