

Repair of lamellar scleral lesions in dogs with preserved equine renal capsule - Short report

Reparação de lesões lamelares esclerais em cães com cápsula renal de equino preservada - Relato curto

Alexandre Lima de Andrade¹
Flávia de Rezende Eugênio²
Rosimeri de Oliveira Vasconcelos²
Lilian Bevilacqua³
José Luiz Laus⁴

ABSTRACT

Purpose: To evaluate the use of equine renal capsule preserved in glycerin to repair lamellar scleral lesions in dogs. **Methods:** Twelve healthy mongrel dogs, male and female, weighing 12 kg were used. The study was both clinical and morphological, and performed on the first, third, seventh, 15th, 30th and 60th day after surgery. Temporal canthotomy was performed after standard preoperative and general anesthesia. Conjunctival and scleral square incisions of 0.5x0.5 cm were carried out in a one o'clock position, near the limbus. A fragment of hydrated biological prosthesis, of the same shape, was sutured with 7-0 Vicryl[®] in an interrupted suture. **Results:** The clinical evaluation showed blepharospasm/photophobia until the 7th day after surgery. Conjunctival edema appeared up to the 5th day after surgery. Mucoid ocular discharge was sustained until the 10th day after surgery. Hyperemia was observed until the end of the evaluation period. There were no signs of graft extrusion in all animals. The anterior and posterior segments did not show clinical signs of inflammation. The optical microscopy morphological evaluation showed an inflammatory exudation with acute aspects in the early and intermediate periods, and inflammatory exudation with chronic aspects in the late periods. There was incorporation of the implant by the recipient's sclera. **Conclusion:** These results suggest that the equine renal preserved capsule could be a useful alternative tissue to repair lamellar corneal lesions in dogs and humans.

Keywords: Sclera/lesions; Transplantation heterologous; Dogs; Animal

INTRODUCTION

A number of specific inflammatory responses affects the episclera and sclera of dogs. The common association of episcleritis or scleritis with rheumatoid arthritis in humans, however, has not been established in dogs⁽¹⁾. Inflammatory diseases of the sclera can be divided into nonnecrotizing granulomatous scleritis and necrotizing granulomatous scleritis. In advanced scleritis, there may be diffuse corneal stromal infiltration, as well as secondary retinal involvement. The scleral lesions may, or may not, be associated with systemic collagen diseases⁽²⁾. In these cases, they may progress to complete perforation or require specific therapy to prevent perforation.

Preserved biological membranes have been used in human and veterinary ophthalmology with good results for corneal and scleral tectonic repair⁽³⁻⁶⁾. Surgical techniques employed for scleromalacia include homologous grafts of sclera⁽⁷⁻⁸⁾, fascia lata graft⁽⁹⁻¹²⁾; aorta graft⁽¹³⁾ and preserved heterologous pericardium⁽¹⁴⁾.

Despite the numerous surgical techniques that have been described, there

¹ Professor Assistente Doutor do Curso de Medicina Veterinária da Faculdade de Odontologia de Araçatuba, da Universidade Estadual Paulista - UNESP - Campus de Araçatuba.

² Professora Assistente Doutora do Curso de Medicina Veterinária da Faculdade de Odontologia de Araçatuba da Universidade Estadual Paulista - UNESP - Campus de Araçatuba.

³ Médica Veterinária Residente do Hospital Veterinário do Curso de Medicina Veterinária da Faculdade de Odontologia de Araçatuba da Universidade Estadual Paulista - UNESP - Campus de Araçatuba.

⁴ Professor Titular da Faculdade de Ciências Agrárias e Veterinárias da Universidade Estadual Paulista - UNESP - Campus de Jaboticabal.

Endereço para correspondência: Rua Clóvis Pestana, 793, Araçatuba (SP) CEP 16050-680
E-mail: landrade@fmva.unesp.br

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are few reports on xenogeneic grafts for tectonic scleral repair. Thus, the purpose of this study was to evaluate the preserved equine renal capsule for repair of the experimental lamellar scleral lesions in dogs.

METHODS

Experimental design

Twelve adult, 12-kg, mongrel dogs, divided into six groups ($n=2$), of one male and one female, were studied. In order to study the postoperative course, six groups of two animals were named: G1, G2, G3, G4, G5 and G6. These groups were analyzed via ophthalmic examinations with the slit-lamp biomicroscope, before and after the lamellar scleroplasties, and placement of an equine renal capsule graft.

Biological prosthesis

The equine renal capsule was preserved in 98% glycerine^(3-4,14). The biological prosthesis was harvested from horses that were euthanized due to orthopedic fractures but otherwise healthy.

Surgical technique

The surgical technique was performed on 12 clinically healthy dogs (each dog had one eye surgically treated). The animals were anesthetized with halothane. After a lateral canthotomy, the surgery was performed with the aid of an operating microscope 40X magnification (Microscope MC-M9). Conjunctival and scleral square incisions of 0.5x0.5 cm were carried out in a 1 o'clock position, near the limbus. For superficial sclerectomies, a trephine was used to create a half-thickness defect in the sclera. A fragment of hydrated biological prosthesis was rinsed and stored in sterile 0.9% saline, and cut with the same dimensions as the graft bed. Then, the prosthesis was fixed in its recipient bed using an interrupted pattern, 8-0 Vicryl® suture. After surgery, the dogs were treated with topically applied chlorphenicol ointment, twice a day for 10 days, in order to prevent bacterial infection.

Clinical and morphological evaluation

The clinical evaluations were performed at 24-h intervals. The ocular signs evaluated were blepharospasm/photophobia, ocular discharge, conjunctival edema and hyperemia⁽³⁾. These evaluations were performed by two observers.

The light microscopy study examined periods of one, three, seven, 15, 30 and 60 days after surgery. Six-micrometer section samples were stained with hematoxylin-eosin (H&E). The scleras, which received the grafts, were then analyzed.

RESULTS

Clinical evaluation

All scleras had marked conjunctival edema in the early postoperative period, which then decreased along 3 days after

surgery. Blepharospasm/photophobia and ocular discharge were marked in the early period. Hyperemia was very significant in the early postoperative period and decreased in the late period.

In this study neither pigmentation of the graft bed, nor extrusion of the graft, as well as signs of inflammation of the posterior and anterior segments were observed. Figure 1 illustrates the clinical aspects on the 30th and 60th day after surgery.

Histopathological evaluation

All dogs followed a similar pattern during the healing process. The main histopathologic changes were those at the junction of the graft tissue and beneath the graft bed. Polymorphonuclear leukocytes were observed in the beginning of the inflammatory process until the 15th after surgery; however, by day 15 the number of mononuclear cells had increased and continued to do so until day 60. On day 7, the conjunctival epithelium was hyperplastic on the graft and inflammation infiltrate plasma cells and lymphocytes in graft bed were observed. The basal cell proliferation started 24 h after surgery. These cells migrated juxtaposed in intimate contact with the biological prosthesis, especially superimposing the whole graft on the third day. The number of goblet cells had increased on day 15. On day 60, the biological prosthesis was atrophic and degenerated; however, there were not alterations of the conjunctival epithelium and sclera beneath the graft. The results of the microscopic study are summarized in figure 2.

DISCUSSION

Many methods have been described for repair of deep corneal ulcers and perforations, and yet, with the exception of penetrating keratoplasties with autogenous grafts, corneal opacification may be the final result⁽³⁾. In humans, biological prosthesis can be performed by reconstructing the anterior ocular segment^(5,15).

Our results showed that photophobia/blepharospasm/epiphora were significant in the early period after surgery⁽³⁾, and may be due to the scleral edema stimulating the scleral nerves and the sutures stimulating the conjunctival eyelid. Sutures were not removed to avoid additional maneuvers that could possibly interfere in the surgical site.

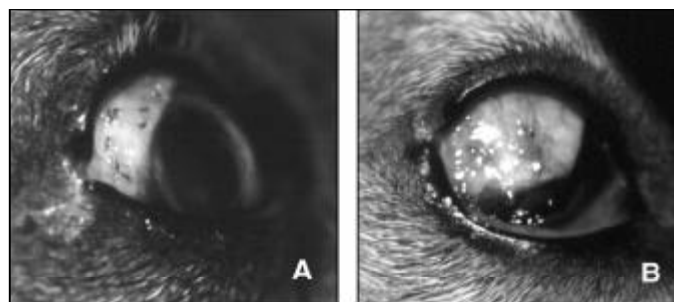


Figure 1 - The intermediate and late clinical postoperative periods of the xenogenous lamellar grafts. (A) 30 days after surgery. (B) 60 days after surgery

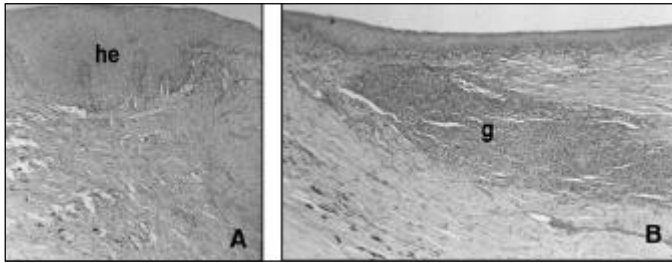


Figure 2 - Representative histopathological changes of the lamellar scleral grafts. (A) Hyperplastic conjunctival epithelium (he) on the 15th after surgery (H&E, x 100). (B) Graft area. Normal conjunctival epithelium superimposing the graft (g) and juxtaposed mononuclear cells in intimate contact with the biological prosthesis (H&E, x 250)

Possible complications associated with this procedure include postoperative infection and progression of the autolytic process by leukocyte collagenase or bacterial protease which may be present⁽¹⁶⁻¹⁷⁾. However, they were not observed. Solutions for preservation of corneal tissue in human medicine, have been described⁽¹⁸⁻¹⁹⁾. Nevertheless, the storage procedure increased the cost. Alternatively, the use of 98% glycerine for biological prosthesis preservation for up to 30 days has been described⁽³⁻⁴⁾. This solution was an excellent fluid for preservation of our grafts and was rather inexpensive.

In the few reports about scleratoplasty, the authors did not study the cicatricial reparation kinetics using light microscopy⁽¹⁴⁾. The first reported a study using preserved equine renal capsule to repair lamellar scleral lesions in dogs. Although the histopathological changes in graft areas has shown inflammation, necrosis and atrophy areas and increased number of globet cells, the graft was integrated into the canine sclera with no detectable clinical and histologically rejection.

CONCLUSIONS

In conclusion, renal capsule grafting may be appropriate for treatment of scleral lesions that may progress to complete perforation or to prevent it. This biological prosthesis was tolerated on clinical and histopathological evaluation. Based on this, the preserved equine renal capsule might represent a reasonable alternative to sclera in such procedures in humans as observed in other studies.

RESUMO

Objetivo: Avaliar o uso da cápsula renal de equino preservada em glicerina 98% no reparo de lesões lamelares esclerais em cães. **Métodos:** Foram utilizados 12 cães, machos e fêmeas, com peso médio de 12 kg. Foram realizadas avaliações clínica e morfológica aos 1, 3, 7, 15, 30 e 60 dias de pós-operatório. Após anestesia geral e procedimentos padrões de preparo do campo operatório, foi realizada cantotomia temporal, seguida de incisão conjuntival e escleral com área de 0,5x0,5 cm na posição de 1 hora, próxima ao limbo. Em seguida, um fragmento de mesma dimensão de cápsula renal de equino preservada

em glicerina, previamente hidratado em solução salina, foi aplicado ao defeito escleral criado sendo fixado com pontos simples isolados com Vicryl 7-0[®]. **Resultados:** A avaliação clínica revelou blefaroespasmofotofobia até o sétimo dia de pós-operatório. Foi observado edema conjuntival até o quinto dia, acompanhado de secreção ocular mucóide, que persistiu até o décimo dia de pós-operatório. Não foram observados sinais clínicos de rejeição do enxerto em todos os animais, em todos os períodos avaliados. Os segmentos anterior e posterior do bulbo ocular não apresentaram sinais de inflamação. A análise morfológica revelou exsudação inflamatória aguda nos períodos precoces e intermediários da avaliação e inflamação crônica nos períodos tardios da observação. Houve incorporação do enxerto ao leito receptor. **Conclusão:** Os resultados sugerem que a cápsula renal de equino preservada pode ser mais uma alternativa de membrana biológica para o reparo de lesões esclerais lamelares em cães e no homem.

Descritores: Esclera/lesões; Transplante heterólogo; Cães; Animal

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