EURASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES
Innovative Academy Research Support Center
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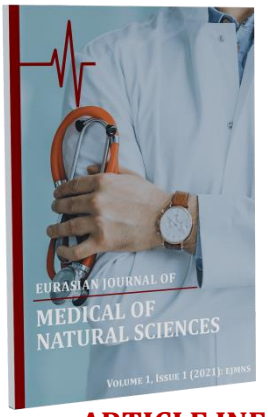

HISTOLOGY OF PTERYGIUM

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https://doi.org/10.5281/zenodo.10829710

ARTICLE INFO

Received: 12th March 2024
Accepted: 17th March 2024
Online: 18th March 2024

KEYWORDS

Pterygium, Histology, Ocular Surface Disorder, Fibrovascular Tissue, Cornea, Conjunctiva.

ABSTRACT

Pterygium is a common ocular surface disorder characterized by the growth of fibrovascular tissue over the cornea. This article provides a comprehensive overview of pterygium histology, including its pathogenesis, cellular components, and molecular characteristics. Understanding the histological features of pterygium is crucial for developing effective treatment strategies and improving patient outcomes.

Introduction:

Pterygium is a benign, wing-shaped growth of conjunctival tissue that extends onto the cornea. Pterygium is a common ocular surface condition characterized by the growth of a pinkish, triangular tissue over the conjunctiva, often extending onto the cornea. It is a prevalent ocular surface disorder, particularly in regions with high levels of ultraviolet light exposure. While the exact etiology of pterygium remains unclear, histological studies have provided valuable insights into its pathogenesis and cellular composition. This article aims to review the current understanding of pterygium histology and its implications for clinical practice.

Types

1. Popliteal pterygium syndrome, a congenital condition affecting the face, limbs, or genitalia but named after the wing-like structural anomaly behind the knee.
2. Pterygium (eye) or surfer's eye, a growth on the cornea of the eye.
3. Pterygium colli or webbed neck, a congenital skin fold of the neck down to the shoulders.
4. Pterygium inversum unguis or ventral pterygium, adherence of the distal portion of the nailbed to the ventral surface of the nail plate.
5. Pterygium unguis or dorsal pterygium, scarring between the proximal nail fold and matrix.

A pterygium reduces vision in several ways:

1. Distortion of the corneal optics. This begins usually when the pterygium is greater than 2 mm from the corneal limbus.
2. Disruption of the tear. The tear film is the first lens in the eye. Pterygia are associated with eyelid inflammation, called blepharitis.
3. Growth over the corneal centre, which leads to dramatic reduction of vision.

4. Induced anterior corneal scarring, which often remains after surgical removal.

A pterygium of the eye grows very slowly. Usually it takes several years or decades to progress.

Surgical Removal

Indications for surgery, in order of decreasing importance:

1. Growth over the corneal centre.
2. Reduced vision due to corneal distortion.
3. Documented growth.
4. Symptoms of discomfort.
5. Cosmesis.

Surgery is usually performed under local anaesthetic with light sedation as day surgery. The pterygium is stripped carefully off the surface of the eye. If this is all that is done, the pterygium regrows frequently. The technique with the lowest recurrence rate uses an autotransplantation of conjunctiva from under the eyelid. This is placed over the defect remaining from the removed pterygium. The graft can be stitched in place, which is time-consuming, and painful for the patient afterwards.

An alternative is the use of tissue adhesive fibrin glue. A Cochrane review including 14 studies and last updated October 2016, found that using fibrin glue when doing conjunctival autografting was associated with a reduced likelihood of the pterygium recurring compared with sutures. The review found that operations may take less time but fibrin glue may be associated with more complications (for example, rupture, shrinking, inflammation,granuloma). A 3-year clinical study on the application of collagen matrix as excision site grafts showed significantly improved surgery success rates.

The mechanism of the collagen matrix graft (commercially available as ologen) works by promoting healthy cell growth into the matrix, thus preventing conjunctiva overgrowth that can cover the iris.

Histological examination

The histological examination of a pterygium typically reveals several key components. The leading edge of the pterygium, known as the head, is characterized by a thickened, disorganized epithelium with overlying conjunctival epithelial cells. This area often shows signs of chronic inflammation, including infiltrates of lymphocytes, plasma cells, and macrophages. The inflammatory response is thought to be driven by various cytokines and growth factors produced by the pterygium tissue.

Beneath the epithelial layer, pterygium is composed of a dense fibrovascular stroma. This stroma contains a network of blood vessels, predominantly capillaries, that supply the growing tissue with nutrients and oxygen. The stroma is rich in collagen fibers, particularly type I and type III collagen, which contribute to the fibrotic nature of pterygium. Fibroblasts are the predominant cell type in the stroma and are responsible for producing collagen and other extracellular matrix components.

One of the hallmarks of pterygium histology is the presence of elastotic degeneration. Elastotic degeneration refers to the accumulation of abnormal elastic fibers in the stroma, which appear as basophilic, tangled masses under the microscope. These elastotic fibers are thought to result from chronic ultraviolet (UV) exposure, which induces the production of

abnormal elastin by fibroblasts. Elastotic degeneration contributes to the characteristic yellowish appearance of pterygium tissue.

In addition to fibrosis and elastosis, pterygium is associated with increased angiogenesis. Angiogenesis, the formation of new blood vessels, is a key feature of pterygium pathogenesis and is driven by pro-angiogenic factors such as vascular endothelial growth factor (VEGF). The neovascularization seen in pterygium tissue is believed to play a role in sustaining the growth and progression of the lesion.

Epithelial changes are also observed in pterygium histology. The conjunctival epithelium covering the pterygium is often hyperplastic and may show signs of metaplasia, such as squamous metaplasia. These epithelial changes are thought to be adaptive responses to the chronic inflammatory and environmental stimuli present in the pterygium microenvironment.

Department of Methods:

Histological analysis of pterygium specimens was performed using standard laboratory techniques. Tissue samples were collected from patients undergoing pterygium excision surgery. Hematoxylin and eosin staining, immunohistochemistry, and electron microscopy were employed to examine the cellular and structural characteristics of pterygium tissue.

Histologically, pterygium is a fascinating entity that involves a complex interplay of various cellular and structural components. Histological Features of Pterygium:

1. Epithelium: The leading edge of a pterygium consists of hyperplastic and metaplastic epithelium. This epithelium is often multilayered, with an increased number of goblet cells compared to normal conjunctiva. The presence of goblet cells is a distinguishing feature of pterygium histology.
2. Subepithelial Fibrovascular Tissue: Beneath the epithelium lies a dense fibrovascular tissue. This tissue is composed of fibroblasts, blood vessels, and inflammatory cells. The fibroblasts are responsible for the production of collagen and other extracellular matrix components, leading to the characteristic fibrotic nature of pterygium.
3. Inflammatory Infiltrate: Pterygium is associated with chronic inflammation, as evidenced by the presence of inflammatory cells such as lymphocytes, macrophages, and mast cells within the stroma. The inflammatory response is thought to play a role in the pathogenesis and progression of pterygium.
4. Angiogenesis: Pterygium is a highly vascularized lesion, with an abundance of new blood vessel formation within the fibrovascular tissue. Angiogenesis is driven by various growth factors and cytokines, promoting the growth and maintenance of the pterygium.
5. Melanocytes: In some cases, pterygium may contain melanocytes, pigment-producing cells that contribute to the brownish coloration often observed in pterygium tissue. The presence of melanocytes is more common in pterygium from individuals with higher levels of sun exposure.
6. Clinical Implications:Understanding the histological features of pterygium is crucial for its diagnosis and management. The presence of specific cellular components and tissue characteristics can help differentiate pterygium from other ocular surface lesions. Histological analysis may also provide insights into the underlying pathophysiology of pterygium, guiding the development of targeted therapies.

Conclusion: In conclusion, pterygium histology is characterized by a complex interplay of epithelial hyperplasia, fibrovascular proliferation, inflammation, angiogenesis, and extracellular matrix remodeling. These histological features contribute to the clinical presentation and progression of pterygium. Further research into the molecular mechanisms driving pterygium histopathology is essential for the development of novel treatment strategies aimed at preventing pterygium recurrence and complications.

Results:

Histological examination of pterygium tissue revealed a complex interplay of inflammatory cells, fibroblasts, blood vessels, and extracellular matrix components. The epithelial layer exhibited hyperplasia and metaplastic changes, while the stroma showed increased collagen deposition and vascularization. Immunohistochemical analysis demonstrated upregulation of pro-inflammatory cytokines and matrix metalloproteinases in pterygium tissue, suggesting a role for chronic inflammation in its pathogenesis.

Discussion:

The histological features of pterygium reflect a dynamic process involving inflammation, fibrosis, and angiogenesis. Understanding the molecular mechanisms underlying these histological changes is essential for developing targeted therapies to prevent pterygium recurrence and progression. Future research should focus on elucidating the signaling pathways involved in pterygium pathogenesis and identifying novel therapeutic targets to improve patient outcomes.

In summary

The histology of pterygium is characterized by a complex interplay of inflammation, fibrosis, angiogenesis, elastosis, and epithelial changes. Understanding these histological features is essential for developing targeted therapies that address the underlying pathogenic mechanisms of pterygium. Further research into the histopathology of pterygium may uncover new therapeutic targets and improve outcomes for patients with this common ocular condition.

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