Eye (2013) 27, 1102–1114

www.nature.com/eye

CORRESPONDENCE

Sir,

Autologous plasma eyedrops prepared in a closed system: a treatment for dry eye

Autologous serum (AS; 20–50%) has been used as a tear substitute for severe dry eye patients. Protocols for preparation of AS are available[1–3] but there is no universally accepted methodology, which hinders regulatory approval and widespread clinical use. Here, we report an approach that utilizes 100% autologous plasma (AP) directly from plasmapheresis, which minimizes contamination. In this 'closed' system, plasma collected is directly portioned into single-use segments within tubings.

Case report

The study was approved by the Singhealth Institutional Review Board and adhered to the tenets of the Declaration of Helsinki. After informed written consent, 10 patients with recalcitrant dry eye (6 women and 4 men, mean ± SD age: 57.4 ± 10.5 years) and tested negative for hepatitis B, HIV, and syphilis underwent plasmapheresis. A plasma volume of 110 ml was collected in a closed bag over a 30-min period. Plasma was dispensed into intravenous tubings and crimped into 1–2-inch segments with the Genosys multi-head crimper. Patients stored the plasma in their freezers and defrosted the required segments in the fridge at 4 °C daily. Eyedrops were used 3–4 times/day in addition to current medication over a 6-week period.

We identified significantly reduced fluorescein staining scores in most zones of the cornea after treatment ($P<0.01$, Table 1). Severity and frequency of dry eye symptoms improved in 50% of the patients as assessed by visual analog scale, while no change or worsening of symptoms was experienced by 30 and 20% of patients, respectively. The overall change in dry eye symptoms in the group was not statistically significant (Table 1, $P=0.35$). Plasma tested in three patients did not show any bacterial or fungal growth. Patients used dry eye medications (including the plasma) significantly less frequently per day during the study period (Table 1, $P<0.01$). In two patients, symptoms were controllable even with the discontinuation of previous cyclosporine treatment. Seventy percent of patients would recommend AP treatment to a relative. No adverse effects were encountered.

Table 1 Summary of clinical signs and symptoms

Measure	*Pre-treatment mean (95% CI)*	*Post-treatment mean (95% CI)*	P-*value*
Corneal staining			
Central	2.5 (1.5–3.5)	1.6 (0.8–2.4)	0.001*
Nasal	3.2 (2.5–4.0)	2.1 (1.3–2.9)	0.001*
Temporal	2.6 (1.7–3.6)	1.8 (1.2–2.4)	0.001*
Superior	1.8 (0.8–2.8)	1.4 (0.5–2.3)	0.11
Inferior	3.2 (2.4–4.0)	2.7 (1.9–3.5)	0.01*
Schirmer's test (mm)	2.1 (1.3–3.0)	1.8 (1.1–2.6)	0.57
Tear break-up time (s)	3.1 (2.5–3.7)	2.6 (2.0–3.2)	0.19
Global symptom score[a]	74.2 (66.7–81.7)	66.1 (52.5–79.6)	0.35
Frequency of eyedrops	12.1 (7.9–16.3)	7.3 (4.6–9.9)	0.001*
Intraocular pressure (mm Hg)	14.4 (13.0–15.8)	15.1 (13.4–16.8)	0.34
Visual acuity (logMar)	0.2 (0.1–0.4)	0.2 (0.1–0.3)	0.17

*$P<0.01$ as analyzed with a generalized estimating equations model accounting for correlated data of right and left eyes (SPSS version 20).
[a]A lower score represents less intense/frequent dry eye symptom.

Comment

The AP treatment dispensed in single-use segments, which minimizes microbial contamination, has the potential to be used more widely for recalcitrant dry eye.[4,5] Cost-effectiveness studies are necessary in different healthcare environments.

Conflict of interest

The authors declare no conflict of interest.

References

1 Geerling G, Maclennan S, Hartwig D. Autologous serum eye drops for ocular surface disorders. *Br J Ophthalmol* 2004; **88**(11): 1467–1474.
2 Lagnado R, King AJ, Donald F, Dua HS. A protocol for low contamination risk of autologous serum drops in the management of ocular surface disorders. *Br J Ophthalmol* 2004; **88**(4): 464–465.
3 Liu L, Hartwig D, Harloff S, Herminghau P, Wedel T, Geerling G. An optimised protocol for the production of autologous serum eyedrops. *Graefes Arch Clin Exp Ophthalmol* 2005; **243**(7): 706–714.
4 Cho YK, Huang W, Kim GY, Lim BS. Comparison of autologous serum eye drops with different diluents. *Current Eye Research* 2012; **38**: 9–17.
5 Yoon KC, Heo H, Im SK, You IC, Kim YH, Park YG. Comparison of autologous serum and umbilical cord serum eye drops for dry eye syndrome. *Am J Ophthalmol* 2007; **144**(1): 86–92.

A Petznick[1], L Tong[1,2,3,4], R Chung[2], JC Wang[2], M Koh[5,6], R Salleh[7] and S Waduthantri[1,2]

[1]Ocular Surface Research Group, Singapore Eye Research Institute, Singapore, Singapore
[2]Singapore National Eye Centre, Singapore, Singapore
[3]Duke-NUS Graduate Medical School, Singapore, Singapore
[4]Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore
[5]Department of Haematology, St George's Hospital and Medical School, London, UK
[6]Blood Services Group, Health Sciences Authority, Singapore, Singapore
[7]Haematology Centre, Singapore General Hospital, Singapore, Singapore
E-mail: louis.tong.h.t@snec.com.sg

Eye (2013) **27,** 1102; doi:10.1038/eye.2013.102; published online 31 May 2013