

# Canine aural haematoma

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## KEY POINTS

- Canine aural haematoma is a common condition in canine practice.
- The aetiopathogenesis is unknown.
- Many surgical and conservative methods have been used in the treatment of canine aural haematoma over the years, with varying results.
- The relative importance of otitis externa, trauma, breed predisposition, immunological and degenerative changes to the pathogenesis of the disease needs further investigation.

## Introduction

Canine aural haematoma is acknowledged to be a common condition in general practice. Surgical treatment for aural haematoma was reported to be the eighth most common surgical procedure in a survey of North American practitioners (1). It was ranked only below ovariohysterectomy, castration, declawing, dental prophylaxis, tooth extraction, abscess treatment and removal of cutaneous neoplasia/granulomas ('lumpectomy') in frequency.

Despite common frequency of occurrence, little is known about aural haematoma. It has been stated that clients' perception of aural haematoma is that the condition is very straightforward and they are therefore disappointed when recurrence is frequent (2). Furthermore, although authors have suggested several methods of treatment, only a few investigators have addressed the causes and pathogenesis of the condition. Mechanical causes, such as head shaking in otitis externa leading to rupture of the pinnal blood vessels and hence haematoma formation, have been suggested (3–6). However, more recently an autoimmune pathogenesis has been proposed, casting doubt on the assumption that the

pinnal swelling is a true haematoma, but rather that the haematoma fluid is an inflammatory exudate (7).

Aural haematoma has also been a frustrating condition in humans. Human aural haematoma was often found to be refractory to treatment and the results of surgery were often unsatisfactory. Various incision and drainage methods have been employed and various pressure devices used, but results were poor. In humans it is most frequently caused by a blow to the ear; this is seen mainly in boxers and wrestlers, but also in football players, acrobats, piano movers, butchers and 'the insane and aged' (8).

## Signalment

It has been reported that aural haematoma occurs most frequently in dogs with pendulous ears (6). However, the breeds affected were not reported, and it is not known whether this is due to the conformation of the ear or related to breed predisposition. Larsen (9) states that there was an increased incidence in German shepherd dogs and poodles in his study, although he conceded that this may reflect the number of these breeds in his practice. Few other studies have reported a breed incidence. An unpublished survey of 237 cases, by the author, of canine aural haematoma in Northern England suggested an increased incidence in the Labrador and Golden retrievers.

There is little evidence of a sex predisposition to canine aural haematoma. Two studies have reported males to be more frequently affected than females (9, 10), but Larsen (9) states that in a previous study he found males and females to be equally affected, and a more recent study also found approximately equal numbers of males and females presenting with canine aural haematoma (11).

There is little information regarding age incidence. An increased incidence of aural haematoma has been reported in middle age with a peak occurring at 6 to 8 years of age (11). The unpublished survey referred to above, of 237 cases, found 148 (62%) to occur between the ages of 7 and 11 years.

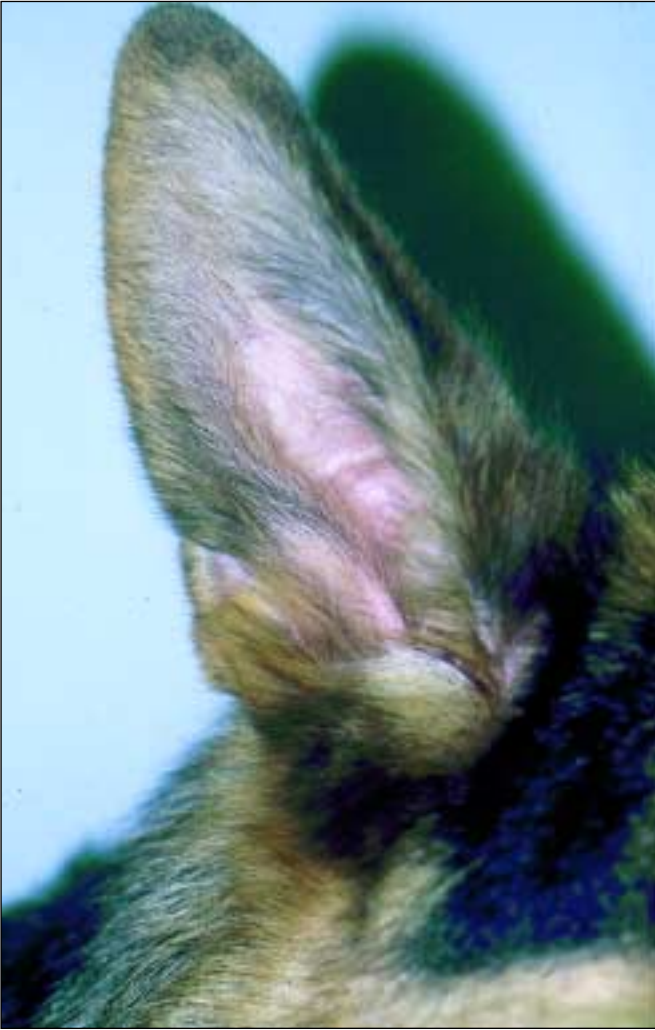
## Clinical features of aural haematoma

The external ear consists of two skin-covered cartilages, the auricular



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**Figure 1** Normal pinna of a German Shepherd dog.

cartilage and the annular cartilage. The pinna is formed by the auricular cartilage, which is a single sheet of elastic cartilage that is thin and pliable at the apex (the pinna) and becomes thicker and more rigid proximally where it rolls into a tube, the external ear canal. The skin on the concave (inner) surface of the pinna is tightly adherent to the cartilage, whereas that on the convex (outer) surface is relatively mobile. The cranial border of the auricular cartilage is relatively straight, whereas the caudal border is curved (**Figure 1**). 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, although in lesser numbers. Branches of the cranial auricular artery and the great auricular artery form the blood supply to the pinna: they encircle the margin of the auricular cartilage and pass through the foramina, supplying the lateral surface. The venous drainage of the ear broadly follows the arterial supply.

Canine aural haematoma (**Figure 2**) may occur unilaterally with occasional subsequent development of haematoma in the contralateral ear. Less commonly aural haematoma may present bilaterally. Recurrence of the haematoma is reported to be fairly common by most authors (2, 5, 10).

Aural haematomas are generally recognised to occur on the concave surface of the pinna, varying in position and size (11, 12), although rarely they may occur on both sides of the pinna (6). Cechner (6) further states that the size and shape of the haematoma is determined by the size and severity of the trauma causing it. Stephenson (3) stated that if detected



**Figure 2** Typical appearance of an aural haematoma – a well-defined, domed, swelling on the concave aspect of the pinna.

soon after incidence, the haematomas normally are found at the tip of the pinna. In humans the haematoma is usually oval and orientated along the long axis of the pinna (3).

There is some debate about the anatomical site of the aural haematoma within the pinna of dogs. Several authors stated that the haematoma forms between the skin and the pinnal cartilage (4, 6, 13). However, on the concave surface the pinnal dermis is firmly attached to the underlying perichondrium and in places merges with it so separation of these layers to allow haematoma formation is unlikely. Haematoma also has been proposed to be sited in the plane between the perichondrium and the cartilage (2). However, the perichondrium is also firmly adherent to the cartilage. Stephenson (3) stated that aural haematoma formation occurs between two layers of cartilage, but only a single layer of cartilage in the auricular cartilage has been demonstrated. Other investigators demonstrated clefts within the cartilage, both parallel and perpendicular to the concave surface of the pinna, suggesting that the haematoma is formed intrachondrally (7, 14).

## Aetiopathogenesis

Many causes of canine aural haematoma have been proposed. Early investigators stated that aural haematoma was one of the sequelae of otodectic mange, and that it was rarely caused by anything other than head shaking (3). More recently, authors have reported that otodectic mites are uncommonly associated with canine aural haematoma (7, 11, 12). However, it is interesting to note that although Fraser *et al.* (13) reported that the incidence of *Otodectes cynotis* to be less than 10% in cases of otitis externa, it may be that the importance of otodectic mites in otitis externa was underestimated.

Earlier authors state that pruritus associated with otitis externa is the cause of aural haematoma (3, 4). It was suggested that vigorous shaking causes the skin to move backward and forward over the cartilage, inducing friction, which causes the blood vessels to break at points where they perforate the foramina. Bleeding would then occur between the cartilage and the perichondrium (6). Two further mechanisms have been proposed whereby head shaking could result in fracture of the pinnal cartilage (14). In the first, explosive head shaking could lead to the creation of a wave through the pinna, which is reflected at the free end as a tensile wave and travels back through the ear, reflecting at the proximal end with double the initial force, resulting in cartilage fracture. In the second mechanism a





**Figures 3 and 4** Preoperative appearance of an aural haematoma (Figure 3). The lesion was incised and multiple sutures used to ensure that the free edges were apposed to the aural cartilage, minimising dead space. These sutures are placed with the knots on the convex aspect of the pinna (Figure 4).



sustained, but less explosive, head shaking could induce a sinusoidal wave motion within the structure of the pinna, resulting in a stress fracture of the cartilage.

However, several authors have found that, although otitis externa is commonly associated with aural haematoma, it is not always present. Young (10) recorded otitis in 22 of 40 cases treated and Kuwahara (7) found 32 of 40 dogs had concurrent otitis externa, of whom 26 had otocariasis. Wilson (12) found that 24 of 35 cases had otitis externa, while in a series of 15 cases Joyce (11) found 9 cases to have concurrent otitis externa and the unpublished survey referred to above found 155 out of 237 cases to have aural disease. Conversely, aural haematoma has been reported as an uncommon finding in cases of chronic otitis in the dog (15). The breeds that have been suggested to be predisposed to canine aural haematoma, the Golden and Labrador retriever, have also not been shown to be predisposed to otitis externa in three studies (13, 25).

Degeneration of the cartilage in affected ears has been found (7, 11). Joyce reported that the cartilage defects were filled with granulation tissue. Studies of experimentally affected rabbits and guinea pigs showed that granulation started 5 days after cartilage damage. Dubielzig *et al.* (14) suggested that regenerative cartilage was not important in the healing process and was insignificant compared with the proliferation of granulation tissue. Larsen (9) studied the pinnae of dogs affected with aural haematoma. He found cartilage clefts in both affected ears and the macroscopically normal contralateral ear.

In 1986 Kuwahara proposed that degeneration of the cartilage is caused by an autoimmune reaction (7). He further proposed that vasoactive amines may increase the permeability of blood vessels within the cartilage, leading to exudation and increased pressure, which in turn result in chondral clefts and further blood vessel rupture and haemorrhage. Kuwahara also demonstrated that there were immune-mediated events taking place in cases of aural haematoma. For example, he found antinuclear antibody titres in 52.5%, and positive Coombs tests in 100% cases. However, neither a significant antinuclear antibody titre nor a positive Coombs test was found in any of the cases in another study (11).

Several investigators have reported that the aural haematoma is caused by bleeding secondary to pinnal vessel rupture (3, 4, 6), but Kuwahara's proposal is supported by reports demonstrating that the composition of aural haematoma fluid has been found to differ markedly from that of blood, in that the packed cell volume, total protein and albumin content was lower (7, 11). These findings suggest that the fluid within the haematoma is an exudate rather than blood, although this may simply reflect the time from initial onset to sampling, which is most frequently 0–7 days (11, 16).

## Treatment

Three main types of treatment have been used for canine aural haematoma.

### Surgical reduction with postoperative compression

Many surgical methods have been devised since the first technique was reported – making an S-shaped incision over the surface, followed by skin closure with through and through stainless steel sutures of the haematoma. Postoperative compression was achieved by bandaging the affected ear to the head. Since then authors have proposed various shapes for the incision: longitudinal, elliptical, and multiple round (using a biopsy punch or leather punch) to create various-sized holes. A fusiform incision made into the skin of the inner pinna has been described, with a purse-string suture placed around the incision for closure.

Various methods have been described to compress the dead space that

Table 1

**Treatment of canine aural haematoma using a Penrose drain and glucocorticoids**

1. A thorough examination of the aural canal is carried out under general anaesthetic to determine any underlying cause. A treatment plan is made for dealing with any concurrent otitis externa.
2. The inner surface of the pinna is prepared for surgery by standard methods, using an aperture drape to expose the surface of the inner pinna.
3. A gauze swab is placed at the entrance to the aural canal to prevent haematoma fluid from draining into the external ear.
4. A circular excision is made at the proximal and distal extremities of the aural haematoma through the inner pinna skin into the haematoma cavity using a 6 mm disposable skin biopsy punch.
5. A Penrose Drain is placed exiting through the punch excisions, proximally and distally. This is sutured into place with 2 metric monofilament nylon.
6. The drain is left *in situ* for 14 days.
7. Postoperatively, oral prednisolone is given at a dose of 1.5 mg/kg daily for 14 days, then 0.75 mg/kg daily for 14 days.



**Figures 5 and 6** Postoperative scarring (Figure 5) and pinnal distortion (Figure 6) following aural haematoma.

results from drainage of the haematoma including through and through sutures, or compressing the ear with various materials. Materials that have been used include cotton wool and paper clips, tongue depressors, sponge rubber applied to the haematoma site and the ear glued to the head, staples, X-ray film and foam, cardboard, thin plastic and aluminium, and even cyanoacrylate adhesives. The Marshall-Putney technique describes a method where the incision is made on the lateral surface of the pinna and through the pinnal cartilage to drain the haematoma. Buttons are used to spread the pressure of through and through mattress suture. This technique, modified to make the incision on the medial surface of the pinna is widely used (Figures 3 and 4). Various substances have been used to reduce the reformation of haematoma after surgery including proteolytic enzymes and sclerosing fluids, although their value is debatable. Postoperative scarring is usually minimal, but occasionally scarring (Figure 5) and pinnal distortion do occur (Figure 6).

**Drainage without surgical incision**

Despite all the methods of surgical treatment that have been developed, a significant number of aural haematomas recur. Kuwahara (16) reported a recurrence rate of 40% following surgery. More recently, treatment methods involving the establishment of continued drainage during the period of haematoma fluid production have been developed – for example, using a hypodermic needle to drain the fluid and then compressing the pinna to prevent accumulation of haematoma fluid. Wilson (12) describes a method using a needle to aspirate the aural haematoma fluid, then flushing with saline and inserting a teat cannula at the distal end. The drain is left *in situ* for 3 weeks. The outcome was reported to be good in 40 out of 47 cases. Reported problems related to the patient removing the tube and the poor cosmetic results. Kagan (5) treated aural haematoma in nine cases with an indwelling drain with good results. Similar results were obtained where an indwelling drain was inserted with concurrent



Table 2

**Results of treatment of canine aural haematoma using drainage methods with or without concurrent systemic or localised glucocorticoid treatment**

Author (ref no.)	Method	Cosmetic result	Recurrence	Good final outcome
Wilson (12)	Drainage with teat tube	Good 33/35	5/35	33/35
Joyce (17)	Indwelling drain and glucocorticoids	Good	3/29	29/29
Kuwahara (16)	Longitudinal incision and sutures	60%	Not recorded	60%
Kuwahara (16)	Aspirate + 2–4 mg/kg intravenous dexamethasone daily	88.9%	Not recorded	84.7%
Kuwahara (16)	Aspirate + 0.5 mg/kg intravenous dexamethasone daily	46.2%	Not recorded	37.5%
Kuwahara (16)	Aspirate + 0.5 mg/kg intravenous dexamethasone + 0.2–0.4mg intralesionally daily	92.9%	Not recorded	88.9%
Kuwahara (16)	Drainage only		All failed and went to surgery	
Kagan (5)	Indwelling drain	Good	2/9	9/9
Young (10)	Aspirate + 0.5–1.0 ml depot methylprednisolone (no sutures)	Good	7/26	24/26
Horstmann (19)	1–2 mg dexamethasone subcutaneously + 1 ml deposit of methylprednisolone intralesionally 1–2 days later	Good	12/53	52/53

Table 3

**Comparison of five methods of surgical treatment of canine aural haematoma**

Method of treatment	Average healing time	Complications
A Longitudinal incision + through and through mattress sutures	17.2 days	Drainage impeded by sutures Puckering
B S-shaped incision + through and through mattress sutures	15.1 days	Moderate scarring 'saw-through' by sutures
C Incisions + buttons and mattress sutures	11.8 days	Buttons add to aural discomfort
D Incision + splintage with X-ray film	14.3 days	Pressure necrosis Postoperative discomfort
E Indwelling drain	Not evaluated	Recurrence of haematoma 2 days after drain removal

compression of the ear by bandaging the ear to the head for 10–14 days. Kuwahara (16). However, it was found that simple daily needle drainage with saline flushing was unsatisfactory.

**Anti-inflammatory or immunosuppressive doses of glucocorticoids**

Following Kuwahara's proposal that aural haematoma has an autoimmune aetiology, several methods of treatment combining drainage with glucocorticoids have been developed. Kuwahara (16) recorded the results of various treatments:

- Surgical reduction and suturing was successful in 60% of cases.
- Aspiration of haematoma fluid in conjunction with intravenous injection of 2 mg/kg dexamethasone once daily was successful in 88.9% of cases.
- Aspiration of haematoma fluid in conjunction with a reduced dose (0.5 mg/kg) of dexamethasone was successful in 46.2% of cases.
- Daily aspiration of haematoma fluid, followed by irrigation with 0.2–0.4 mg dexamethasone in saline for 2–3 days, and 0.5 mg/kg dexamethasone orally was successful in 92.9% of cases.

Young (10) described a method of draining the aural haematoma cavity by needle and injecting 0.5–1.0 ml of a depot steroid into the cavity. He reported a good outcome in 36 out of 40 cases, and although there was frequent recurrence no cases needed surgical treatment. Joyce (17) described a method combining the use of an indwelling Penrose drain

(Table 1) in conjunction with oral prednisolone at a dose of 2 mg/kg for 2 weeks, reducing to 1 mg/kg for a further 2 weeks, which had a successful outcome in 26 out of 29 cases. Of the three cases which recurred, all responded to a single repeated treatment. Recently, as a result of the failure to document an autoimmune aetiopathogenesis of canine aural haematoma (11), the author has reduced the dose of prednisolone used to an initial dose of 1.5 mg/kg daily for 2 weeks, reducing to 0.75 mg/kg daily in recent cases.

**Other methods of treatment**

Homeopathic treatment has also been proposed for aural haematoma. Seven dogs were treated using a combination of Hammamalis, Bufo and Arnica (18). Corticosteroids at antipruritic doses and heparin cream were administered concurrently. Recovery was noted in 7–23 days. There was a recurrence in one dog, which was treated surgically.

**Outcome of treatment**

Results for the medical management of aural haematoma, i.e. drainage of the haematoma, with or without concurrent anti-inflammatory treatment, are summarised in Table 2. It should be remembered that, whereas many techniques have been proposed, only a few authors have evaluated results with regard to successful outcome, cosmetic result and recurrence rate.

A similar situation pertains to the evaluation of surgical options for management of aural haematoma. However, one study, by Narwade and Diwan (20), compared the healing time and cosmetic results of five methods of surgical treatment. The results are summarised in **Table 3**.

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