



Clinical Evaluation of Intraocular Silicone Prosthesis in Dogs

Ankur Paul Tirkey^{1*}, Babita Das¹, Apoorva Mishra¹, Apra Shahi¹, Randhir Singh¹, Shobha Jawre¹,
Payal Jain², Neha Sharma¹ and Mayank Meena¹

¹Department of Veterinary Surgery and Radiology, College of Veterinary Science and A.H., NDVSU, Jabalpur, M.P., INDIA

²Department of Veterinary Anatomy, College of Veterinary Science and A.H., NDVSU, Jabalpur, M.P., INDIA

*Corresponding author: AP Tirkey; E-mail: ankurpaul27@gmail.com

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ABSTRACT

The present study was conducted to evaluate the clinical outcome of intraocular silicone prosthesis implantation in dogs with irreparable traumatic and chronic ocular conditions. During November 2025 to April 2026, 4,921 canine cases presented at the Veterinary Clinical Complex, College of Veterinary Science, Jabalpur, were screened, of which 262 (5.32%) had ocular affections and 16 (0.33%) had irreparable ocular conditions. Twelve dogs were selected for surgical management irrespective of age, breed and sex. Preoperative clinical, ophthalmic, ultrasonographic and haemato-biochemical evaluations were performed. Implant size was determined from the axial globe length of the contralateral normal eye (axial globe length - 3 mm). Four dogs with closed globe injuries underwent perilimbal evisceration, whereas eight dogs with open globe injuries were managed by the four-petal evisceration technique followed by intraocular silicone prosthesis implantation; extraocular prosthesis was placed after complete conjunctival healing. Traumatic injury was the predominant cause (68.75%), with adult male non-descript dogs being most commonly affected. Mean axial globe length and implant size were 17.94 ± 0.51 mm and 14.66 ± 0.51 mm, respectively. Postoperative pain and eyelid swelling resolved completely by day 15 and day 10, respectively, while ocular discharge persisted in only one dog. Functional and cosmetic appearance was graded as excellent in 75% and good in 25% of dogs. No intraocular implant failure was observed during the 60-day follow-up, although one extraocular prosthesis was dislodged. The study demonstrated that intraocular silicone prosthesis implantation, particularly when combined with the four-petal evisceration technique and an extraocular prosthesis, is an effective option for restoring cosmetic appearance and maintaining satisfactory eyelid function in dogs with irreparable ocular conditions.

HIGHLIGHTS

- ① Use of intraocular silicone prosthesis in irreparable ocular injuries in dogs.
- ② It is an effective option for restoring cosmetic appearance and eyelid function in dogs.

Keywords: Dog, Evisceration, Intraocular silicone prosthesis, Ocular trauma

Irreparable ocular affections in dogs, including severe ocular trauma, chronic glaucoma and other end-stage painful ocular diseases, are important causes of irreversible blindness and ocular discomfort. Besides loss of vision, these conditions adversely affect the cosmetic appearance of the eye, resulting in facial asymmetry and reduced owner satisfaction. Conventional surgical procedures such as enucleation effectively eliminate pain but often produce orbital depression and unsatisfactory cosmetic outcomes. Consequently, globe-sparing procedures that preserve the ocular contour while relieving pain have gained increasing

importance in veterinary ophthalmology (Duncan and Ramsey, 2015). Evisceration with intraocular silicone prosthesis implantation has emerged as a promising alternative for the management of blind, painful eyes. Preservation of the scleral shell together with implantation of a silicone prosthesis helps maintain orbital volume,

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improve facial symmetry and achieve satisfactory cosmetic rehabilitation. Accurate implant size selection using ultrasonographic ocular biometry has further enhanced the success of this procedure by improving implant stability and postoperative outcomes (Park *et al.*, 2020).

Despite the increasing acceptance of this technique, information regarding its clinical application, ultrasonographic implant sizing and postoperative outcomes under Indian clinical conditions remains limited. Most available reports are restricted to isolated case reports or small case series and comprehensive evaluation of cosmetic appearance, implant retention and postoperative complications is lacking. Therefore, the present study was undertaken to clinically evaluate intraocular silicone prosthesis implantation in dogs with irreparable, traumatic and chronic painful ocular conditions, with special emphasis on ultrasonographic implant sizing, postoperative outcome and cosmetic rehabilitation (Romkes and Eule, 2012).

MATERIAL AND METHODS

Ethical approval

The study was approved by the Institutional Animal Ethics Committee, College of Veterinary Science & A.H., Jabalpur, M.P.

Animals

The study was conducted over six months from November 2025 to April 2026 in which twelve adult dogs irrespective of age, breed and sex suffering from irreparable, traumatic and chronic painful ocular conditions. Ophthalmic examination was done by magnifying lens, indirect ophthalmoscope and slit lamp. Neuro-ophthalmic examination like palpebral reflex, menace response and pupillary light reflex were assessed for confirming loss of visual function. Ultrasonographic examination of the contralateral normal eye was done to evaluate the size of intraocular silicone implant.

Patient Preparation and Anaesthesia

The animals were kept off-feed for 12 hours and off-water for 6 hours prior to surgery. All the surgical procedures

were performed under general anaesthesia. Premedication consisted of inj. Atropine sulphate @ 0.04 mg/kg b.w. IM, inj. Diazepam @ 1 mg/kg b.w. IV and inj. Ketamine hydrochloride @ 5 mg/kg b.w. I/V. Maintenance was done by Isoflurane @ 1-3 % MAC (as per the requirement).

Surgical Procedure

Two surgical techniques were employed for intraocular silicone prosthesis implantation depending on the type of ocular injury. In dogs with closed-globe injuries, a fornix-based conjunctival flap was created and the sclera was incised parallel to the limbus. The intraocular contents were carefully removed while preserving the corneoscleral shell, followed by implantation of a silicone intraocular prosthesis. The sclera and conjunctiva were closed using interrupted or continuous 5-0 polyglactin 910 sutures as described by Maggs (2008). In dogs with open-globe injuries, evisceration was performed using the four-petal technique. A 360° perilimbal incision was made approximately 1 mm posterior to the limbus and the cornea and intraocular contents were removed. Four scleral petals were created by radial sclerotomies extending to the optic nerve. The silicone prosthesis was placed within the scleral shell and the petals were closed in an overlapping fashion using continuous 4-0 or 5-0 polyglactin 910 sutures according to the technique described by Park *et al.* (2020).

Post-operative management

Postoperative care included topical neomycin ophthalmic ointment four times daily and moxifloxacin eye drops (2 drops) three times daily for 4-6 weeks. Flurbiprofen eye drops (2 drops) were administered three times daily for 3 days. Oral amoxicillin-clavulanic acid (12.5 mg/kg, every 12 h) was given for 7 days and carprofen (4 mg/kg, once daily) was administered for 3 days for analgesia. An Elizabethan collar was maintained until complete healing to prevent self-trauma.

Parameters of study

Clinical and ophthalmic evaluation was performed on the day of presentation. Neuro-ophthalmic examination, including menace response, pupillary light reflex and palpebral reflex, was assessed preoperatively according to Das *et al.* (2024). Ultrasonographic ocular biometry

of the contralateral normal eye was carried out on the day of presentation to measure axial globe length (AGL) and transverse diameter of the lens (TDL) for selection of intraocular prosthesis size. Haemato-biochemical evaluation was performed using 3 mL of blood collected aseptically from the cephalic or saphenous vein on the day of presentation. The parameters estimated included haemoglobin (Hb), packed cell volume (PCV), total leukocyte count (TLC), blood glucose, blood urea nitrogen (BUN) and serum creatinine. Postoperative assessment was carried out on days 5, 10, 15, 30, 45 and 60 to evaluate pain, ocular discharge, eyelid swelling, prosthesis fitting and implant failure, while functional and cosmetic appearance was assessed on days 30, 45 and 60 according to the modified scoring system of Park *et al.* (2020) in table 1.

Table 1: Post-operative cosmetic and functional outcomes

Parameters	Postoperative Day					
	5	10	15	30	45	60
Pain (-/+)	-	-	-	-	-	-
Ocular discharge (-/+ /++ /+++)	-	-	-	-	-	-
Eye lid swelling (-/+ /++ /+++)	-	-	-	-	-	-
Functional and Cosmetic appearance (E/G)				-	-	-
Prosthesis fitting (WF/LF)	-	-	-	-	-	-
Implant failure (Yes/No)	-	-	-	-	-	-

RESULTS

During the study period, a total of 4921 dogs presented to the Veterinary Clinical Complex, College of Veterinary Science and Animal Husbandry, Jabalpur. Among these, 262 (5.32%) dogs were diagnosed with various ocular affections, while 16 (0.33%) were identified with irreparable, traumatic, or chronic painful ocular conditions. Traumatic or accidental injury was the principal etiological factor (68.75%), followed by chronic glaucoma (31.25%). Unilateral ocular involvement was more frequent (75%) than bilateral involvement (25%) and the majority of dogs (62.50%) were presented within 1-5 days of onset of ocular injury. Adult dogs (>1 year; 87.50%), Indian mongrels (62.50%) and males (75%) were predominantly affected.

Clinical examination revealed normal physiological parameters in all selected dogs. Ophthalmic evaluation demonstrated conjunctival congestion in 58.33% of cases, proptosis in 50%, buphthalmos in 33.33% and corneal rupture in 25%, while ocular discharge ranged from mild to severe at presentation. Ophthalmoscopic examination could not be performed because severe corneal opacity and advanced globe damage prevented visualization of intraocular structures. Neuro-ophthalmic examination revealed absence of menace response, pupillary light reflex and palpebral reflex in all affected eyes, confirming complete and irreversible loss of visual function.

Ultrasonographic examination

Ultrasonographic biometry of the contralateral normal eye was performed in all 12 dogs using a 7-12 MHz linear transducer to determine the appropriate intraocular prosthesis size. The mean axial globe length (AGL) and transverse diameter of the lens (TDL) were 17.94 ± 0.51 mm and 9.90 ± 0.49 mm, respectively in table 2. Intraocular prosthesis size was calculated by subtracting 3 mm from the AGL, resulting in a mean implant size of 14.66 ± 0.51 mm.

Table 2: Ultrasonographic axial globe length (AGL), transverse diameter of lens (TDL) measured on day of presentation and intraocular silicone prosthesis size used.

Sl. No.	AGL (Axial globe length) in mm	TDL (Transverse diameter of lens) in mm	Intraocular silicone prosthesis size used (in mm)
1	17.0	9.0	14
2	15.4	8.4	12
3	17.6	9.6	14
4	17.3	8.3	14
5	17.5	8.0	14
6	17.0	7.6	14
7	19.5	11.3	16
8	15.1	10.5	12
9	19.4	11.6	16
10	19.2	11.0	16
11	21.1	13.2	18
12	19.2	10.4	16
(Mean $\pm$ SE)		(Mean $\pm$ SE)	(Mean $\pm$ SE)
17.94 ± 0.51		9.90 ± 0.49	14.66 ± 0.51

Extraocular prostheses (18-22 mm; mean 20.00 ± 0.50 mm) were placed in eight dogs treated by the four-petal

technique after complete conjunctival healing. Prosthesis size was selected by trial fitting to achieve optimal retention and cosmetic appearance.

Post-operative observations

Postoperative pain was observed in 7 of 12 dogs (58.30%) on day 5 and decreased to 2 dogs (16.70%) by day 10, with complete resolution from day 15 onwards shown in table 3.

Table 3: Post-operative pain score at different time intervals

Day	Number of dogs showing pain (n=12)	Per cent (%)
5	7	58.30
10	2	16.70
15	0	0.00
30	0	0.00
45	0	0.00
60	0	0.00

Ocular discharge showed a similar pattern of improvement. On day 5, ocular discharge was absent in 50% of dogs, while mild and moderate discharge were observed in 41.67% and 8.33% of dogs, respectively. From day 10 onwards, 91.67% of dogs remained free of ocular discharge, with only one dog exhibiting persistent moderate discharge in table 4, suggesting satisfactory wound healing and minimal postoperative complications in the majority of cases. Mild eyelid swelling was recorded in 25% of dogs on day 5 and resolved completely by day 10, as shown in table 5.

Table 4: Post-operative ocular discharge at different time intervals

Day	Mild (+)		Moderate (++)		Severe (+++)		No Discharge (-)	
	n	%	n	%	n	%	n	%
5	5/12	41.67	1/12	8.33	0/12	0.00	6/12	50.00
10	0/12	0.00	1/12	8.33	0/12	0.00	11/12	91.67
15	0/12	0.00	1/12	8.33	0/12	0.00	11/12	91.67
30	0/12	0.00	1/12	8.33	0/12	0.00	11/12	91.67
45	0/12	0.00	1/12	8.33	0/12	0.00	11/12	91.67
60	0/12	0.00	1/12	8.33	0/12	0.00	11/12	91.67

Table 5: Post-operative eyelid swelling at different time intervals

Day	Mild (+)		Moderate (++)		Severe (+++)		Absent (-)	
	n	%	n	%	n	%	n	%
5	3/12	25.00	0/12	0.00	0/12	0.00	9/12	75.00
10	0/12	0.00	0/12	0.00	0/12	0.00	12/12	100.00
15	0/12	0.00	0/12	0.00	0/12	0.00	12/12	100.00
30	0/12	0.00	0/12	0.00	0/12	0.00	12/12	100.00
45	0/12	0.00	0/12	0.00	0/12	0.00	12/12	100.00
60	0/12	0.00	0/12	0.00	0/12	0.00	12/12	100.00

Functional and cosmetic assessment from day 30 onwards revealed excellent outcomes in 75% of dogs and good outcomes in the remaining 25% in table 6, demonstrating effective restoration of orbital contour, acceptable cosmetic appearance, and satisfactory eyelid movement. Prosthesis fitting remained stable in all dogs throughout the follow-up period, with no evidence of loosening, displacement, or instability, indicating accurate implant size selection and successful surgical implantation. No intraocular implant failure was observed during the 60-day follow-up, confirming excellent implant stability and biocompatibility. Although one extraocular prosthesis was dislodged approximately 36 days after surgery, the overall postoperative outcome indicated that intraocular silicone prosthesis implantation provided a safe and cosmetically satisfactory method for the management of irreparable ocular conditions in dogs.

Table 6: Post-operative functional and cosmetic appearance at different time intervals

Day	Good (G)		Excellent (E)	
	n	%	n	%
30	3	25.00	9	75.00
45	3	25.00	9	75.00
60	3	25.00	9	75.00

Haemato-biochemical parameters

Preoperative haemato-biochemical evaluation demonstrated that the mean haemoglobin concentration (13.26 ± 0.16 g/dL), packed cell volume ($37.79 \pm 0.57\%$), blood urea nitrogen (19.63 ± 0.28 mg/dL), serum creatinine (0.94 ± 0.02 mg/dL) and blood glucose (112.93 ± 1.52 mg/dL) were within normal physiological limits.

However, the mean total leukocyte count ($19.01 \pm 0.73 \times 10^3/\mu\text{L}$) was mildly elevated, indicating an inflammatory response associated with ocular trauma.

DISCUSSION

Irreparable traumatic and chronic ocular conditions accounted for 0.33% of canine cases presented during the study period. The incidence of ocular affections (5.32%) observed in the present study was comparable with the findings of Kokde *et al.* (2025) and Makode (2024). Traumatic or accidental injury was the predominant etiological factor (68.75%). Adult, male, non-descript dogs (62.50%) in accordance with Niranjana *et al.* (2023) and Nema *et al.* (2025) who also reported the highest incidence in non-descript dogs were more frequently affected, probably because of their greater outdoor activity and prolonged exposure to traumatic events.

The mean implant size of 14.66 ± 0.51 mm provided satisfactory orbital volume replacement and stable prosthesis retention, indicating that preoperative ocular biometry is a reliable method for implant selection. Similar observations regarding implant sizing and prosthesis selection have been reported by Park *et al.* (2020) and Pandey (2023).

Postoperative evaluation demonstrated progressive resolution of pain, ocular discharge and eyelid swelling, indicating satisfactory wound healing and effective postoperative management. Complete disappearance of pain by day 15 and eyelid swelling by day 10 reflected successful elimination of the diseased ocular tissues and resolution of postoperative inflammation similar findings were reported by Yi *et al.* (2009) and Park *et al.* (2020). Functional and cosmetic appearance was graded as excellent in 75% and good in 25% of dogs, demonstrating satisfactory restoration of orbital contour and eyelid movement. Stable prosthesis fitting in all dogs and absence of intraocular implant failure throughout the 60-day observation period confirmed the safety and reliability of the surgical procedure. These findings are in accordance with the reports of Hamor *et al.* (1993), Lin *et al.* (2007), Park *et al.* (2020) and Pandey (2023). Overall, evisceration with intraocular silicone prosthesis implantation, particularly when combined with the four-petal technique and extraocular prosthesis, proved to be an effective globe-sparing procedure for achieving favorable

cosmetic and functional outcomes in dogs with irreparable ocular conditions.

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GENERATIVE AI DECLARATION

The author(s) confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript, and no images were manipulated using AI. The authors developed and verified all scientific content, data analysis, interpretation of results, and conclusions. The authors take full responsibility for the accuracy, integrity, and originality of the work presented, and no AI tool was listed as an author.

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