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## M Vigneswari

Assistant Professor, Department of Veterinary Surgery and Radiology, Rajiv Gandhi Institute of Veterinary Education and Research (RIVER), Kurumbapet, Puducherry, India

## S Tina Roshini

Assistant Professor, Department of Veterinary Surgery and Radiology, Rajiv Gandhi Institute of Veterinary Education and Research (RIVER), Kurumbapet, Puducherry, India

## N Gurunathan

Assistant Professor, Department of Veterinary Surgery and Radiology, Rajiv Gandhi Institute of Veterinary Education and Research (RIVER), Kurumbapet, Puducherry, India

## N Arul Jothi

Professor and Head, Department of Veterinary Surgery and Radiology, Rajiv Gandhi Institute of Veterinary Education and Research (RIVER), Kurumbapet, Puducherry, India

## Corresponding Author:

### M Vigneswari

Assistant Professor, Department of Veterinary Surgery and Radiology, Rajiv Gandhi Institute of Veterinary Education and Research (RIVER), Kurumbapet, Puducherry, India

## Canine aural haematoma: A review

M Vigneswari, S Tina Roshini, N Gurunathan and N Arul Jothi

### Abstract

Untreated aural haematoma may result in deformity of the ear pinna. Aural haematoma is treated either by surgical or by conservative treatment. Both techniques usually require several interventions and re-checks. Aural haematoma is categorized based on the severity of the condition and the management procedure engaged. The article reviews about the clinical signs, different surgical management, pathogenesis and complications/cosmetic outcomes.

**Keywords:** Aural haematoma, dogs

### Introduction

Aural haematoma (AH) means blood accumulation in the ear inside the cartilage and between the cartilage and the skin (Kuwahara, 1986) [6] and it's a frequent disease of the external ear. It is characterised by a purplish rounded hard swelling of the external ear due to blood accumulation in the interstitial space as reported earlier (Fossum, 2007; Lanz and Wood, 2004; Brown, 2010) [4, 2, 1]. The aim of any operative or conservative therapeutic pathway is to remove the accumulated blood from the pinna and prevent fluid development later on (Lanz and Wood, 2004; Brown, 2010) [2, 1]. Because AHs within the auricular cartilage are not rapidly absorbed but replaced by large amounts of granulation tissue and contracture progress, early drainage is essential for maintaining appearance and early healing (Dye *et al.*, 2002; Henderson and Home, 2003; Lanz and Wood, 2004) [22,9,2].

### Incidence and Aetiology

According to David *et al.*, 2000 [21] the cause for AHs thought to be traumatic action, but has not been supported by any direct evidence so far. In some cases, it has been associated with external otitis and allergic dermatitis (Blattler *et al.*, 2007 and Ahiwrrar *et al.*, 2007) [19, 8]. In most of the cases intradermal eosinophil and mast cell infiltrations were described; these signs are thought to be related to allergic reactions according to Cynthia, 2005 [20]. Reports also stated that *Otodectes cynotis* infection observed both in dogs and cats according to Lanz and Wood, 2004 [2]; Brown, 2010 [1] and Harvey *et al.*, 2001 [23], the development of haematoma is suspected to be the result of an immune response to ticks. However cases have also been reported with no evidence of an infection by ticks, a direct relationship is questionable (Harvey *et al.*, 2001) [23]. In the course of the disease, serum or blood accumulates in the inner face of the auricle, inside the cartilage and between the cartilage and the skin as reported earlier (Lanz and Wood, 2004; Brown, 2010) [2, 1]. In the absence of treatment a chronic callous fibrosis evolves, leading to a cauliflower like shrinkage of the pinna (Harvey *et al.*, 2001) [23].

### Breed

Aural haematoma is a common problem reportedly occur in medium to large breed dogs, floppy pendulous eared dogs like Labrador retriever, Cocker spaniel, Golden Retriever, Basset hound, German shepherd, Boxer, Pit-bull and Spitz breed of dog according to Judith, 2000 [25], Hassan *et al.*, 2002 [16]; Andras and Attila, 2014 [24]. Dogs with long and heavy droopy ear are prone to bacterial infection as the droopy ear prevent natural airing and drying of ear canal and it block light and maintaining dark, moist and warm environment suitable for yeast and bacteria growth in addition to endo or ecto parasites and neoplastic growth may become a source irritant cause ear scratching and make the dog shake it's head vigorously to get rid of itch (Judith, 2000 and Hassan *et al.*, 2002) [25, 16]. Furthermore morphological changes of the ear pinna following management are more pronounced in erect eared breed dogs (Doberman, Boxer, Pit Bull and GSD) compared to droopy eared dogs where it is obvious on palpation of the pinna and findings are in accordance with Kazuhiro *et al.*, 2005 [3] concurred that

cartilaginous changes associated with large, pendulous ears leads to intracartilaginous sinusoidal waves caused by head shaking contribute to AH formation.

### Age

According to Kazuhiro *et al.*, 2005<sup>[3]</sup> and Cynthia, 2005<sup>[20]</sup> middle aged to older dogs are likely to develop AHs due to association with cleavage of the cartilage plate as cartilaginous changes associated with aging may be partly involved in the cartilage disruption that leads to AHs. Study reported by Kazuhiro *et al.*, 2005<sup>[3]</sup> that external otitis and associated self-injury are not uncommon even in young dogs.

### Sex

There are no evidence related to sex predisposition stating the occurrence of AHs according to the case reports by Moshin, 2010<sup>[12]</sup>, David *et al.*, 2000<sup>[21]</sup>; Hassan *et al.*, 2002<sup>[16]</sup>; Dye *et al.*, 2002<sup>[22]</sup> and Feyisa *et al.*, 2020<sup>[11]</sup>.

### Anatomical location

The external ear consists of skin covered cartilage, the ocular cartilage and annular cartilage. The ocular cartilage is a single- sheet of elastic cartilage which is thin and pliable at the apex. The skin on the concave (inner) surface of pinna is tightly adherent to the cartilage whereas that on the convex (outer) surface relatively mobile; the cranial border of auricular cartilage is relatively straight whereas the caudal border is curved. The helix is the free margin and adjacent part it is serrated and perforated by numerous foramina which are also found throughout the auricular cartilage. Branches of cranial auricular and the great auricular artery form the blood supply to the pinna. They encircle the margin of the auricle cartilage and pass through the foramina supplying the lateral surface. The venous drainage of the ear broadly allows the arterial supply (Fossum, 2007)<sup>[4]</sup>.

### Pathogenesis

The pathogenesis of AHs remains unclear, but theories include traumatic haemorrhage (Cechner 2014, Dubielzig *et al.* 1984, Kuwahara 1986)<sup>[28, 32, 6]</sup> autoimmune disease (Kuwahara 1986)<sup>[6]</sup> and other immunological factors (Joyce and Day 1997)<sup>[33]</sup>. Associations with hypersensitive skin disease (Joyce and Day 1997)<sup>[33]</sup>, otitis externa (Joyce 1994, Kuwahara 1986, Wilson 1983)<sup>[7, 6, 30]</sup> and otocariasis (Henderson and Horne 2003, Kuwahara 1986)<sup>[9, 6]</sup> have been identified.

### Clinical signs

The clinical signs of AHs depend upon the duration of haematoma, size as well as extent and level of morphological changes of the ear. According to Teruo *et al.*, 2022<sup>[17]</sup> and Cordero *et al.*, 2020<sup>[15]</sup> AHs may occur unilaterally with occasional subsequent development of haematoma in the contralateral ear and less commonly present bilaterally and it is generally occur on a concave surface or the pinna. According to Hassan *et al.*, 2002<sup>[16]</sup>, the clinical features were marked as moderate swelling, marked swelling, injury to pinna, pinna thickening with moderate morphological changes, pinna thickening with marked morphological changes, head tilting with shaking and otitis externa.

### Diagnosis

According to Moshin, 2010<sup>[12]</sup>; Fossum, 2007<sup>[4]</sup>; Brown,

2010<sup>[1]</sup>; Hassan *et al.*, 2002<sup>[16]</sup> and David *et al.*, 2000<sup>[21]</sup> the diagnosis is based upon the history, clinical symptoms and physical examination. Physical examination often revealed fluid filled, soft, and fluctuant mass on the concave surface of the ear pinna with unilateral / bilateral swelling. On auriculocentesis, with fine needle aspiration blood tinged fluid will be noticed.

### Preoperative management

Studies suggesting that positioning of animal in lateral recumbency by placing the affected ear on top, placing cotton plug at external auditory meatus to prevent haematoma draining into ear canal, shaving and clipping of hair (Moshin, 2010; Fossum, 2007; Brown, 2010; Hassan *et al.*, 2002 and David *et al.*, 2000)<sup>[12, 4, 1, 16, 21]</sup>.

### Surgical techniques

A successful treatment of canine aural haematoma should resolve clinical signs, prevent recurrence and have minimal negative effects, including cosmetic outcome. There are numerous treatment options for AHs in dogs, with a wide range of medical and surgical techniques described (Ahirwar *et al.*, 2007; and Swaim & Bradley, 1996)<sup>[8, 27]</sup>.

Case reports suggesting that acute condition with moderate swelling (< 3cm) were treated with simple needle aspiration, in this method haematoma fluid will be aspirated with or without local corticosteroids infiltration and protective bandage in the form of pressure bandages is applied. This method often resulted in recurrence within 24 hrs therefore necessitating an alternate management according to Hassan *et al.*, 2002<sup>[16]</sup>. The retrospective study of Kazuhiro *et al.*, 2005 stated that repeated aspiration and instillation of corticosteroids was more effective than aspiration alone with a moderate level of evidence for assessing treatment. According to the findings of MacPhail, 2016<sup>[5]</sup>; Joyce, 1994<sup>[7]</sup> and Balagopalan *et al.*, 2013<sup>[31]</sup> as concurrent otitis externa and allergic skin disease are common in such cases where surgical management is not appropriate or suitable use of systemic corticosteroids in conjunction with daily steroid instillation and drainage would be more successful than drainage alone in preventing recurrence and achieving resolution.

According to Giles *et al.* 2007<sup>[34]</sup>, Hassan *et al.*, 2002<sup>[16]</sup> and Kuwahara *et al.*, 1986<sup>[6]</sup> surgical drainage may be performed if the haematoma is recurrent or older than 7 days. In this method, a triangular shaped incision was made at the tip of the bulging under aseptic precautions and the contents are drained. Similar type incision is made at the base of the bulging and fibrous adhesions are removed and a flexible fenestrated sheath is been passed through the incisions and fixed to the pinnae by stay suture for drainage. The ear pinna then folded around a conical roll of sterile gauze kept on the internal aspect and the bandage is removed after 24 hrs and daily cleaning of the sheath using normal saline and the cavity is infused with povidone iodine.

Alternative management for surgical drainage according to Balagopalan *et al.*, 2013<sup>[31]</sup> is placement of sterile fenestrated prosthetic tube; after haematoma fluid drained through a triangular incision made distally and the cavity is flushed with normal saline, fibrous tissues were removed and another similar incision made proximally and fixed with stay sutures. The ear pinna was fixed under compression for one day. The success rate and cosmetic outcome were relatively higher

except for moderate scarring was noticed.

On comparative study of three different techniques according to Hafiz *et al.*, 2018<sup>[18]</sup> reported that, skin adhesive (Surgical Glue) is the most favourable and effective technique for the closure of skin incision as compared to skin staples and silk suture. A longitudinal incision was given on the length of the hematoma on the concave surface of ear pinna comprising the skin but avoiding the cartilage. Blood was drained and fibrin clots were removed from the cavity by using a moistened gauze sponge or mosquito forceps and flushed with sterile saline. Suturing is achieved by using absorbable silk extended through the skin (0.75 to 1 cm) on the incision, attaching the skin to the underlying cartilage. Skin staples were applied over the incision for closure of skin while surgical glue was infiltrated in the cavity with the help of nozzle of surgical glue bottle. Evaluation was mainly done on the basis of wound dehiscence and cosmetic appearance. Results obtained showed that the rate of wound dehiscence was greater in case of skin adhesive and the cosmetic appearance was also better in case of suture group. According to the findings of Mattoo *et al.*, 2007<sup>[14]</sup> and Manisha *et al.*, 2016<sup>[13]</sup> stapling technique found economically feasible which required very less surgical time for obliteration of dead space created by AH and complete healing achieved at 12-14 days with better cosmetic appearance and found superior to other conventional method.

#### Post-operative management

According to Hassan *et al.*, 2002<sup>[16]</sup> the ear pinna was evaluated on every alternate day i.e. 2<sup>nd</sup>, 4<sup>th</sup>, 6<sup>th</sup>, 8<sup>th</sup> and 10<sup>th</sup> postoperative day for oedema/inflammation, oozing/discharge, redness, dehiscence and condition of drain sheath/sutures/staples. The ear pinna was also evaluated for cosmetic outcome.

#### Complications/ Cosmetic outcome

According to Hassan *et al.*, 2002<sup>[16]</sup> main complications after surgical management were oedema, inflammation, oozing, discharge, redness, dehiscence and disturbances to drain sheath/sutures/staples. In the studies of Wilson 1983<sup>[30]</sup>, Kagan 1983<sup>[10]</sup>, Joyce 1994<sup>[7]</sup> and Hall *et al.*, 2016 recurrence was the most common complication. Hassan *et al.*, 2002 reported that cases which were presented early in the courses of AH resolved faster with minimal complication. According to Balagopalan *et al.*, 2013<sup>[31]</sup> the common complications of surgical drainage like post-operative discomfort, drain tube blockage, pressure necrosis of the pinna, permanent scarring and shrinkage. Seibert & Tobias, 2013<sup>[26]</sup> reported that abscess formation as one of the complication when use of local corticosteroid instillation as a treatment option.

Drainage of acute haematomas may have better cosmetic results than drainage of chronic haematoma with long lasting inflammation that result in fibrosis, leading to significant thickening and distortion of the pinna (Pavletic, 2015)<sup>[29]</sup>.

#### Summary

A review of the developmental patterns and pathogenesis suggests that multiple risk factors are involved in the development of AH and factors which are associated with the progression or recurrence of AH: perichondral edema and inflammation, and slow healing within the cartilage (Kazuhiro *et al.*, 2005)<sup>[3]</sup>. Therefore, the control of inflammation and edema (inhibition of fluid production), the continuous

drainage considering the delay of adhesion, and the promotion of adhesion actively was considered as treatment strategies.

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