J Vet Clin 20(1) : 26-32(2003)

Total Ear Canal Ablation and Lateral Bulla Osteotomy for Chronic Otitis Externa and Media in Dogs: Postoperative Recovery and Long-Term Follow-up

Joon-Young Kim, Soon-Wuk Jeong[1], Man-Bok Jeong, Hyun-Jung Han and Je-Sun Kim

Department of Veterinary Surgery, College of Veterinary Medicine, KonKuk University, Seoul 143-701, Korea

Abstract : The clinical results of 10 consecutive total ear canal ablation combined with lateral bulla osteotomy (TECA-LBO) in six dogs with chronic otitis externa and media were evaluated by the postoperative recovery and long-term follow-up. All dogs were selected for TECA-LBO on the basis of following five clinical symptoms. First, medical treatment couldnt improve clinical signs at least for over 2 months. Second, tympanic membrane was completely disappeared. Third, radiopacity was increased in tympanic cavity. Forth, petrous temporal bone was sclerosed. Fifth, ear canal calcification was progressed. And all cases were satisfied all five clinical symptoms. At 14 days after operation, the preoperative symptoms of chronic otitis externa and media which were scratching ear, pain, and hardening ear canal were resolved, and postoperative swelling, erythema, head tilt, and exudate from Penrose drainage were not existed in all cases. Loss of eye blink was happened in 4 cases, but these were disappeared between 14 days after operation except one case on 3 months. All dogs were discharged form hospital at 14 days after operation. Between 3.5 and 6.5 months after discharging from hospital, para-aural abscessation was happened only in all Cocker spaniels. But this complication was solved by ventral bulla osteotomy (VBO). The dogs which didnt show para-aural abscessation after TECA-LBO didnt show scratching, pain, hardening of ear and hearing ability was improved, at 7.5 months after TECA-LBO. And the dogs which showed para-aural abscessation after TECA-LBO also didnt show scratching, pain, hardening of ear and hearing ability was also improved, at 7.5 months after VBO. In conclusion, After TECA-LBO, all dogs were recovered well without complication within 2 weeks except Cocker spaniel. And loss of eye blink can be cured naturally within 2 weeks after surgery. And para-aural abscessation can be happened between 4 and 7 months after TECA-LBO, so surgeon must follow-up until 8 months.

Key words **:** total ear canal ablation and lateral bulla osteotomy (TECA-LBO), otitis media, dog

Introduction

Otitis media in dogs is frequently come into existence[7]. In one survey of 100 patients with otitis externa, 16 percent with acute otitis externa had concurrent otitis media and 50 percent with chronic otitis externa had concurrent otitis media[7]. The most common cause of otitis media is otitis externa. Thus; the dogs with chronic or recurrent otitis externa should always be suspected otitis media[7].

If otitis media couldnt be controlled so the infection reach the vestibular sensory organs, the signs of otitis interna (ataxia, head-tilt, and nystagmus) can be seen[25]. Although the signs of otitis interna are not appeared, because of severe pain, ataxia, and possibility of otitis interna, otitis media must be treated.

Among numerous surgical techniques for treatment of otitis media, total ear canal ablation combined with lateral bulla osteotomy (TECA-LBO) is a surgical procedure most commonly performed for control of otitis media in dogs[10,16,27,28]. Total ear canal ablation combined with ventral bulla osteotomy (TECA-VBO) has the advantage of providing improved exposure and more consistent ventral drainage of the tympanic bulla than the TECA-LBO but TECA-LBO is more frequently used technique than TECA-VBO because of the major disadvantages of TECA-VBO which are the technical difficulty of performing the procedure and repositioning of patients[7]. TECA-LBO can remove complete vertical and horizontal portion of the auricular cartilages with associated epithelium as well as a portion of the ventrolateral wall of the osseous bulla to aid in complete removal of debris and epithelium in the tympanic cavity[1-3,22,29]. So, whole resection of external ear canal, and the removal of debris and necrotic epithelium in the middle ear can control ear with inflammation.

But a high rate of complications has been reported with TECA-LBO[7]. Complications of TECA-LBO attributed to two main factors: technical difficulty in performing the two procedures and bacterial contamination of the surgical site from contaminated tissues[7,29]. Complications of TECA-LBO are various, and include acute infection, partial and complete facial nerve paralysis, damage to the vestibular and cochlear windows with resulting inner ear injury, Horners syndrome, intraoperative hemorrhage, hypoglossal nerve damage, damage to the hyoid apparatus, hearing loss, avascular necrosis of the pinna or caudal pinna margin, and persistent dermatitis of the pinna[2,22,23,28]. Most complications are short lived and resolved with just medical treatment and costly

[1]Corresponding author.
E-mail : swjeong@konkuk.ac.kr

surgical procedures[2,28]. Among the many complications, loss of eye blink, hearing loss, facial nerve paralysis, and recurrent infection of the middle ear or other structures deep to the subcutaneous tissue layer are most complications[5,21,24,27].

The informations of postoperative recovery course, and long-term outcome of TECA-LBO was a little. The purpose of this study is to evaluate the postoperative recovery and long-term outcome of dogs undergoing TECA-LBO.

Materials and Methods

Experimental animals

Six dogs with chronic otitis externa and media were presented between March 2001 and February 2002. Dog were admitted to Veterinary Medical Teaching Hospital of College of Veterinary Medicine of KonKuk University and performed total ear canal ablation and bulla osteotomy. All dogs were determined to have chronic otitis externa and media, and were selected for TECA-LBO on the basis of following five clinical symptoms. First, medical treatment couldnt improve clinical signs at least for over 2 months. Second, tympanic membrane was completely disappeared. Third, radiopacity was increased in tympanic cavity. Forth, petrous temporal bone was sclerosed. Fifth, ear canal calcification was progressed. All cases were satisfied with all five clinical symptoms.

History taking

Breed, age, sex, main complaints, concomitant other diseases, affected ear, duration of clinical signs, previous treatment and deafness were recorded. Data are reported as mean±SD.

Physical examination

Head tilting, facial nerve paralysis (including loss of eye blink), consistence of ear canal, hyperplasia of ear canal, hearing, scatching ear, and ear pain were examined.

Hearing ability was performed by whether responding or not after shouting loudly beside affected ear.

The frequency of scratching was divided to 3 degree. Mild was scratching ear sometimes. Moderate was scratching ear often-times. And severe was scratching ear so many times. The degree of pain was evaluated by 3 grades. Grade 0 was that didnt show any pain. Grade 1 was that showed the pain when palpated. Grade 2 was that showed pain in ordinary times. For evaluating the degree of hardening of ear canal, degree was divided into 3 classes. Class 1 was slightly ossification of auricular cartilage. Class 2 was moderate ossification but opening of ear canal. Class 3 was full calcified and no opening of ear canal.

Otoscopic examination

Ear canal was evaluated about patency or stenosis, color changes, ulcerations, exudates, foreign bodies, parasites, tumors, and excessive hair or waxy accumulation by the otoscope under anesthesia. And tympanic membrane was evaluated about anatomical structural, especially about manubrium of malleus, pars flaccida, and pars tensa[11,12]. If tympanic membrane was ruptured completely, and manubrium of malleus, and pars flaccida were not seen, tympanic membrane was considered it would not be healed[13,14].

Radiographic examination

Plain radiograph was performed using lateral oblique, ventrodorsal, dorsoventral, and open mouth view. For contrast radiograph, iohexol (Omnipaque®, Nycomed Imaging, 300 mgI/ml, 2-5 ml/ear) was injected via each ear cannel (cannalography), and radiographic evaluation was then performed by the use of lateral oblique, ventrodorsal, dorsoventral view for confirming whether tympanic bulla was perforated[23].

Surgical procedures and postoperative management

Total ear canal ablation, Lateral bulla osteotomy and Ventral bulla osteotomy were performed as the method which was referred by Fossum[9].

Postoperative management. For postoperative analgesics, butorphanol (Butorphan®, MYUNGMOON PHARM., 0.2 mg/kg, IM, one time.), lidocaine spray (Xylocaine® 10% Spray, Astrazeneca Korea, one time.) and tranquilizer, acepromazine (SEDAJECT injection, SamWoo Chemical IND.CO., LTD, 0.025 mg/kg, IV, one time.) was administered[27]. Bandage was placed over the ears. If necessary an Elizabethan collar was used to prevent bandage removal and ear mutilation. Because bandages and excessive swelling could impair respiration, patient was monitored postoperatively. Antibiotics were administered for 2 to 3 weeks. Penrose drains were removed in 3 to 7 days[2,24,25,27]. Sutures were removed in 10 to 14 days.

Postoperative examination and long-term follow-up

All dogs were hospitalized for 14 days after operation. In this time, postoperative care and assessment were performed. Postoperative assessment was performed with following items. (1) Swelling (2) Erythema (3) Penrose drainage (4) Loss of eye blink (5) Head tilt. And vital signs-body temperature, heart rate, respiratory rate, activity, and appetite were also checked during 14 days.

At 14 days after operation, the first evaluation was performed. All dogs was evaluated about the symptom of chronic otitis externa and media which were scratching ear, pain, hardening of ear, the postoperative assessment items, vital signs, and hearing ability. In this evaluation, if any problem was not showed, then a dog could discharged from hospital.

For the long-term follow-up, the second evaluation was performed. Until 8 months, if any complications had not

happened, the second evaluation was performed at 8 months after TECA-LBO. But if para-aural abscessation come out during that time, VBO was performed and then the second evaluation was performed at 8 months after VBO. For the second evaluation, dogs were either examined by author, or owners and referring veterinarians were interviewed by telephone. The second evaluation items were as same as the first evaluation items and owners satisfactory with the results of the operation. All data are also reported as mean±SD.

Result

Signalments and history taking

Among six dogs, three of which were cocker spaniel, one poodle, one yorkshire terrier, and one mixed, just one dog underwent unilateral otitis, and others had bilateral otitis. One ear of No. 3 dog had chronic otitis externa and media, but the other ear of No. 3 dog suffered from temporarily otitis media. Age at admission ranged from 2 to 9 years (mean±SD, 5.2±2.6 years). All dogs had received the medical treatment at least 2 months (mean±SD, 10±7.8 months) in local animal clinics. Three of them treated just medical treatment. Others received flushing ear canal and bulla lavage with saline and medical treatment. Two dogs didnt have any other disease. No. 1 dog had interdigital dermatitis, No. 3 dog had benign tumor on abdominal wall, No. 5 dog had keratoconjunctivitis sicca and No. 2 dog had chronic renal failure, chronic heart failure, hip dysplasia, degenerative joint disease, and cystitis (Table 1).

Physical examination findings

All affected ears (n = 11, but ten ears were received TECA-LBO) had scratched severely. Seven ears had grade 2 pain and three ears had grade 1 pain. Just one ear canal was class 2 hardening, and this ear was recovered by medical treatment. Three ears canal were class 1 hardening and others were class 3 hardening. No dogs had head tilt and facial nerve paralysis (including loss of eye blink). Pus was discharged from seven ears (four dogs). Among the eleven affected ears, ten ears couldnt respond loud sound.

Otoscopic findings

Three ears were severely stenosed and calcified, and no opening was existed (No. 1 dog (both ears), No. 3 (right ear)). So, otoscopic examination couldnt be carried out. Seven ears had severe wet cerumen, and no hair growth. All ears had inflammation, and swelling. Tympanic membranes (TM) did not exist except one ear (No. 3 dog (left ear)). Left ear of No. 3 dogs TM was ruptured around cranioventral region of the TM. Other TMs were not found. Anatomical structures specially manubrium of malleus, and pars flaccida which was most important factors to healing tympanic membrane, were also not identified (Table 2).

Radiologic findings

Ten ears had three common symptoms including calcification of ear canal, sclerosis of petrous temporal bone, and increasing bulla opacity. Because three ears were completely obstructed these ears couldnt be carried out positive contrast ear canalogram. Positive contrast entered into tympanic cavity in eight ears. Seven ears didnt have TM, and one ear partial TM (Table 3).

Postoperative evaluation and long-term follow-up

Left ear of dog 3 was not irreversible otitis externa and media. Medical treatment was tried to this ear and this ear was healed. So TECA-LBO was performed on ten ears.

Swelling (mean±SD, 4±2.6 days) and erythema (mean±SD, 3.9±2.6 days) was disappeared between 3 and 5 days after operation. All Penrose drain was removed until 7 days

Table 1. Signalments and history taking in six dogs with otitis externa and media

Dog No.	Breed	Age (years)	Other diseases	Affected Ear	Duration of Signs (months)	Previous Treatment
1	Cocker Spaniel	3	IDD	Right Left	24	Intermittent medical treatment
2	Poodle	9	CRF,HD, DJD,CHF, Cystitis	Right Left	4	Intermittent medical treatment
3	Cocker Spaniel	7	Tumor on abdominal wall	Right Left	7	Medical treatment Flush all ear canal and Bulla lavage
4	Mix	2	Absence	Right	11	Medical treatment Flush all ear canal and Bulla lavage
5	York-shire Terrier	6	KCS	Right Left	2	intermittent medical treatment Flush all ear canal and Bulla lavage
6	Cocker Spaniel	4	Absence	Right Left	12	Intermittent medical treatment

IDD = Interdigital dermatitis, CRF = Chronic renal failure, HD = hip dysplasia, DJD = degenerative joint disease,
CHF = Chronic heart failure, KCS = keratoconjunctivitis sicca, R = Right ear, L = Left ear

Table 2. Otoscopic findings in six dogs with chronic otitis externa and media

Dog No.	Ear canal		Tympanic membrane	
	Right ear	Left ear	Right ear	Left ear
1	No opening both ear canal		No opening of both ear canal	
2	Severe wet cerumen Swelling of all ear canal Severe inflammation of all ear canal		None	None
3	Stenotic	Small exudates No hair on ear canal	None	Ruptured cranioventrally
4	Black cerumen in & in front of tympanic bulla	Normal ear	None	Normal ear
5	Severe wet cerumen & erythema Severe stenosis (But corticosteroid can increase the lumen diameter)		None	None
6	Wet cerumen & pus from tympanic bulla of both ear canal		None	None

Table 3. Radiologic findings in six dogs with chronic otitis externa and media

Dog No.	Ear	Plane radiologic view	Positive contrast ear canalography
1	Right	A,B,C,D	E
	Left	A,B,C,D	E
2	Right	A,B,C	F,G
	Left	A,B,C	F,G
3	Right	A,B,C,D	E
	Left	Non-specific findings	F,H
4	Right	A,B,C	F,G
5	Right	A,B,C,D	F,G
	Left	A,B,C,D	F,G
6	Right	A,B,C	F,G
	Left	A,B,C	F,G

A = Ear canal is calcificated
B = Sclerosis of petrous temporal bone
C = Increasing bulla opacity
D = Occlude all ear canals
E = Cant progress because of the obstruction of both ear canals
F = Enter positive contrast into tympanic cavity.
G = Disappearance of tympanic membrane
H = Existence of tympanic membrane

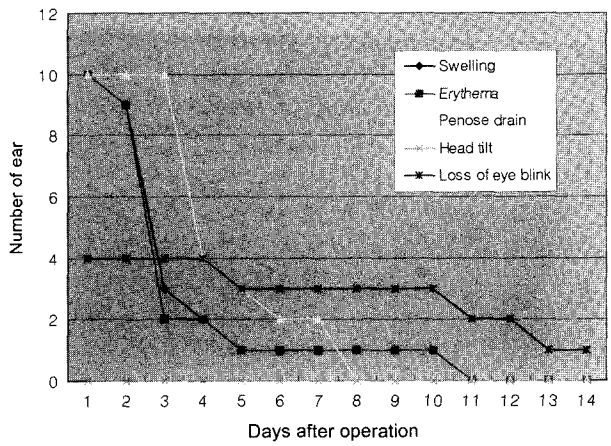

Fig 1. Postoperative findings in six dogs performed total ear canal ablation and lateral bulla osteotomy. All penrose drain was removed until 7 days. 1 case could blink eye 3 months after surgery.

(mean±SD, 5.1±1.7 days). Head tilt was not appeared after operation. Four ears showed loss of eye blink after operation, and most eyes were healed naturally between 5 and 11 days (mean±SD, 12.5±27.6 days). But one ear was recovered three months after operation (Fig. 1). At 14 days after operation. the first evaluation was performed. No symptoms of chronic otitis externa and media which were scratching ear, pain, and hardening ear canal were showed, and swelling, erythema, head tilt, and discharge from Penrose drainage was not exist, and normal vital sign was shown in all cases. All dogs were discharged from hospital after the first evaluation was performed. One dog which couldnt blink eye at that time, also discharged, because any other complications were not shown and with artificial tears, the eye could be protected. No ears were responded by shouting loudly beside affected ear. And after discharging from hospital, no complications were happened until 3.5 months.

From 3.5 months to 6.5 months (mean±SD, 5.4±1.1) after discharging hospital, para-aural abscessation was happened only in all cocker spaniels. The symptoms of para-aural abscessation were following. First, severe swelling was happened around ear: abscessation was happened around pinna. Second, dogs which were affected scratched ear, showed pain. Third, dogs which were affected decrease appetite and activity. Forth, dogs which were affected couldnt open the mouth easily. On radiological view, radiodensity of tympanic cavity remarkably increased. For the treatment of para-aural

abscessation, VBO was performed. After performing VBO, all the symptoms were disappeared.

In the second evaluation, no symptoms (scratching ear, pain, hardening ear) of chronic otitis externa and media, and no complications (fistula or abscessation, loss of eye blink, head tilt) were shown. Two ears couldnt response with loud voice. But the others could response with loud voice. And all owners were satisfied with the result of operation.

Discussion

Total ear canal ablation and lateral bulla osteotomy (TECA-LBO) is most often performed for irreversible inflammatory ear canal disease[29]. Irreversible inflammatory ear canal disease is present when one or a combination of the following is observed. Hyperplasia of the epithelium occluding the horizontal ear canal caused by infection within the cartilage or bone. Calcified periauricular tissue observed on skull radiographs[29].

Other less common indications include severe ear canal trauma, invasive neoplasia, and certain congenital obstructing horizontal ear canal drainage[29]. It is also indicated in animals with the otitis externa and media in which appropriate medical treatment was failed. And it is also indicated in animals with lateral ear resections that have failed. But TECA-LBO should not be performed in animals that has not severe disease or by surgeons unfamiliar with the anatomy of the ear because of the potential for serious complications[9].

Even though TECA-LBO was indicated following previous mentioned, it is not easy that which case should be performed TECA-LBO. Because this method has potential complications, surgeon must consider that whether the dog that will be received TECA-LBO, can get more advantages or disadvantages after operation.

Tympanic membrane (TM) can be another indication. If the TM couldnt be healed, otitis media is continued. So the evaluation of the TM is so important. Unless the structures associated with the eardrum are completely destroyed, the eardrum attempts to heal. Gotthelf LN introduced the mechanism for healing a ruptured TM[14]. The mechanism is that a ruptured eardrum requires the presence of an adequate blood supply and a viable germinal epithelium. Regrowth of the eardrum to heal is determined by the extent of the damage to them. The germinal epithelium for the epidermal layer of the tympanic membrane is located in the area of the manubrium of the malleus and grows radially toward the annulus of the tympanic membrane from that location. Vascular supply to the germinal epithelium is derived from the blood vessels branching from the pars flaccida along the "vascular strip." If the malleus is preserved and the vascular strip is not compromised, the processes of healing can continue[14,32]. In this study, all cases were evaluated with otoscope. In this examination three ears were stenosed severely, so this examination couldnt be carried out. And seven ears could be evaluated. In this examination seven ears did not have any TM. Maybe this was happened because the TM was melted by protease from cerumen[11,12,14].

The evaluation of the TM by contrast radiography was described by Denny (1973)[31]. And in 1998 Trower ND, *et al* report positive contrast ear canalography was 100 per cent accurate in detecting the rupture of the TM[31]. But with positive contrast ear canalography, the evaluation of tympanic membrane with otoscope is necessary for the assessment of anatomical structure of tympanic membrane. In this study, because three ears were completely obstructed these ears couldnt be carried out positive contrast ear canalogram. And in eight ears, positive contrast entered into tympanic cavity (Seven TMs were complete ruptured, and one TM was partial ruptured). So with positive contrast ear canalogram, ruptured TM was surely certified. This results showed 100 per cent accuracy of positive contrast canalogram.

In plane radiologic view, all the case which were received TECA-LBO had three common symptoms those were calcification of ear canal, sclerosis of petrous temporal bone.

Although the otitis media is diagnosed with radiographic findings, and calcified ear canal is cleared, if ear canal is opened and tympanic membrane can be repaired, TECA-LBO is not needed. So evaluation of tympanic membrane, tympanic bulla, and ear canal is so important. And surgeon must consider about TECA-LBO with result of examination from this three parts.

In this study among the six dogs, three dogs were cocker spaniels (50%). Breeds predilection was showed[25]. Age and other disease were not related with chronic otitis externa and media in this study. Medical treatment was tried at least over 2 months in all cases. But symptoms were not improved.

In this study, after TECA-LBO, no clinical symptoms of chronic otitis externa and media and no complication except loss of eye blink in one case was shown until 14 days later. And loss of eye blink was cured naturally until 3 months later. So at 3.5 months after discharging from hospital, recovery rate was 100%.

The complication of TECA-LBO is superficial wound infections, facial nerve paralysis, vestibular dysfunction, deafness, chronic fistulation or abscessation, and avascular necrosis of the skin of the pinna[21-23,28,30]. In this study, facial nerve paralysis (four of ten ears) and para-aural abscessation (five of ten ears) was happened. And facial nerve paralysis is naturally disappeared for about two weeks. Para-aural abscessation has occurred only in all cocker spaniels ear (five ears, three dogs)[5,19,27]. This has happened between 3.5 and 6.5 months after discharging from hospital. All these dogs were taken ventral bulla osteotomy. After that, para-aural abscessation was disappeared. In this study, para-aural abscessation was only happened in cocker spaniel breed. So, the breed predilection of cocker spaniel may be suspected.

This result was almost as same as the report of Smeak, et al in 1996[6]. And this predilection was also introduced in textbook of Devitt, *et al*[6].

Another complication of TECA-LBO is deafness[21,24]. In Krahwinkel *et al* report[1], after total ear canal ablation combined with bulla osteotomy, ears that responded to bone-conducted stimulation prior to operation, also responded after operation. That phenomenon will happen because after removing all inflammation, bone-conducted stimulation system will be strengthen. Actually in this study, all owners satisfy the hearing capability of their dogs and all dogs which were received total ear canal ablation combined with bulla osteotomy were adequate for them to remain good house pets, even when bilateral TECA-LBO was performed[22].

Conclusion

TECA-LBO is an effective treatment for dogs with the chronic otitis externa and media. But, in cocker spaniel breed, because of para-aural abscessation after TECA-LBO, additional operation (VBO) is needed. Also because para-aural abscessation can be happened between 4 and 7 months after TECA-LBO, surgeon must follow-up until 8 months after surgery.

References

1. Barrett RE, Rathfon BL. Lateral approach to bulla osteotomy. J Am Anim Hosp Assoc. 1975; 11: 203-205.
2. Beckman SL, Henry WB, Cechner P. Total ear canal ablation combining bulla osteotomy and curettage in dogs with chronic otitis externa and media. J Am Vet Med Assoc. 1990; 196: 84-90.
3. Boothe HW. Surgery of the tympanic bulla(Otitis media and Nasopharyngeal polyps). Probl Vet Med. 1991; 3: 254-269.
4. Buback JL, Boothe HW, Carroll GL, *et al*. Comparison of three methods for relief of pain after ear canal ablation in dogs. Vet Surg. 1996; 25: 380-385.
5. Connery NA, McAllister H, Hay CW. Para-aural abscessation following traumatic ear canal separation in a dog. J Small Anim Pract. 2001; 42: 253-256.
6. Devitt CM, Seim HB 3rd, Willer R, *et al*. Passive drainage versus primary closure after total ear canal ablation-lateral bulla osteotomy in dogs: 59 dogs (1985-1995). Vet Surg. 1997; 26: 210-216.
7. Douglas HS. Ear. In: Textbook of Small Animal Surgery, 2nd ed. W. B. Saunders Co. 1993; 1545-1576.
8. Elkins AD. Surgery of the external ear canal. Probl Vet Med. 1991; 3: 239-253.
9. Fossum TW. Surgery of the ear, In: Small Animal Surgery, 2nd ed. Mosby, Inc. 2002; 229-253.
10. Frasier G, Gregor WW, Mackenzie CP, *et al*. Canine ear disease. J Small Anim Pract. 1970; 10: 725-754.
11. Gotthelf LN. Anatomy of the canine and feline ear, In: Small Animal Ear Diseases. W. B. Saunders Co. 2000: 1-23.
12. Gotthelf LN. Examination of the external ear canal, In: Small Animal Ear Diseases. W. B. Saunders Co. 2000: 25-44.
13. Gotthelf LN. Otitis Media, In: Small Animal Ear Diseases. W. B. Saunders Co. 2000: 121-143.
14. Gotthelf LN. Healing of the Ruptured Eardrum, In: Small Animal Ear Diseases. W. B. Saunders Co. 2000: 169-179.
15. Grono LR. The surgical treatment of canine otitis externa. Aust Vet J. 1962; 38: 235-238.
16. Harvey CE. Ear canal disease in the dog: medical and surgical management. J Am Vet Med Assoc. 1980; 177: 136-139.
17. Harvey RG, Harari J, Delauche AJ. Diagnostic Procedures, In: Ear Diseases of the Dog and Cat, 1st ed. Iowa State University Press. 2001: 43-79.
18. Harvey RG, Harari J, Delauche AJ. Otitis Media, Otitis Interna, In: Ear Diseases of the Dog and Cat, 1st ed. Iowa State University Press. 2001: 147-155.
19. Harvey RG, Harari J, Delauche AJ. Para-Aural Abscess, In: Ear Diseases of the Dog and Cat, 1st ed. Iowa State University Press. 2001: 157-160.
20. Harvey RG, Harari J, Delauche AJ. Surgical Resection,Aural Ablation,and Bulla Osteotomy, In: Ear Diseases of the Dog and Cat, 1st ed. Iowa State University Press. 2001: 233-256.
21. Krahwinkel DJ, Pardo AD, Sims MH, Bubb WJ. Effect of total ablation of the external acoustic meatus and bulla osteotomy on auditory function in dogs. J Am Vet Med Assoc. 1993; 202: 949-952.
22. Mason LK, Harvey CE, Orsher RJ. Total ear canal ablation combined with lateral bulla osteotomy for end-stage otitis in dogs. Results in thirty dogs. Vet Surg. 1988; 17: 263-8.
23. Matthieson DT, Scavelli T. Total ear canal ablation and lateral bulla osteotomy in 38 dogs. J Am Anim Hosp Assoc. 1990; 26: 257-267.
24. McAnulty JF, Hattel A, Harvey CE. Wound healing and brain stem auditory evoked potentials after experimental total ear canal ablation with lateral tympanic bulla osteotomy in dogs. Vet Surg. 1995; 24: 1-8.
25. Parker AJ, Schiller AG, Cusick PK. Bulla curettage for chronic otitis media and interna in dogs. J Am Vet Med Assoc. 1976; 168: 931-933.
26. Seward CO, Blackmore WM, Ott RL. Treatment of chronic canine otitis externa by ablation of the ear canal. J Am Vet Med Assoc. 1958; 133: 417-419.
27. Smeak DD, Crocker CB, Birchard SJ. Treatment of recurrent otitis media that developed after total ear canal ablation and lateral bulla osteotomy in dogs: nine cases (1986-1994). J Am Vet Med Assoc. 1996; 209: 937-42.
28. Smeak DD, DeHOFF WD: Total ear canal ablation-clinical results in the dogs and cat. Vet Surg 1986; 15: 161-170.
29. Smeak DD, Kerpsack SJ. Total ear canal ablation and lateral bulla osteotomy for management of end-stage otitis. Semin Vet Med Surg (Small Anim). 1993; 8: 30-41.
30. Sharp DJH. Chronic otitis externa and otitis media treated by total ear canal ablation and ventral bulla osteotomy in thirteen dogs. Vet Surg. 1990; 19: 162-166.
31. Trower ND, Gregory SP, Renfrew H, Lamb CR. Evaluation of the canine tympanic membrane by positive contrast ear canalography. Vet Rec. 1998; 142: 78-81.
32. Truy E, Disant F, Morgon A. Chronic tympanic membrane

perforation: an animal model. Am J Otol. 1995; 16: 222-225.
33. Tufvesson E. Operation for otitis externa in dogs according to zepps method. Am J Vet Res. 1955; 16: 565-570.
34. Vogel PL, Komtebedde J, Hirsh DC, *et al.* Wound contamination and antimicrobial susceptibility of bacteria cultured during total ear canal ablation and lateral bulla osteotomy in dogs. J Am Vet Med Assoc. 1999; 214: 1641-1643.

개에서 만성외이염과 중이염에 대한 전이도 적출술과 외측 고포절골술: 수술 후 회복과정과 장기간 예후

김준영 · 정순욱[1] · 정만복 · 한현정 · 김지선
건국대학교 수의과대학 외과학교실

요 약 : 전이도적출술 및 외측고포절골술 (total ear canal ablation combined with lateral bulla osteotomy, TECA-LBO)을 행한 10개의 (6마리의 개) 임상결과를 수술 후 회복과정과 장기간 예후를 통해서 평가하였다. 모든 개들은 아래의 다섯가지 소견을 보일 때 TECA-LBO를 실시하였다. 첫째, 적어도 2개월 이상 약물적인 치료가 더 이상 임상증상을 호전 시키지 못하는 경우, 둘째, 고막이 완전히 사라진 경우, 셋째, 고포의 방사선밀도가 증가된 경우, 넷째, petrous temporal bone에 경화가 일어난 경우, 다섯째, 이도의 석회화가 진행된 경우. 수술 후 회복경과는 입원 14일 동안, 퇴원 후 7.5개월에 평가하였다. 수술 후 14일째 만성외이염 및 중이염의 증상인 귀를 긁는 것, 통증, 그리고 귀의 경화는 사라졌다. 그리고 이때 수술부위의 종창, 발적, 머리를 기울이는 증상 그리고 Penrose에 의한 삼출물은 모두 사라졌다. 눈을 깜박이지 못하는 것은 4예에서 발생하였고, 이것은 수술 후 14일째 사라졌다. 하지만 한 경우에는 3개월 뒤에 사라졌다. 모든 개들은 수술 후 14일째 퇴원하였다. 퇴원 후 3.5개월에서 6.5개월 사이에 para-aural abscessation이 모든 코커 스파니엘 종에서 발생하여 VBO을 통해 완치시켰다. TECA-LBO를 행하고 para-aural abscessation이 생기지 않은 개들에서는 수술 후 7.5개월 후 귀를 긁는 것, 통증, 귀의 경화가 더 이상 발견되지 않았고, 듣는 능력도 향상되었다. 또한 TECA-LBO를 행하고 para-aural abscessation이 생긴 개들에서는 VBO를 행하고 7.5개월 후 귀를 긁는 것, 통증, 귀의 경화가 더 이상 발견되지 않았고, 듣는 능력도 향상되었다. 결론적으로 전이도적출술 및 외측고포절골술은 적용한 후 약 2주 정도의 치료 경과를 보였고 치료 후 코커 스파니엘 종을 제외하고는 별다른 합병증 없이 좋은 회복을 보였다. 그리고 수술 후 눈을 깜박이지 못하는 것은 수술 후 약 2주안에 자연적으로 사라졌다. 그리고 para-aural abscessation은 수술 후 4개월에서 7개월 사이에 발생하므로 follow-up은 8개월까지 이루어져야 한다.

주요어 : 전이도적출술 및 외측고포절골술, 중이염, 개