



Evaluation of minor labial salivary gland transplantation for treatment of dry eye in brachycephalic breeds of dogs*

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Abstract

Six brachycephalic breeds of dogs irrespective of age and sex presented to the Teaching Veterinary Clinical Complex, Mannuthy, and University Veterinary Hospital, Kozhikode, were selected for treatment of dry eye condition. All the selected dogs were Chinese Pugs (100%) and they were in good general condition. Clinical, physiological and biochemical parameters were in normal physiological range pre-operatively. On ophthalmologic examination, mean Schirmer Tear Test (STT) value was recorded as 10.00 ± 0.93 mm/min and Tear Film Breakup Time (TBUT) was 4.66 ± 0.33 sec and the other parameters like intra ocular pressure and results of visual function tests were normal. The dogs were thoroughly investigated by detailed clinical, haematological, biochemical and wet film examination prior to surgical procedure and underwent minor labial salivary gland auto-transplantation and evaluated at biweekly interval up to 60th post-operative day. The tear production and tear film breakup time had shown significant increase compared to pre-operative values. All the animals had recovered without any complications and the grafting procedure did not alter the vision and normal habits.

Keywords : Dry eye, dogs, brachycephalic breeds

Dry eye is a very common condition in brachycephalic dogs because of prominent eyeballs, macropalpebral fissure, incomplete closure of eye and lagophthalmos (Lacerda *et al.*, 2017). It is an inflammatory condition of cornea, sclera and conjunctiva, secondary to deficiency of precorneal tear film characterised by mucoid to mucopurulent discharge, keratitis, pain and corneal ulcer that ends up with blindness. Tear plays an important role in the preservation of ocular surface moisture and maintains its the health status by providing lubrication, nutrition and removal of waste materials

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(Ofri *et al.*, 2009). This paper places on record surgical management of dry eye by minor labial salivary gland auto transplantation as treatment in brachycephalic breeds of dogs.

Materials and Methods

Six brachycephalic breeds of dogs irrespective of age and sex presented to the Teaching Veterinary Clinical Complex, Mannuthy, and University Veterinary Hospital, Kozhikode, were screened for dry eye condition. The dogs had mucoid to mucopurulent discharge along with pigmentation of the cornea and prominent globe. On clinical examination all the physiological parameters were within normal range. Tear production was assessed using Schirmer Tear Test (STT) and Tear Film Breakup Time (TBUT) was evaluated by slit lamp biomicroscope after application of fluorescein dye on the ocular surface (Best *et al.*, 2014). Time was recorded for first breaking point of dye on the ocular surface (Ribeiro *et al.*, 2008). Intraocular pressure was measured by applanation tonometry using Tonopen-Vet after desensitization of cornea with 0.5% of proparacaine eye drops. The selected dogs were thoroughly investigated by detailed clinical, physiological, visual function test, haematological, biochemical and wet film examination before surgical procedure and follow up observations were continued every two weeks during the post-operative period up to 60th day.

All the animals were prepared for aseptic surgery by withholding food and water and topical application of antibiotic eye drops for 5 days. Atropine sulphate at the dose of 0.045mg/kg body weight followed by xylazine hydrochloride at dose of 1mg/kg body weight were used as premedicants and anaesthesia was induced with ketamine hydrochloride and diazepam (1:1 v/v) given "to effect". Anaesthesia was further maintained by administration of 2% isoflurane for the surgical procedure. Under general anaesthesia an incision was made on the upper lip of the oral cavity near to the commissure. The incision was deepened until the muscular layer and approximately 5mm graft was dissected and removed from the donor site. The mucosal wound was closed



Fig. A. Sutured edges of labial mucosa



Fig. B. Bleb created by injecting normal saline



Fig. C. Sutured graft in the upper conjunctival fornix



Fig. D. Cross section of labial salivary gland - H&E X 40x

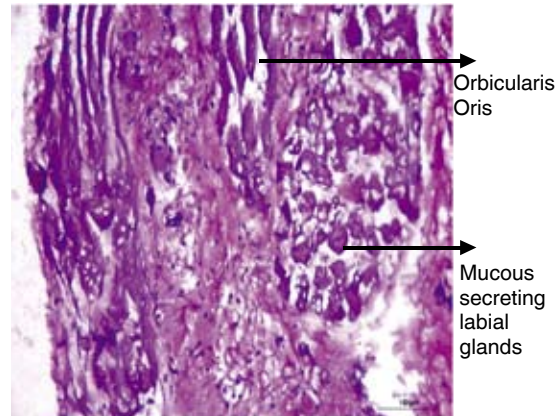


Fig. E. 60th post-operative day of labial salivary gland transplantation

with 3-0 polyglactin in simple continuous suture pattern (Fig A). The graft was kept in the normal saline until the recipient site was ready to place it. About 0.5ml of normal saline was injected into upper fornix of the eye to separate the mucosa from the submucosa and a bleb was created (Fig B). The fusiform wound was made on the bleb by using corneal scissors. The size matched graft was transferred to the surface of wound and sutured with 6-0 polyglactin suture material at 12 O' clock, 6 O' clock, 3 O' clock and 9 O' clock and between these positions (Fig C). The samples of labial tissue collected from six dogs were stained with haematoxylin and eosin stain and the section was subjected to detailed examination under light microscope for identification of the pattern of salivary glands. Systemic antibiotic (ceftriaxone 20mg/kg) was administered intravenous on the day of surgery and followed by oral administration of cefpodoxime at the rate of 20 mg/kg for five

days. Topical antibiotic (moxifloxacin) and anti-inflammatory (bromfenac) eye drops were administered for five days. Meloxicam tablet was advised orally as analgesic for three days at the dose rate of 0.1mg/kg.

Results and Discussion

The mean age of dogs affected with dry eye was 33 months. One dog (16.6%) selected was below 1 year of age, two dogs (33.33%) between one to two years, two dogs (33.33%) between three to four-years and one (16.66%) above six years. Majority of dogs were in the age group between one to four years. Sansom and Barnett (1985) observed that mean age group for dry eye was five years. According to Sanchez *et al.* (2007) it was five years and one month for English Cocker Spaniels and five years and six months for West Highland White Terriers.

Table 1: Mean value of ophthalmic tests

Parameter	Pre-operative	Post-operative			
	DOP	Day 14	Day 28	Day 42	Day 60
STT (mm/min)	10.00±0.93 ^a	14.00±1.91 ^b	15.50±1.58 ^b	14.66±1.33 ^b	15.83±1.22 ^b
TBUT (sec)	4.66±0.33 ^a	5.83±0.73 ^a	5.66±0.33 ^a	6.00±0.25 ^b	6.83±0.70 ^a
IOP (mm/Hg)	22.83±2.82 ^a	23.83±2.76 ^a	28.00±3.13 ^a	27.66±2.23 ^a	27.00±2.33 ^a
Visual function test	0.77±0.16 ^a	0.76±0.16 ^a	0.76±0.16 ^a	0.76±0.16 ^a	0.76±0.16 ^a

Table 2: Mean value of random blood sugar

Parameter	Pre-operative	Post-operative			
	DOP	Day 14	Day 28	Day 42	Day 60
RBS	82.03±6.56 ^a	71.04±4.96 ^a	71.94±4.66 ^b	68.26±3.69 ^b	69.96±3.21 ^a

Table 3: Mean values of the haematological parameter

Parameter	Pre-operative	Post-operative				
	DOP	Day 14	Day 28	Day 42	Day 60	
Hb(g/dl)	12.92±10.20 ^a	12.74±10.38 ^a	12.92±10.72 ^a	12.42±10.31 ^a	12.24±10.02 ^a	
VPRC (%)	34.83±1.51 ^a	34.08±1.66 ^a	33.63±1.78 ^a	34.71±1.82 ^a	34.73±1.77 ^a	
TEC (10 ⁶ /μL)	5.57±0.44 ^a	5.10±0.26 ^a	5.14±0.16 ^a	5.67±0.84 ^a	4.96±0.26 ^b	
TLC (10 ³ /μL)	19.13±2.40 ^a	18.35±2.00 ^a	16.28±1.75 ^a	15.73±1.28 ^a	16.35±1.85 ^a	
DLC	G%	71.27±3.54 ^a	67.74±3.33 ^a	65.01±2.27 ^a	63.92±1.72 ^a	65.43±1.76 ^a
	M%	8.08±0.41 ^a	7.19±0.47 ^b	7.85±0.57 ^b	7.19±0.30 ^b	6.95±0.16 ^b
	L%	20.63±1.61 ^a	25.10±2.10 ^a	27.14±2.46 ^a	28.87±1.77 ^a	27.71±1.61 ^a

Means with different superscripts in the rows differ significantly at 5% level

Among six dogs, two were males (33.33%) and four (66.66%) were female. Ribeiro *et al.* (2008) reported that chance of dry eye in female was more when compared to male animals due to the fact that prolactin inhibits the tear secretion in these animals. According Kaswan and Salisbury (1990) androgens play a role as an endogenous immunosuppressants in autoimmune disorders. Hence, females were more predisposed to autoimmune mediated diseases.

The graft was pale pink in two dogs and pigmented four and it had healed and incorporated completely to the surrounding conjunctiva on 14th post-operative day. The surface of graft had elevated from the conjunctival fornix in two dogs during the healing period as reported by Castanho *et al.* (2013). Initially the mean STT value was 10mm/min and TBUT was 4 sec. and after minor labial salivary gland transplantation the STT value has increased significantly up to 15mm/min as reported by Angelic *et al.* (2011) on 60th post-operative day and TBUT increased significantly up to 6 sec as reported by Castanho *et al.* (2013) on 42nd post-operative day. The stained sections were subjected to detailed examination under light microscope and tubule-acinar and mixed gland mostly mucous glands suggestive of minor labial salivary gland were identified (Fig D). This observation was in accordance with that of Galvao *et al.* (2016) who observed that histology revealed tubule-acinar, mixed gland with excretory ducts in both mucous and serous glands in the study. There were variations in mean physiological,

haematological, intraocular pressure and biochemical parameters during observation period and which were not significant. All the dogs had recovered without any complications except for elevation of graft materials from the surface of scleral tissue in two cases.

Conclusion

The surgical treatment of dry eye in six dogs of the brachycephalic breed, -Chinese Pug was conducted under general anaesthesia. The surgery could achieve increase in tear production and tear film breakup and can be considered a simple method to treat such conditions in dogs.

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References

- Angelic, G.T., Ranzani, J.J.T., Brandao, C.V.S., Schellini, S.A., Padovani, C.R. and Sereno, M.G. 2011. Transplantation of the minor salivary gland in the treatment of dry keratoconjunctivitis in dogs. *Arq. Bras. med. vet. zootec.* **63**:1-5.
- Best, L.J., Hendrix, D.V. and Ward, D.A. 2014. Diagnosis & Treatment of Keratoconjunctivitis Sicca in Dogs. *Vet. Clin. Pathol.* **4**: 16-22.

- Castanho, L.S., Moreira, H., Ribas, C.A.P.M., Wouk, A.F.P.D.F., Sampaio, M. and Giordano, T. 2013. Labial salivary glands transplanted in the treatment of dry eye in dogs by autograft. *Rev. Bras. Oftalmol.* **72**(6):373-378.
- Galvão, S.R., da Cunha, D.N.Q., Del Carlo, R.J., Borges, A.P.B., dos Anjos Benjamin, L., Fonseca, C.C., Marcon, L. and Pereira, C.E.R. 2016. Morphological, morphometric and histochemical aspects of the labial salivary glands of dogs. *Semina: Ciências Agrárias*, **37**(5): 3079-3086.
- Kaswan, R.L. and Salisbury, M.A. 1990. A new perspective on canine keratoconjunctivitis sicca: treatment with ophthalmic cyclosporine. *Vet. Clin. North Am. Small Anim. Pract.* **20**(3):583-613.
- Lacerda, R.P., Gimenez, M.T.P., Laguna, F., Costa, D., Rios, J. and Leiva, M. 2017. Corneal grafting for the treatment of full thickness corneal defects in dogs: a review of 50 cases. *Vet. Ophthalmol.* **20**(3): 222 – 231.
- Ofri, R., Lambrou, G.N., Allgoewer, I., Graenitz, U., Pena, T.M., Spiess, B.M. and Latour, E. 2009. Clinical evaluation of pimecrolimus eye drops for treatment of canine keratoconjunctivitis sicca: a comparison with cyclosporine A. *Vet. J.* **179**(1):70-77.
- Ribeiro, A.P., Brito, F.L.D.C., Martins, B.D.C., Mamede, F. and Laus, J.L. 2008. Qualitative and quantitative tear film abnormalities in dogs. *Cienc. Rura.* **38**(2):568-575.
- Sanchez, R.F., Innocent, G., Mould, J. and Billson, F.M. 2007. Canine keratoconjunctivitis sicca: disease trends in a review of 229 cases. *J. Small. Anim. Pract.* **48**(4):211-217.
- Sansom, J. and Barnett, K.C. 1985. Keratoconjunctivitis sicca in the dog: a review of two hundred cases. *J. Small. Anim. Pract.* **26**(3):121-131. ■