



## Potential factors affecting the outcome of dogs with a resection of the lateral wall of the vertical ear canal

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**Abstract** — The records of 60 dogs that had a resection of the lateral wall of the vertical ear canal (Zepp) were examined. The surgical outcomes were evaluated in association with the following variables: breed, sex, age of onset of the otitis externa, duration of the disease before the surgery was performed, treatment received for the otitis externa, the status of the ear and tympanic membrane at the time of the surgery, the culture results, and concurrent medical problems. The outcome of surgery was acceptable in 45% and unacceptable in 55% of the cases. Breed was the only factor that could be correlated with the outcome. The procedure failed in 86.5% of the cocker spaniels. When surgical outcomes in breeds other than cocker spaniels were evaluated, 63% were acceptable and 37% were unacceptable. Sharpeis were found to have an ear canal of small diameter compared with that of other breeds and a tendency to have better outcomes.

**Résumé** — **Facteurs potentiels pouvant affecter les résultats d'une résection de la paroi latérale du canal vertical de l'oreille chez le chien.** Les dossiers de 60 chiens ayant subi une résection de la paroi latérale du canal vertical de l'oreille (Zepp) ont été examinés. Les résultats chirurgicaux ont été évalués en association avec les variables suivants : race, sexe, âge au début de l'otite externe, durée de la maladie avant la chirurgie, traitements de l'otite externe, état de l'oreille et de la membrane du tympan au moment de la chirurgie, résultats de culture et problèmes médicaux concomitants. Les résultats de la chirurgie étaient acceptables dans 45 % des cas et inacceptables dans 55 %. La race était le seul facteur pouvant être relié aux résultats. La procédure a fait défaut 86,5 % des cockers.

Lorsque les résultats ont été évalués chez les races autres que le cocker, 63 % étaient acceptables et 37 % inacceptables. Les shar-peis ayant le canal de l'oreille d'un diamètre plus petit que celui des autres races ont eu tendance à obtenir de meilleurs résultats.

(Traduit par docteur André Blouin)

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### Introduction

Otitis externa is a common problem in the dog and can be difficult to manage medically. Several surgical procedures have been described for cases where the otitis externa is not responsive to medical management (1-6). A total ear canal ablation (TECA) is performed in cases of end stage otitis externa, where the ear canals have become occluded with hyperplastic tissue. The TECA is a salvage procedure that involves removing the external ear canals and is performed in conjunction with an osteotomy of the tympanic bulla.

A resection of the lateral wall of the vertical ear canal (Zepp operation) (2) is used for the treatment of

diseased ears that are not end stage. The procedure involves removal of the lateral wall of the vertical ear canal, causing the horizontal canal to open directly to the environment. The purpose of the procedure is to alter the microenvironment by improving the drainage and allowing for better aeration in the horizontal canal (7,8). The resulting effect is a decrease in temperature, moisture, and humidity, presumably creating an environment that is less conducive to bacterial growth (7). The Zepp operation is more likely to be successful in dogs in which the horizontal canal is still patent, otitis media is not present, and an underlying dermatopathy, if present, can be controlled (2,5,8,9). Continued cleaning and management of the ears is recommended to ensure a successful postoperative outcome (8). However, 2 previous studies have indicated that the failure rate of this procedure is high (42.3% and 34.9%), despite what seemed to be an appropriate selection of cases (10,11).

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**Table 1. Distribution of the outcomes of surgical procedures in the cocker spaniel, miscellaneous breeds, sharpei, and German shepherd**

	Total ears	Acceptable outcomes		Unacceptable outcomes	
		Excellent	Good	Fair	Poor
Cocker spaniel	37	1 (3%) 5 <sup>a</sup> (13.5%)	4 (10%)	1 (3%) 32 <sup>b</sup> (86.5%)	31 (84%)
Miscellaneous	37	11 (30%) 23 <sup>b</sup> (62%)	12 (32%)	9 (24%) 14 (38%)	5 (14%)
Sharpei	10	6 (60%) 8 <sup>b</sup> (80%)	2 (20%)	0 2 (20%)	2 (20%)
German shepherd	6	3 (5%) 4 (67%)	1 (17%)	0 2 (33%)	2 (33%)

<sup>a</sup>Value indicates the sum of the above two values

<sup>b</sup>Denotes the statistically significant differences among breeds. The acceptable outcome of the miscellaneous breed and sharpei groups is no longer statistically significant when the cocker spaniels are removed from the equation (see text for further explanation)

The purpose of this study was to identify factors that may influence the outcome of a Zepp procedure, with a view to improving the overall success rates.

## Materials and methods

The records of dogs that had a lateral wall resection of the vertical ear canal performed at the Ontario Veterinary College, Veterinary Teaching Hospital (OVC-VTH) between 1989 and 1996 were examined. The information retrieved from the records included signalment, number of ears affected, number of ears that received the surgical procedure, age of onset of the otitis externa, duration of the disease before the surgery was performed, treatment received for the otitis externa, the status of the ear and tympanic membrane at the time of the surgery, the culture results obtained from swabs taken within the ear canal at the time of the procedure, and concurrent medical problems. The follow-up information was obtained by one of the following methods: examination of the dog at the OVC-VTH, examination of the dog by the referring veterinarian, or telephone conversation with the owners. The outcome was determined to be excellent if the ears no longer required regular cleaning and the patient had no more than 2 bouts of otitis externa since the surgery; good, if the ears had occasional (maximum of 2/y) flare ups of otitis externa that readily responded to topical medical management; fair, if the ears required regular cleaning in order to prevent a relapse of the otitis, and the dog experienced an average of 3 or more bouts of disease annually; and poor, if the ears progressed to an end-stage ear with an occluded canal, as indicated on follow-up physical examination, or if the ears continued to be unmanageable. Excellent and good results were considered to be acceptable outcomes, while poor and fair results were viewed as unacceptable.

The results of surgery were evaluated in association with the above defined variables. When evaluating an association between breeds and outcomes, the breeds were divided into 4 groups, based on the numbers of dogs presented. The groups were cocker spaniels, German shepherds, sharpeis, and a miscellaneous group that included breeds not represented more than twice and mixed breed dogs.

A repeated-measures analysis of variance (Excel, Microsoft, Redmond, Washington, USA) was used to determine if the various factors examined had a significant influence on the outcome of the dogs' ears. Differences were declared significant for a *P* value of <0.05; however, Bonferroni's adjustment was applied when evaluating among the 4 groups, resetting the significant *P* value at 0.02.

## Results

The records of 71 dogs were examined. Only 60 of those records (*n* = 90 ears) had sufficient documentation and follow-up information to be included in this study. They involved 24 cocker spaniels (*n* = 37 ears); 5 sharpeis (*n* = 10 ears); 5 German shepherds (*n* = 6 ears); and 26 miscellaneous (breeds not represented more than twice and mixed breed) dogs (*n* = 37 ears) (Table 1). Forty of the 90 ears (45%) had acceptable outcomes; 50 (55%) had unacceptable outcomes.

There were significantly fewer females (*n* = 22, 36.6%) than males (*n* = 38, 63.3%) (*P* = 0.009). There were no significant differences when the outcomes were compared with the sexes of the dogs or whether they had been neutered.

When the effect of breed on the outcome was analyzed, cocker spaniels had an 86.5% (32 of 37 ears) failure rate. This was statistically significant (*P* < 0.00001) when compared with all the dogs in the study. The sharpei and the mixed breed groups had statistically better outcomes (*P* = 0.008 and *P* = 0.0006, respectively). The statistical analysis was repeated with the cocker spaniels removed from the population, because I felt that the large size of this group with an overall poor outcome could falsely increase the significance of the outcomes of the other groups. Therefore, if one accepts that the cocker spaniels should not have been considered as candidates for the procedure and eliminated them from the study, the statistical analysis can be repeated on the remainder of the population. With the elimination of the 37 cocker spaniel ears, the outcome for the remaining 53 ears was acceptable for 35 (66%) and unacceptable for 18 (34%) ears. There were no significant differences in the outcome among the 3 remaining breed groups.

Follow-up times ranged from 7 mo to 7 y, with a mean of 3.2 y for dogs with excellent, good, or fair outcomes. The average time to failure (doing a TECA) was 18.3 mo (range 2 mo to 3.5 y, with one outlier at 9 y). The calculation of the mean was repeated with the one outlier removed, resulting in a mean time to failure of 10.9 mo.

There were no significant differences among the outcomes and the age of onset or the duration of the otitis externa before performing the Zepp operation. The age of onset was not significantly different among the various breeds, but the sharpei had a tendency to develop otitis externa at a younger age ( $12.4 \pm 7.0$  mo) when compared with the rest of the population ( $40.7 \pm 31$  mo) ( $P = 0.047$ ).

Dogs that had bilateral Zepp operations performed had similar outcomes for both ears. The cocker spaniels that had a unilateral Zepp operation ( $n = 11$ ) either had or developed significant otitis in the opposite ear. Seven of the 11 had previously had a TECA performed on the opposite ear. In contrast, dogs in the German shepherd and miscellaneous breed groups that previously had a unilateral Zepp operation ( $n = 18$ ) had either similar outcomes ( $n = 6$ ), better outcomes ( $n = 6$ ), or worse outcomes ( $n = 6$ ) compared with those for the ear operated on previously.

Information on the results of the bacterial cultures and cytological examination, as well as on the concurrent diseases, was sporadic and incompletely documented, making the data insufficient for statistical analysis. The organisms most commonly retrieved were *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Malassezia pachydermatis*, and *Escherichia coli*. The information regarding the status of the ear at the time of admission for surgery varied in detail, but most of the dogs appeared to be good candidates for the Zepp procedure, as they had minimal hyperplasia of the ear canals. One exception was a cocker spaniel that presented with hyperplastic and ossified ear canals. A Zepp operation was performed at the owner's request and failed. Four cocker spaniels presented for a TECA on one ear, with the opposite ear being normal. A Zepp operation was performed on the normal ear as a preventative measure, but the ear progressed to have a TECA performed within months in all 4 cases.

Five of the 24 cocker spaniels were referred to the OVC-VTH for the evaluation of a discrete mass located within the external ear canal. These dogs also had clinical signs of otitis externa. Typically the mass appeared discrete, fleshy, and attached to the external ear canal, not reddened or discolored, with debris and erythema often found proximal to the mass. It occluded all or a portion of the canal. The ear canal otherwise appeared normal. In all cases, the mass was confirmed histologically as an inflammatory response, consistent with chronic otitis externa.

All 5 sharpeis in this study had bilateral Zepp operations performed; although this was not a statistically significant finding, the trend is noteworthy ( $P = 0.028$ ). The comment that the diameter of the ear external canal was very small (without hyperplastic changes) was made in 4 of the 5 records. Although 80% of the outcomes for this breed were acceptable, the number was not statistically significant (cocker spaniels removed). The

German shepherds had ulcerative lesions within the ear canals and only a small amount of proliferation, if any.

The information in the records regarding the status of the tympanic membrane and concurrent medical problems (especially dermatopathies) was not consistent or detailed enough to make any valid conclusions. The information on previous medical management of the ears with otitis externa was very detailed; however, the types of drugs used and their combinations were so varied that they precluded any statistical analysis.

## Discussion

Results from previous studies showed that 42.3% (11) and 49.5% (10) of dogs with lateral ear canal resections had complete resolution of the otitis externa, while 15.4% (11) and 15.6% (10) had improved and 42.3% (11) and 34.9% (10) had poor outcomes. These overall results are similar to those found in this study. Males were overrepresented in this study (63%), as they were in one of the previous studies (65%) (11). The reason is unclear.

The extremely poor outcome for cocker spaniels (86.5% failure rate) seen in my study was not reported in other papers (10,11). One study was performed in California between 1974 and 1980 (11), while the other (10) was completed in Sweden in 1953. This discrepancy may reflect different geographical or temporal factors resulting in phenotypically dissimilar cocker spaniels, but based on this study, I can not recommend a Zepp procedure for cocker spaniels, especially since the average time to failure was not long, negating any potential benefits from the procedure in this breed.

Sharpeis are not mentioned in the earlier retrospective studies, reflecting the current popularity of the breed. The high rate of acceptable outcomes (80%) for this breed was not significantly different from that of the other breeds (excluding cocker spaniels), likely because of the small sample size. Most of the sharpeis in this study had a congenitally stenotic ear canal, which would explain their trend towards an earlier age of onset for the otitis externa, as well as the more positive outcomes following a lateral wall resection of the vertical canal. This breed is also renowned for its skin problems and, therefore, the prognosis for the Zepp procedure in this breed must be gauged upon the existence of a concurrent dermatopathy and the diameter of the ear canal.

The average time to failure reported in this study may not accurately correspond to the moment when the Zepp operation failed. Most of the "times to failure" were recorded as the date upon which the TECA was performed, since this was often the only documented event that reflected failure of the Zepp procedure. However, occlusion of the ear canals may have occurred long before that date, falsely increasing the average time to failure reported in this study.

Several cocker spaniels had been presented for the evaluation and treatment of a mass in the ear canal, with neoplasia being the primary differential diagnosis. In all such cases, histological examination confirmed that the mass was inflammatory, not neoplastic, in nature. The common clinical signs associated with otitis externa are well documented in the literature, but the "mass-like"

appearance of the hyperplastic tissue is not noted. In this study, the "mass-like" protrusion was only recorded in cocker spaniels.

The limitations of this study are typical of most retrospective studies. The information recorded is not as complete or as reliable as it would be if collected prospectively. Interpretation of the follow-up information can differ significantly among the various veterinarians and owners involved. A control population of dogs with otitis externa that did not have the Zepp procedure performed is necessary to determine if the surgery truly affected the outcome. However, most of the dogs had their ears managed medically for *at least* 3 mo with no consistent positive response before undergoing surgery. It is my opinion that the surgery contributed to the resolution of the otitis. Also, because of the lack of a control population, it can not be determined if the dogs with good results would have had a poorer outcome without the Zepp operation. Unfortunately, the difficulties in organizing and managing a randomized, controlled, prospective study to accurately determine the role of the Zepp procedure and the concurrent problems in the management of otitis externa are numerous. cvi

## References

1. Fraser G, Gregor WW, MacKenzie CP, Spreull JSA, Withers AR. Canine ear disease. *J Small Anim Pract* 1970; 10: 725-754.
2. Zepp CP. Surgical technique to establish drainage of the external ear canal and correction of hematoma of the dog and cat. *J Am Vet Med Assoc* 1949; 115: 91-92.
3. Elkins DA, Hedlund CS, Hobson HP. Surgical management of ossified ear canals in the canine. *Vet Surg* 1981; 10: 163-168.
4. Harvey CE. A history of the surgical management of otitis externa in the dog. *Vet Surg* 1980; 9: 150-152.
5. Fraser G, Withers AR, Spreull JSA. Otitis externa in the dog. *J Small Anim Pract* 1961; 2: 32-47.
6. Siemering GH. Resection of the vertical ear canal for treatment of chronic otitis externa. *J Am Anim Hosp Assoc* 1980; 16: 753-758.
7. Krahwinkel DJ. External ear canal. In: Slatter D, ed. *Textbook of Small Animal Surgery*. 2nd ed. Toronto: WB Saunders, 1993: 1560-1567.
8. Fossum TW. Surgery of the ear. In: Fossum TW, ed. *Small Animal Surgery*. Toronto: Mosby, 1997: 153-178.
9. Harvey CE. Ear canal disease in the dog: Medical and surgical management. *J Am Vet Med Assoc* 1980; 177: 136-139.
10. Tufvesson G. Operation for otitis externa in dogs according to Zepp's method. *Am J Vet Res* 1955; 16: 565-570.
11. Gregory CR, Vasseur PB. Clinical results of lateral ear resection in dogs. *J Am Vet Med Assoc* 1983; 182: 1087-1090.

## Answers to Quiz Corner / Les réponses du Test Éclair

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|---|---|
| <p>1. c</p> <p>2. b</p> <p>3. c — <i>Campylobacter jejuni</i> frequently infects people.<br/>c — <i>Campylobacter jejuni</i> infecte fréquemment les humains.</p> <p>4. a</p> <p>5. d — Isoflurane is minimally metabolized and causes fewest side effects in birds.<br/>d — <i>L'isoflurane est métabolisée de façon minimale et cause le moins d'effets secondaires chez les oiseaux.</i></p> <p>6. a</p> <p>7. b — Unlike cattle, affected goats do not develop diarrhea.<br/>b — <i>Contrairement aux bovins, les chèvres qui sont atteintes ne font pas de diarrhée.</i></p> | <p>8. c — Suture material in the bladder lumen can serve as a nidus for formation of cystic calculi.<br/>c — <i>Les sutures dans la lumière de la vessie peuvent constituer un noyau pour la formation de calculs cystiques.</i></p> <p>9. a — <i>Ichthyophthirius multifiliis</i> is causative organism of "ich," a disease readily identified by small white spots over the fish several days after the introduction of a carrier fish to the aquarium.<br/>a — <i>Ichthyophthirius multifiliis est l'agent causal de l'ichthyophthiriose, une maladie facilement identifiable par la présence de petits points blancs sur le poisson plusieurs jours après l'introduction dans l'aquarium d'un porteur.</i></p> <p>10. a</p> |
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