



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; SP-12(12): 2335-2339
© 2023 TPI

www.thepharmajournal.com

Received: 15-09-2023

Accepted: 18-10-2023

J David Suresh
Professor, M.B. Veterinary
College, Dungarpur, Rajasthan,
India

Panchabhai H Chaudhary
Assistant Professor, M.B.
Veterinary College, Dungarpur,
Rajasthan, India

Manoj S Trivedi
Assistant Professor, M.B.
Veterinary College, Dungarpur,
Rajasthan, India

Amrut M Chaudhary
Assistant Professor, M.B.
Veterinary College, Dungarpur,
Rajasthan, India

Ranjeetsinh V Dodiya
Assistant Professor, M.B.
Veterinary College, Dungarpur,
Rajasthan, India

Dhaval B Rajgor
Assistant Professor, M.B.
Veterinary College, Dungarpur,
Rajasthan, India

Keshav
Assistant Professor, M.B.
Veterinary College, Dungarpur,
Rajasthan, India

Ravindra Jadav
Assistant Professor, M.B.
Veterinary College, Dungarpur,
Rajasthan, India

Anand Parikh
Assistant Professor, M.B.
Veterinary College, Dungarpur,
Rajasthan, India

Vishal Kotwal
Assistant Professor, M.B.
Veterinary College, Dungarpur,
Rajasthan, India

Corresponding Author:
J David Suresh
Professor, M.B. Veterinary
College, Dungarpur, Rajasthan,
India

Superficial keratectomy for the management of corneal wounds in canines

J David Suresh, Panchabhai H Chaudhary, Manoj S Trivedi, Amrut M Chaudhary, Ranjeetsinh V Dodiya, Dhaval B Rajgor, Keshav, Ravindra Jadav, Anand Parikh and Vishal Kotwal

Abstract

The study was conducted on sixteen apparently healthy adult mongrel dogs of either sex. The animals were randomly divided into two groups (Group I and Group II) consisting of eight animals each. An injury was created on ventral half of the cornea in the left eye in both groups. In group I, the corneal wound was protected by suturing the third eye lid with the upper eyelid and temporary tarsorrhaphy. In group, II. After 24 hrs, superficial keratectomy of the ventral half of the cornea and temporary tarsorrhaphy were performed. Clinical signs observed were swelling of eye lid. Lacrimation, scratching and pawing, corneal oedema, and vascularization of cornea in both the groups. The animals were kept under observation for a maximum of 30 days. Hemogram and fluorescent dye test was performed at different interval. The incidence of neovascularization and corneal oedema are higher after superficial keratectomy with third eye lid flap and temporary tarsorrhaphy, though complete healing of the cornea occurred within 30 days. Superficial keratectomy followed by temporary tarsorrhaphy is associated with minimal postoperative complications and complete healing occurred within 27 days. The epithelialization of the cornea was complete clinically between sixth and ninth day and can be correctly assessed by fluorescein dye testing. Topical application of Dexamethasone in the eye was found effective to suppress the vascularization of cornea after superficial keratectomy.

Keywords: Mongrel, tarsorrhaphy, third eye lid, superficial keratectomy

Introduction

Disease affecting the cornea are commonly encountered in dogs and cats. Usually, the vision of the animal is at risk, when the cornea is severely damaged because it is one of the important structures of the refractive media of the eye. Injury of the cornea often occurs in dogs from cat scratches, contact with sharp objects like thorns, barbed wires, nails and other foreign bodies, chronic irritation from conditions like entropion, trichiasis, distichiasis and from chemical burns (Studdert, 1967 and Startup, 1984) [6, 5]. Superficial corneal wounds or ulcers heal rapidly, but sometimes it becomes chronic due to irritation or bacterial invasion (Studdert, 1967) [6]. Disease of the cornea in animals and their surgical correction have gained importance during the last few years (Mohanty and Mitra, 1971) [3]. Superficial keratotomy, corneal transplantation, conjunctival keratoplasty, third eye lid flap and temporary tarsorrhaphy have been reported to promote healing and reduce the healing time. Superficial keratectomy was advocated to enhance the healing in many types of corneal lesions (Kirschaner *et al.*, 1989) [2].

Materials and Methods

The study was conducted on sixteen apparently healthy adult mongrel dogs of either sex. The dogs were dewormed, screened for blood parasites and tested for normal vision. Animals with visible ocular diseases and disorders were excluded. The selected animals were kept under observation for a period of one week before the experiment on identical condition of feeding and management. The animals were randomly divided into two groups (Group I and Group II) consisting of eight animals each. In group I, an injury was created on ventral half of the cornea in the left eye. After 24 hrs, superficial keratectomy of the ventral, half of the cornea was performed. The corneal wound was protected by suturing the third eye lid with the upper eyelid and temporary tarsorrhaphy. In group, II, an injury was created on the ventral half of the cornea in the left eye. After 24hrs, superficial keratectomy of the ventral half of the cornea and temporary tarsorrhaphy were performed.



Fig 1: Eye showing experimentally induced corneal wound outlined with fluorescein staining



Fig 2: Eye showing experimentally induced corneal wound outlined with fluorescein staining

a. Presurgical preparation of other animals

Framycetin eye drops was instilled into the eye thrice daily, from three days prior to surgery and feed was withheld for 18 hours before the operation.

b. Induction of injury

4% topical lignocaine solution was instilled in the eye for local anaesthesia.

c. Anaesthesia

Premedication – Atropine sulphate – 0.04 mg/kg S/c

Xylazine – 0.5mg/kg IM

Induction and maintenance – Thiopentone sodium – IV

d. Superficial keratectomy

Superficial keratectomy was performed using No.10 blade. Horizontal incision was made on the centre of cornea commencing from medial canthus to lateral canthus. It was connected by a semicircular incision on the ventral half of the cornea enclosing the previously made injury and approximately one millimetre away from the limbal border. The depth of the incision was adjusted so that the cornea could be grasped with the rat toothed forceps. Using the

corneal tissue forceps, one end of the incised lamella was lifted and a corneal scissors was introduced beneath the lamella. The tips of the scissors were dilated to separate the corneal lamella from its attachments. Throughout the procedure, the corneal surface was kept moist by instilling sterile normal saline solution. After superficial keratectomy, the eye was washed with sterile normal saline, the eyeball was reduced and a few drops of framycetin was instilled.

In Group I, after superficial keratectomy the cornea was covered with third eye lid flap (TEP) using the modified technique recommended by Helper and Blogg (1983) [1]. The free edge of the third eye lid was held with a forceps. The double armed needle was passed through the upper fornix and out through the upper eye lid skin dorsal to the lateral canthus at a distance of four millimetre. Temporary tarsorrhaphy was performed by placing a single suture, three millimetres from the lid margins (Peiffer *et al.*, 1987b) [4].

In animals of Group II, after superficial keratectomy the cornea was covered by performing temporary tarsorrhaphy a mentioned in Group 1. In both the groups, tarsorrhaphy suture was removed on the third postoperative day for observation. The suture was reapplied after examination and retained till the sixth day. The nictitans flap was released and reapplied at three-day intervals in Group I to facilitate observation. The sutures fixing the third eye lid was removed on the ninth day. Venous blood samples were collected for haematological studies prior to surgery, one hour after surgery and at intervals of five days during the period of observation.

e. Post-operative care

Benzathine penicillin G 600, 000 IU was given for five days. Eyelid were cleaned with sterile moist cotton and the eye was irrigated through the lateral canthus with one per cent sterile sodium chloride solution in all the animal daily. Framycetin drop was instilled four times daily for five days and dexamethasone- framycetin eye drop during the postoperative period up to 30 days.



Fig 3: Eye showing superficial layer of cornea being removed during superficial keratectomy

f. Haematological study

Blood sample were collected and TLC, DLC and Hb was measured

Results

The average bodyweight of the animals was 10.06 ± 0.49 kg. In all the animals, atropine sulphate at the dose rate of 0.04

mg/kg bodyweight (s/c), and after five minutes, xylazine at the dose rate of 0.5 mg/kg body weight (1/ml was administered. Fifteen minutes later, general anaesthesia was induced using five per cent solution of thiopentone sodium, administered i/v till the palpebral reflex was abolished and there was sufficient relaxation of muscles of eyeball.

Group I

1. Clinical signs

Clinical signs observed were swelling of eye lid, lacrimation, scratching, pawing, corneal oedema, and vascularization of cornea. The animals were kept under observation for a maximum of 30 days.

a. Swelling of eye lid

Swelling of eye lid was noticed in all the animals within 24 hr after surgery and it persisted up to the third postoperative day in six animals and up to the sixth postoperative day in two animals.

b. Lacrimation

Lacrimation was observed in all the animals from the day of surgery. It was observed up to the third day in two animals, up to the sixth day in five animals and up to the ninth postoperative day in one animal.

c. Scratching and pawing

Scratching and pawing was noticed in all the animals from the day of surgery and it persisted up to the third day in seven animals and sixth postoperative day in one animal.

d. Corneal oedema

Corneal oedema was observed in all the animals from third day and persisted up to 12th postoperative day in two animals.

e. Vascularization

Six animals in this group showed vascularization of the cornea by the sixth postoperative day. The vessels were seen on the lower half of cornea as a continuation from the adjacent bulbar conjunctive at the limbus. The vessels were bright red and branched in tree like fashion.

f. Other observations

When the third eye lid flap sutures were released in different postoperative periods to examine the cornea, the third eye lid did not return to its original position but was found to cover two-third of the cornea on the third day and the sixth day in all the animals and is covered one-third of the cornea on the ninth day It was found to return to its normal position after the 9th to 12th day in animals.

2. Physiological parameters

Physiological parameters

Parameters	Intervals					
	0 min.	1 hour	5 th day	10 th D	20 th D	30 th D
Rectal temperature (°C)	39.18±0.13	37.75±0.18	39.15±0.15	39.05±0.17	38.80±0.2	39.20±0.1
Pulse rate (/min.)	118.80±3.61	93.50±2.69	120.00±6.09	120.00±2.3	116.00±2.87	130.00±8.00
Respiration rate (/min.)	30.25±1.44	14.00±1.0	33.25±1.07	28.67±0.84	29.00±1.0	33.00±1.0

The rectal temperature, pulse rate and respiration rate did not show marked variation except at one hour after surgery where there was marked reduction in all the three parameters.

3. Evaluation of corneal healing

a. Fluorescein dye test

All the animals were positive for fluorescein dye test and costs was seen stained bright green at the keratectomy site at 3rd post operative day while greenish yellow at 6th post operative day and it was negative after 7th postoperative day.



Fig 4: Eye and the corneal surface stained with fluorescein dye immediately after superficial keratectomy



Fig 5: Eye on 3rd post-operative day in group 1 showing the third eye lid converting two third of the eye ball after releasing the third eye lid flap

b. Clarity at the keratectomy site

The part of cornea where keratectomy was performed showed opacity in all the animals. Opacity was gradually decreased as day passes and become crystal clear on 30th post operative day.



Fig 6: Eye on the 21st post operative day in group I, showing clear corneal surface at keratectomy site



Fig 7: Eye on the 30th post operative day in group I, showing Crystal clear corneal surface at keratectomy site

4. Haemogram

Haemogram

Parameters	Intervals				
	0 min.	1 hr	10 th day	20 th day	30 th day
Hb (g/dl)	17.45±0.27	16.51±0.56	16.83±0.47	17.21±0.39	17.75±0.75
TLC (10 ³ /cu mm)	10.52±0.27	11.60±0.35	11.04±0.26	10.38±0.28	10.78±0.33
Neutrophils (%)	72.13±0.95	74.88±0.83	73.17±0.7	74.00±0.0	72.50±0.50
Lymphocyte (%)	20.13±0.72	20.38±0.91	21.17±0.95	18.00±0.00	20.00±1.00
Eosinophils (%)	5.88±0.44	3.63±0.57	4.00±0.52	5.00±1.00	6.00±1.00
Monocyte (%)	1.88±0.30	1.25±0.45	1.33±0.42	2.50±0.50	1.50±0.50

The haemoglobin content, TLC and DLC did not show significant variation.

Group II

1. Clinical signs

Clinical signs observed were swelling of eye lid, lacrimation, scratching and pawing, corneal oedema and vascularization of cornea. The animals were kept under observation for a

maximum of 30 days.

a. Swelling of eye lid

Swelling of eye lid was noticed in all the animals within 24 hrs after surgery. It persisted up to the third day in five animals and in three animals it persisted up to the sixth postoperative day.



Fig 8: Eye on the 3rd postoperative day in group II, showing bright green staining after fluorescein dye test. Opacity at the keratectomy site.

b. Lacrimation

Lacrimation was observed in all the animals in this group from the day of surgery. It persisted up to the third day in two animals and in other animals it persisted up to the sixth postoperative day.

c. Scratching and pawing

Scratching and pawing was exhibited by all the animals from the day of surgery. It persisted up to the third postoperative

day in two animals and in other animals it persisted up to the sixth postoperative day.

d. Corneal oedema

Corneal oedema was observed in five animals from the third day and persisted up to the ninth postoperative day in one animal.

e. Vascularization

Vascularization of the cornea was observed in two dogs on the third day, whereas it was not observed in the other animals.

f. Other observations

Congestion of the bulbar and palpebral conjunctivae and third eye lid was observed on the third day and it persisted up to the sixth postoperative day.

2. Physiological parameters

Physiological parameters

Parameters	Intervals					
	0 min.	1 hour	5 th day	10 th D	20 th D	30 th D
Rectal temperature (°C)	39.20±0.11	37.64±0.16	39.11±0.11	39.13±0.12	38.90±0.10	39.15±0.15
Pulse rate (/min.)	119.75±1.53	94.25±2.71	118.00±3.57	117.67±3.12	103.00±5.00	116.00±4.00
Respiration rate (/min.)	31.75±1.91	12.50±0.91	31.00±1.73	29.67±2.02	27.00±1.00	27.00±1.00

The rectal temperature, pulse rate and respiration rate did not show marked variation except at one hour after surgery where it showed marked reduction in all the three parameters.

3. Evaluation of corneal healing

a. Fluorescein dye test

All the animals were positive for fluorescein dye test and costs was seen stained bright green at the keratectomy site at 3rd post operative day while greenish yellow at 6th post operative day and it was negative after 7th postoperative day.

b. Clarity at the keratectomy site

The part of cornea where keratectomy was performed showed opacity in all the animals. Opacity was gradually decreased as day passes and become crystal clear on 30th post operative day.



Fig 9: Eye on 27th post-operative day in group II, showing crystal clear corneal surface in the keratectomy site

4. Haemogram

Haemogram

Parameters	Intervals				
	0 min.	1 hr	10 th day	20 th day	30 th day
Hb (g/dl)	16.51±0.50	15.26±0.83	16.27±0.63	14.21±0.49	16.50±0.50
TLC (10 ³ /cu mm)	10.87±0.26	11.53±0.63	10.82±0.85	10.17±1.28	10.14±0.05
Neutrophils (%)	69.13±1.88	71.00±2.19	71.66±1.61	64.50±0.50	69.00±0.00
Lymphocyte (%)	25.25±1.99	24.50±2.17	22.67±1.36	30.00±2.00	23.00±0.00
Eosinophils (%)	4.00±0.38	3.63±0.32	3.83±0.37	4.00±1.00	6.00±2.00
Monocyte (%)	1.63±0.32	0.88±0.30	1.67±0.42	1.50±1.50	1.00±1.00

The haemoglobin content, TLC and DLC did not show significant variation.

Conclusions

The incidence of neovascularization and corneal oedema are higher after superficial keratectomy with third eye lid flap and temporary tarsorrhaphy, though complete healing of the cornea occurred within 30 days. Superficial keratectomy followed by temporary tarsorrhaphy is associated with minimal postoperative complications and complete healing occurred within 27 days. The epithelialization of the cornea was complete clinically between sixth and ninth day and can be correctly assessed by fluorescein dye testing. Topical application of Dexamethasone in the eye was found effective to suppress the vascularization of cornea after superficial keratectomy.

References

1. Helper LC, Blogg R. A modified third eyelid flap procedure. *Journal of the American Animal Hospital Association*. 1983;19(6):955-956.
2. Kirschner SE, Niyo Y, Betts DM. Idiopathic persistent corneal erosions: Clinical and pathological findings in 18

dogs. *The Journal of the American Animal Hospital Association (USA)*. 1989;25(1):84-90

3. Mohanty J, Mitra AK. Conjunctival keratoplasty in a dog as a treatment for descemetocele with corneal ulceration. *Indian veterinary Journal*. 1971;48(2):753-755.
4. Peiffer LR Jr, Nassisse MP, Cook CS, Harling DE. Surgery of the canine and feline orbit, adnexa and globe Other Part-3: structural abnormalities and neoplasia of the eyelid. *Companion Animal Practical*. 1987b;1(4):20-35.
5. Startup FG. Corneal ulceration in the dog. *Journal of Small Animal Practice*. 1984;25(12):737-752.
6. Studdert VP. Corneal ulcers in the dog. *Australian Veterinary Journal*. 1967;43(10):466-470.