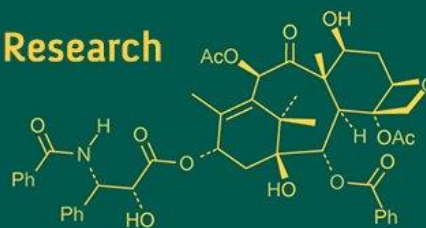


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Comparative evaluation of N-butyl cyanoacrylate and platelet-rich plasma assisted suturing for treatment of aural hematoma in dogs based on surgical time, healing and cosmetic outcome

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Abstract

The present clinical investigation was undertaken to evaluate and compare the efficacy of N-butyl cyanoacrylate adhesive and platelet-rich plasma (PRP) assisted suturing in the management of canine aural hematoma. A total of eighteen dogs affected with aural hematoma were randomly divided into three equal groups consisting of six animals each. Dogs of Group I were treated using conventional through-and-through horizontal mattress suturing, Group II was managed with N-butyl cyanoacrylate adhesive glue and Group III was treated using PRP infiltration followed by conventional suturing. Clinical evaluation was performed based on surgical time, healing time and cosmetic appearance of the ear pinna. The highest incidence of aural hematoma was observed in dogs between 5-10 years of age (55.56%) and Labrador retrievers (33.33%). Ectoparasitic infestation was the most common predisposing factor (38.88%). Mean surgical time was significantly lower ($p < 0.05$) in Group II (10.33 ± 0.49 min) compared with Group I (30.16 ± 1.44 min) and Group III (33.66 ± 2.30 min). The shortest healing time was observed in Group III (21.00 ± 0.86 days), followed by Group II (23.17 ± 1.23 days) and Group I (25.67 ± 1.23 days). Cosmetic appearance score was highest in Group II (4.16 ± 0.30), followed by Group III (3.83 ± 0.16) and Group I (2.50 ± 0.22). The study concluded that N-butyl cyanoacrylate adhesive provided rapid surgical closure and superior cosmetic outcome, whereas PRP-assisted suturing enhanced tissue healing in canine aural hematoma.

Keywords: Aural hematoma, dog, cyanoacrylate adhesive, platelet-rich plasma, healing, cosmetic outcome

Introduction

Aural hematoma is a common pathological condition encountered in canine clinical practice and is characterized by accumulation of blood between the auricular cartilage and skin of the ear pinna, resulting in a fluctuant swelling on the concave surface of the ear. The condition commonly develops due to vigorous head shaking or scratching associated with otitis externa, ectoparasitism, allergic dermatitis, foreign bodies and hypersensitivity reactions. Repeated trauma causes rupture of small auricular blood vessels leading to hemorrhage within the subperichondrial space. If left untreated, chronic inflammation and fibroblast proliferation may result in fibrosis, cartilage thickening and permanent deformity of the pinna, commonly termed as "cauliflower ear".

The primary objective of treatment is to evacuate the hematoma contents, obliterate dead space, prevent recurrence and preserve the natural conformation of the ear pinna. Conventional surgical drainage followed by horizontal mattress suturing remains one of the most widely practiced techniques; however, complications such as prolonged operative time, postoperative inflammation, recurrence, tissue thickening and unsatisfactory cosmetic appearance are frequently encountered.

In recent years, minimally invasive alternatives have gained attention in veterinary surgery. N-butyl 2-cyanoacrylate is a tissue adhesive that rapidly polymerizes upon contact with tissues, producing strong adhesion with minimal tissue reaction. The adhesive possesses antibacterial properties, reduces operative time and improves cosmetic healing compared with conventional suturing methods. Similarly, platelet-rich plasma (PRP), an autologous concentrate rich in growth factors, enhances wound healing by stimulating angiogenesis,

fibroblast proliferation and collagen synthesis. Although both cyanoacrylate adhesive and PRP have shown promising results individually, comparative information regarding their clinical efficacy in canine aural hematoma is limited. Therefore, the present study was undertaken to comparatively evaluate N-butyl cyanoacrylate adhesive and PRP-assisted suturing for the treatment of aural hematoma in dogs based on surgical time, healing duration and cosmetic outcome.

Materials and Methods

Experimental animals and study design

The present investigation was conducted at the Department of Veterinary Surgery and Radiology, College of Veterinary Science and Animal Husbandry, Rewa and Divisional Veterinary Hospital, Bichhiya, Rewa, Madhya Pradesh over a period of six months. A total of eighteen dogs affected with aural hematoma irrespective of breed and sex were selected and randomly divided into three equal groups consisting of six animals each.

Detailed history regarding age, breed, sex, duration of illness and associated ear diseases was recorded. All animals were subjected to detailed clinical examination prior to inclusion in the study.

Anaesthetic protocol and surgical procedure

All animals were premedicated using atropine sulphate (@ 0.02 mg/kg BW, IM). Anaesthesia was induced using ketamine (@ 5 mg/kg BW) and diazepam (@ 0.5 mg/kg BW) intravenously followed by endotracheal intubation and maintenance with isoflurane and 100% oxygen.

The affected ear was prepared aseptically and a stab incision was made on the concave surface of the pinna to evacuate hematoma contents and fibrin clots. The incision was extended along the long axis of the pinna and the cavity was scraped gently to promote adhesion.

Group I

Dead space was obliterated using interrupted horizontal mattress sutures with non-absorbable suture material.

Group II

The cavity was dried completely and N-butyl cyanoacrylate adhesive was applied along the inner margins of the hematoma cavity followed by uniform pressure until complete stabilization of adhesive.

Group III

Platelet-rich plasma prepared by double centrifugation technique was infiltrated into the hematoma cavity before conventional suturing.

Postoperative care

Postoperatively, all dogs received amoxicillin and sulbactam (@ 10 mg/kg BW, IM) and meloxicam (@ 0.3 mg/kg BW, IM) for five days along with routine antiseptic dressing.

Parameters evaluated

1. Time required for surgical intervention (minutes)
2. Time required for complete healing (days)
3. Cosmetic appearance score of ear pinna (1-5 scale)

Statistical analysis

The data obtained during the present investigation were

statistically analyzed using SPSS software version 20. The values were expressed as Mean $\pm$ SE and differences among groups were analyzed at $p < 0.05$ level of significance.

Results

Distribution of aural hematoma cases

Among 18 dogs, the highest incidence of aural hematoma was observed in dogs between 5-10 years of age (55.56%), followed by dogs below 5 years (27.78%) and above 10 years (16.67%). Labrador retriever was the most commonly affected breed (33.33%), followed by non-descript dogs (22.22%). Male dogs (55.56%) were slightly more affected than females (44.44%). Ectoparasitic infestation was the major predisposing cause (38.88%) followed by otitis externa (27.77%).

Time required for surgical intervention

The mean time required for completion of surgical procedure differed significantly ($p < 0.05$) among groups. Group II required significantly lesser time (10.33 $\pm$ 0.49 min) compared with Group I (30.16 $\pm$ 1.44 min) and Group III (33.66 $\pm$ 2.30 min).

Table 1: Mean $\pm$ SE values of time required for surgical intervention

Group	Surgical time (minutes)
Group I	30.16 $\pm$ 1.44 ^b
Group II	10.33 $\pm$ 0.49 ^a
Group III	33.66 $\pm$ 2.30 ^b

Means bearing different superscripts differ significantly ($p < 0.05$).

The reduced operative time observed in Group II may be attributed to rapid application and polymerization of cyanoacrylate adhesive without placement of multiple sutures.

Time required for healing

Healing time varied significantly among treatment groups. Group III exhibited the shortest healing duration (21.00 $\pm$ 0.86 days), followed by Group II (23.17 $\pm$ 1.23 days), whereas Group I showed the longest healing period (25.67 $\pm$ 1.23 days).

Table 2: Mean $\pm$ SE values of healing time

Group	Healing time (days)
Group I	25.67 $\pm$ 1.23 ^c
Group II	23.17 $\pm$ 1.23 ^b
Group III	21.00 $\pm$ 0.86 ^a

Means bearing different superscripts differ significantly ($p < 0.05$).

Accelerated healing in Group III may be due to regenerative properties of PRP growth factors promoting tissue repair and angiogenesis.

Cosmetic appearance

Cosmetic appearance scores differed significantly among treatment groups. Group II demonstrated the highest cosmetic score (4.16 $\pm$ 0.30), followed by Group III (3.83 $\pm$ 0.16), while Group I showed the lowest score (2.50 $\pm$ 0.22).

Table 3: Mean $\pm$ SE values of cosmetic appearance score

Group	Cosmetic appearance score
Group I	2.50 $\pm$ 0.22 ^a
Group II	4.16 $\pm$ 0.30 ^c
Group III	3.83 $\pm$ 0.16 ^b

Means bearing different superscripts differ significantly ($p < 0.05$).

The superior cosmetic outcome observed in Group II may be associated with reduced tissue manipulation, minimal inflammatory response and absence of multiple suture punctures.

Discussion

The present study demonstrated that N-butyl cyanoacrylate adhesive significantly reduced surgical time compared with conventional suturing techniques. Similar findings were reported by Gawande (2003) ^[5], who observed that adhesive glue technique required considerably less operative time than conventional through-and-through suturing. Reduced surgical duration in adhesive technique may be due to elimination of multiple sutures and rapid tissue adhesion.

Healing time was shortest in Group III, indicating beneficial effects of PRP on tissue regeneration and wound healing. PRP contains platelet-derived growth factors that stimulate angiogenesis, collagen synthesis and fibroblast proliferation, thereby accelerating tissue repair. Similar observations were reported by Farghali *et al.* (2017) ^[4] and Iacopetti *et al.* (2020) ^[7].

The highest cosmetic appearance score observed in Group II may be associated with reduced tissue manipulation, minimal inflammatory response and absence of suture tracts. Cyanoacrylate adhesive provides uniform tissue apposition and minimizes scar formation. Similar findings have been reported by Safwan *et al.* (2018) ^[12] and Sharma *et al.* (2025) ^[13], who concluded that adhesive techniques produced superior cosmetic outcomes compared with conventional suturing.

Overall, the study indicated that cyanoacrylate adhesive provides excellent cosmetic restoration with rapid surgical closure, while PRP-assisted suturing enhances postoperative tissue healing.

Conclusion

The present study concluded that N-butyl cyanoacrylate adhesive is an effective and minimally invasive technique for management of canine aural hematoma due to significantly reduced operative time and superior cosmetic appearance. PRP-assisted suturing demonstrated accelerated healing compared with conventional suturing alone. Therefore, both techniques may serve as beneficial alternatives to conventional surgical management of aural hematoma in dogs.

Ethical Approval

The study was conducted after approval from the Institutional Animal Ethics Committee (IAEC), College of Veterinary Science and Animal Husbandry, Rewa.

Conflict of Interest

The authors declare that there is no conflict of interest regarding publication of this manuscript.

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