

**USE OF AUTOLOGOUS BLOOD
COMPONENTS IN OPHTHALMIC
PRACTICE**

Essay

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ophthalmology

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Introduction

The positive effects of the application of autologous serum in the treatment of dry eye patients are known since 1984 according to the research of Fox et al. However, the lack of knowledge about its action mechanism at the eye surface level kept its utilization in clinical practice from growing until the end of the decade when Tsubota in 1999 described its successful use in eyes with persistent epithelial defects. (1,2)

Good vision requires maintenance of the transparency and proper refractive shape of the cornea. While the corneal demand for glucose, electrolytes, and amino acids is supplied by the aqueous humour, growth factors, vitamins and neuropeptides, which are secreted by the lacrimal gland, support proliferation, migration, and differentiation of the ocular surface epithelia, thus playing an important role in the maintenance of healthy ocular surface. (2-6)

These epitheliotropic factors include EGF, vitamin A, TGF- β , acidic and basic FGF, and neurotropic factors such as substance P and α 2 macroglobulin.(6) As part of inflammatory processes additional proteins such as the adhesion factor fibronectin, complement factors, and antimicrobial proteins are released into the tears from conjunctival vessels.(7,8)

The lack of these epitheliotropic factors e.g., in dry eye, can result in severe ocular surface disorders such as persistent epithelial defects. In such cases surgical attempts as punctal occlusion, frequently fail. (9, 10) Also with increasing severity of aqueous deficiency, the application frequency of tear substitutes increases, their turnover is reduced, and the ocular surface becomes more susceptible to toxicity from preservatives resulting in corneal blindness. (11, 12)

Autologous serum is an unpreserved artificial tear substitute, with slightly hypotonic or physiologic electrolyte composition and biologic buffers, which improves corneal epithelial barrier function, patient comfort and may address parts of the underlying multifactorial pathogenesis of dry eye. (11, 12) In vitro cell culture experiments showed that corneal epithelial

cell morphology and function are better maintained by serum than by pharmaceutical tear substitutes. (13)

Autologous serum eye drops are also reported to improve other ocular surface diseases including aniridic keratopathy (14), neurotrophic ulcers (15) and Mooren's ulcer. Also they can be used after pterygium excision to reduce the rate of relapse. (1)

The risk of contamination, arbitrary dilution of autologous serum, and a current lack of regulations for its use represent part of the problems encountered with the use of autologous serum eye drops (16). The major disadvantage of this treatment is the requirement for repeated blood donation. However, optimum storage, dilution and treatment regimens may well reduce the amount of blood required. (17)

Autologous serum is also used to provide autologous xenobiotic-free bioengineered ocular surface equivalents for clinical transplantation. (18-20)

Also autoserum instillation over leak points in filtration blebs helps to reproduce the conjunctival epithelium in a comparatively short period, and uninvvasively, without hurting the function of the filtering bleb. (21)

Regarding the posterior segment, autologous plasmin helps in cleaving the vitreous from the retinal surface. This is an obvious surgical goal for many indications. Thus it has been successfully used as an adjunct to vitrectomy for diabetic retinopathy, macular holes, proliferative vitreoretinopathy, neovascular age-related macular degeneration and retinopathy of prematurity. It is also injected intravitreally to obtain a pharmacologic posterior vitreous detachment. This could enhance the ability of intravitreally injected bevacizumab (Avastin) or triamcinolone to treat eyes with clinically significant macular edema due to diabetic retinopathy and cystoid macular edema due to central retinal vein occlusion (CRVO). (22-24)

Macular holes are breaks at the central retina that may occur spontaneously with a prevalence of 3/1000 in people over 50 years of age and which are bilateral in 10% of patients (25). Autologous blood components, including autologous serum, autologous platelets and autologous fibrin, contain cytokines which promote chorioretinal adhesion at the margins of the hole. (26-28) Thus serum preparations increase success

rate of surgery from 70% to >90% ,while autologous platelets give 95% success rate and autologous fibrin 84%.(29)

Aim of the work

The aim of this essay is to review the literature concerning the use of autologous blood components in ophthalmic practice showing their methods of preparation and storage, their biochemistry and effects on the ocular tissue, different anterior and posterior segment indications and possible complications.

Contents

1. Preparation and storage of autologous blood components used in ophthalmic practice.
2. Biochemistry of those autologous blood components and their effects on the ocular tissue.
3. Anterior segment indications.
4. Posterior segment indications.
5. Possible complications of their use in ophthalmic practice.
6. Conclusion and summary.
7. Referances.
8. Arabic summary.

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