Association of ventral bulla osteotomy and lateral wall resection to treat dogs presenting otitis externa and media

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SUMMARY

The objective of this retrospective study is to report complications and long-term follow-up related to ventral bulla osteotomy (VBO) and lateral wall resection (LWR) of the vertical ear canal for treatment of otitis media and externa in dogs instead of total ear canal ablation (TECA) and lateral bulla osteotomy (LBO). Medical records were reviewed to identify dogs in which a VBO and a LWR were performed in order to treat otitis media and externa. Sixty VBO and LWR were performed on 52 dogs. The overall complication rate was 56.7% (34/60) and the incidence of major complications (recurrence or permanent nerve paralysis) was 26.7% (16 cases / 60). Facial nerve injury was reported in 13.3% of the cases (3 temporary, 5 permanent). Recurrence represented another main complication (13.3%). Complication rate with VBO is similar to that shown with LBO. The association of VBO and LWR represents an alternative treatment for otitis media and externa that could preserve auditory function. However, to limit recurrence, a thorough otoscopic examination must be performed preoperatively to exclude major ear canal involvement.

Keywords: Tympanic bulla, ventral bulla osteotomy, lateral wall resection, otitis, dog, complications, nerve deficit, recurrence.

RÉSUMÉ

Gestion des otites externes et moyennes chez le chien par trépanation ventrale de la bulle tympanique et ouverture latérale du conduit auditif

L’objectif de cette étude rétrospective est de rapporter les complications et le suivi à long terme lors de trépanation ventrale de la bulle tympanique et d’ouverture latérale du conduit auditif externe vertical utilisées dans le traitement d’otites externes et moyennes chez le chien plutôt que la trépanation latérale associée à l’ablation du conduit auditif externe. Après sélection sur dossiers, il est apparu que 52 chiens (soit 60 oreilles traitées) ont subi ces 2 interventions. Le taux global de complications était de 56.7 % (34/60) et la fréquence des complications majeures (récidive ou lésion nerveuse définitive) était de 26.7 % (16 cas / 60). Des lésions du nerf facial (3 temporaires et 5 permanentes) ont été rapportées dans 13.3 % des cas. L’autre principale complication est la survenue d’une récidive (13.3 %). Le taux de complications associées à la trépanation ventrale est voisin de celui observé lors de trépanation latérale. L’association trépanation ventrale et ouverture latérale du conduit auditif vertical représente une alternative préservant l’audition chez les chiens présentant une otite externe et moyenne. Cependant, pour limiter les risques de récidive, un examen otoscopique minutieux doit être réalisé afin d’éliminer les cas présentant un atteinte majeure de l’ensemble du conduit auditif.

Mots clés : Bulle tympanique, trépanation ventrale, ouverture latérale du conduit auditif, otite, chien, complications, déficits nerveux, récidive.

Introduction

Ventral bulla osteotomy (VBO) with curettage is a surgical procedure that involves removal of a portion of the ventral wall of the osseous tympanic bulla and removal of the contents including the epithelial lining. This technique is commonly performed to remove inflammatory polyps in cats or bulla neoplasia, and rarely to treat otitis media [4, 6, 13, 15]. A lateral wall resection of the vertical ear canal (LWR) consists in reflecting ventrally the lateral part of the vertical ear canal in order to improve drainage and ventilation of the ear canal [16]. It is indicated when otitis externa has not responded favourably to proper medical treatment and the horizontal ear canal is still patent. It permits drainage of the ear canal and provides ventilation to reduce moisture, humidity and temperature, which all favour infection [7].

Otitis media is often an extension of otitis externa. The main clinical sign is pain. When inflammation or infection reach the vestibular sensory organs, signs of otitis interna (head-tilt, nystagmus, and ataxia) are observed. While nystagmus and ataxia may disappear, head-tilt may persist [12].

We hypothesized that association of VBO and LWR could represent an interesting alternative to treat otitis externa and media when the horizontal ear canal remains patent and not stenotic. To our knowledge, no retrospective study has been published on the complications and outcome after combination of VBO and LWR. The purpose of this study was to review all the cases performed in our hospital to evaluate surgical complications and long-term results associated with this procedure.

Materials and Methods

For this retrospective study, medical records from 1993-2004 were reviewed and all cases in which a bulla osteotomy
were performed were retained. To be included in the present study, VBO and LWR had to be performed and the following data had to be recorded: signalment, history, physical examination, postoperative management and complications, and at least, 6 months follow up. In all the otitis cases, a medical treatment had been previously administered before the patient presentation for consultation.

Physical and neurological examinations, haematological and serum biochemical analyses were performed in all cases. Radiographic examination was performed under general anaesthesia and consisted of lateral, oblique, ventro-dorsal and open-mouth views of the osseous bulla. Then, otoscopic examination was performed to assess the degree of patency of the external ear canal. Oro-pharyngeal examination was performed to check for the presence of inflammatory polyps.

When the vertical ear canal was stenotic and the horizontal ear canal remained patent, a VBO and a LWR were performed. The patient was positioned in dorsal recumbency. A VBO was performed using a standard technique [11]. A skin incision was made centred midway between the level of the angular process of the mandible and the level of the wing of the atlas. Using blunt dissection, the digastricus muscle was separated from the hyoglossal and the styloglossal muscles. The hyoglossal nerve was identified on the lateral aspect of the hyoglossal muscle and carefully retracted medially (figure 1).

Jugulohyoideus muscles were incised and reflected to expose the ventral aspect of the bulla. The digastricus muscle (1) is retracted laterally and the hyoglossal and styloglossal muscles (2) medially. The hyoglossal nerve (3) lies ventrally to the bulla (4).

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Postoperatively, cephalixin (20mg/kg, PO BID) was discontinued when culture was negative, continued or changed for a 10 day period, according to the results of bacteriologic culture and antimicrobial susceptibility testing. A neurological examination was performed the day after the surgery. The patient was discharged 2 days after the drain was removed. Sutures were removed 10 to 14 days after surgery. Postoperatively, patients were monitored for duration and character of complications.

Patients were examined at the time of the suture removal and at the consultation when complications had to be managed. For long-term follow-up, for patients which were not re-examined in the ENVL clinic, owners were contacted by telephone to evaluate the long-term status of their pets. At least, a 6 months long follow-up was performed in each case. Complications were classified into two categories: minor (wound inflammation or dehiscence, seroma, local infection or temporary nerve dysfunction) or major (permanent nerve lesion or recurrence).

Results

Ventral bulla osteotomy and a LWR were performed on 60 ears of 52 dogs. Mean age at the time of surgery was 5.7 years (range: 1 to 12 years) and it was unknown in 2 cases. Among the 52 dogs, there were 25 males (10 castrated males) and 27 females (20 spayed females). Follow-up evaluation ranged from 6 months to 8 years. The most common breeds were German shepherd dog (11), Poodle (5), Yorkshire terrier (5), Beauce sheepdog (3), Cocker spaniel (3), Labrador retriever (3), mixed breed (4). Other breeds were not represented more than twice.

In all cases, otitis was diagnosed with extension to the middle ear. Duration of clinical signs varied from 3 weeks to 8 years. In 2 cases, otitis media was associated with neuroplasia of the vertical ear canal. After removal of the mass, histological examination was performed and a ceruminoma was diagnosed in the both 2 cases. The 58 with end-stage otitis had clinical signs typical of external ear disease including ear scratching, head shaking, ear odour, abnormal ear carriage, pain on palpation of the ear canal and aural drainage. Similar clinical signs were also observed in the 2 cases of neoplasia. Otoscopic examination was performed in each case. A tympanic membrane perforation was observed in 38 cases (figure 2). In 14 dogs, the tympanic membrane appeared to be inflamed and in 11 cases, its visualization was impossible. Radiographic examination was carried out only in 53 cases because some owners declined for economic concerns. In 41 of these, radiographic changes of the bulla were observed and included loss of air density within the tympanic cavity and thickening of the bulla wall (figure 3). Bacteriologic culture results were available for 45 dogs (52 ears). The most common bacteria isolated from collected samples included Staphylococcus spp. (16), Pseudomonas spp. (14), Proteus spp. (11),...
Streptococcus spp. (10) and E. coli (3). Mixed bacterial populations were seen in 30 ears. No isolate was identified in samples from 8 ears.

Of the 60 cases, 26 (43.3%) did not present any complications but minor and major complications occurred in 34 cases (Table I).

The main minor complication was seroma (10 cases). Wound dehiscence developed in 4 cases (figure 4) and was treated by wound lavage and healing was obtained by second intention. Other complications encountered were cellulitis (3 cases), local inflammation (2 cases) and kerato-conjunctivitis of the affected side (1 case). The most frequently observed temporary nerve complication was facial nerve dysfunction and consisted in drooping of the eyelid and lip (3 cases). In each case, complete function was regained within 2 weeks postoperatively. Other nervous complications were unilateral hypoglossal nerve dysfunction (lateral deviation of the tongue) (1 case), vestibular signs (head tilt) (1 case) and seizure (1 case). Furthermore, temporary nerve complications were associated with tissue injury in 2 cases.

The main major complication was otitis recurrence (8 cases). Recurrence occurred within the first 4 months. In 4 cases, a medical treatment was administered and in 4 cases, a second surgery was necessary. One dog was euthanized due to poor response to medical treatment. Ten neurologic dysfunctions were diagnosed during hospitalization in 8 dogs. Facial nerve dysfunction was observed in 5 cases and one dog that had neurologic deficits prior to surgery, exhibited partial resolution after surgery. Other nerve dysfunctions were Horner’s syndrome (2 cases), hypoglossal nerve dysfunction (1 case), trigeminal nerve dysfunction (1 case), slight ataxia and head tilt (1 case). Besides, 2 cases exhibited simultaneous severe nerve dysfunctions (facial and trigeminal nerve injuries, Horner’s syndrome and hypoglossal nerve dysfunction) and 3 dogs presented simultaneously minor and major complications.

Discussion

All dogs in the present study had otitis externa complicated by otitis media. Appropriate medical therapy had been unsuccessful and therefore surgical treatment was recommended.

The surgical procedure of bulla osteotomy has been well described. Many retrospective studies using total ear canal ablation (TECA) and lateral bulla osteotomy (LBO) have been published [1, 3, 8, 10, 14]. However, scarce data exist [13] evaluating the surgical management of otitis media and postoperative com-
plications associated with VBO in dogs. Surgery of the middle ear is indicated when otitis is not responding to medical treatment or if neoplastic or inflammatory masses have to be removed from the middle ear [5, 7]. Access to the middle ear is obtained with a ventral or a lateral approach. The ventral approach should be favoured when a mass is located in the middle ear without any involvement of the ear canal [15]. This procedure should also be performed if otitis media is associated with otitis externa without stenosis of the ear canal. In these cases, a ventral approach can be associated with a LWR or a vertical canal ablation depending on inflammatory involvement of the vertical ear canal [5, 15]. According to SHARP, association of VBO and TECA does not present any advantage due to the high rate of facial nerve injury (31%) and the number of recurrences (2 out of 14 dogs) [13]. Lateral approach must be carried out when neoplasia, major inflammation or stenosis affect the horizontal ear canal. This is the reason why a complete otoscopic examination must be performed before choosing a procedure. If ear canal involvement is underestimated, risk of recurrence may be dramatically increased as in this retrospective study.

Bulla osteotomy is associated with a high rate of complication (21 to 84%) but about 90% of owners consider the outcome successful [1, 3, 8, 13]. Many complications are the result of the surgical approach. Nerve injuries are probably the most frequently observed. Complications associated with bulla osteotomy and curettage, are really closed. A high rate of temporary or permanent neurologic deficits is reported. These include ipsilateral Horner’s syndrome (damage to the oculosympathetic pathways of the middle ear), head tilt, nystagmus and postural abnormalities (damage to the inner ear or the vestibular portion of the eighth cranial nerve) [2, 4]. FAULKNER et al. [4] reported that Horner’s syndrome and otitis (83% and 42% respectively) were the main postoperative complications following VBO in cats. In dogs, it was observed by MATTHIESEN et al. in 4 out of 38 cases [8], and in 2 cases in this study.

The hypoglossal nerve lies ventrally to the bulla and the facial nerve is close to the horizontal ear canal. During the ventral approach, the hypoglossal nerve must be identified and retracted laterally. One case of hypoglossal nerve deficit was reported by Sharp [13] and 2 cases are reported here. Facial nerve injury is the most frequently observed with both approaches [3, 8, 12, 14]. Following TECA and LBO, the rate of facial nerve deficit (partial or complete) in dog ranged between 22% and 58% [3, 8]. MATTHIESEN et al. [8] reported that it was partially due to the inexperience of surgeons but also to distortion of normal anatomy (ear canal ossification and fibrosis), which impedes visualization of the nerve. In the present study, 8 dogs (13.3%) exhibited facial nerve injury, 5 of which in a permanent way. This is likely due to an inappropriate Hohmann retractors’ placement, which were used to allow adequate exposure of the bulla. This complication should be avoided by retaining the hypoglossus and the stylo-glossus muscles with small Weitlenier or two miniature Gelpi retractors [15].

Another main complication is infection [8]. Positive bacterial cultures from specimens of dogs with otitis externa and media have been reported in several studies [1, 3, 5, 8, 11]. The more common isolates were Staphylococcus spp., Pseudomonas spp., Proteus spp., Streptococcus spp. and E. coli [1, 5, 12]. The same isolates were evidenced in the present retrospective study. Bacterial contamination of the surgical field from manipulation of an infected or contaminated middle ear and horizontal ear canal is common, predisposing the patient to postoperative infection (for example, acute cellulitis) [8]. Varying degrees of acute cellulitis developed in 23% of the dogs [8]. However, only 3 cases of cellulitis were observed (3%) in this study. Although seroma was uncommonly described in literature as a surgical complication, the frequency of this affection appeared relatively high (17%) in the present study and was probably associated with premature removal or incorrect placement of the drain or inappropriate dead space obliteration [3]. Nevertheless, none of the 10 cases related here required a second surgery.

In the present study, a major problem was recurrence. This is probably due to an underestimation of the ear canal involvement. The main inconvenience of VBO is that despite allowing a superior visualization of the inner bulla it provides only poor access to the external ear [15]. When the horizontal ear canal was partially occluded or stenotic, LWR was probably insufficient. For this reason, we decided to perform TECA and LBO in the cases of recurrence which did not respond to medical management. Recently, PALMEIRO et al. [11] published a retrospective study evaluating treatment of otitis media with video-otoscopic lavage of the tympanic bulla and long-term antimicrobial drug treatment. This procedure presents the main advantage of allowing a complete exploration and lavage of the bulla without any surgical approach. They did not report any nerve injury but 7 out of 44 cases recovered and 4 required a second procedure. If the ear canal is still patent, otoscopic lavage would probably represent the next treatment of choice for otitis media. Complete deafness may occur with bilateral TECA/LBO, but many owners believed that their dogs had some hearing after surgery and were able to respond to very high pitched or very loud noises [14]. However, it has been reported that owners have complained that deafness was more severe than they had expected [1]. By performing LWR and VBO, we preserve the ear canal and then we could expect to preserve a level of hearing similar to pre-surgery. Owners reported that they thought their pets were able to hear at least as well as before but unfortunately, we were unable to perform brain stem auditory evoked potentials as described by Mc ANULTY et al. [9].

In conclusion, as with LBO and TECA, VBO and LWR are associated with a high complication rate but a lower prevalence of facial nerve injury. Preoperatively, a thorough otoscopic examination must be carried out in order to evaluate the horizontal ear canal involvement and allow the most appropriate procedure to be chosen. Throughout the surgery, surgeons must be meticulous about muscle and nerve retraction. When VBO and LBO are available, surgeons may prefer the former in order to have better exposure of the bulla structure and to limit facial nerve injury and deafness.

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References


