

# Treatment of Persistent Deep Infection After Total Ear Canal Ablation and Lateral Bulla Osteotomy

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## KEYWORDS

• Surgery • Dog • Ear canal ablation • Deep infection

## KEY POINTS

- Deep infection following total ear canal ablation (TECA) and lateral bulla osteotomy (LBO) is thought to originate from remnants of an incompletely excised ear canal, or epithelium and debris left in the osseous ear canal or tympanic cavity after surgery.
- Clinical signs may be delayed months to years following TECA-LBO.
- Facial swelling or fistula formation in the region of the original incision, pain elicited on deep palpation over the affected bulla or when opening the mouth are clinical signs seen with deep infection.
- Dogs often respond to antibiotic therapy but recurrence of signs is common after therapy is withdrawn.
- Contrast CT often helps accurately locate the nidus of infection for surgical planning.

## INTRODUCTION

Surgery is often recommended by veterinarians for small animals that present for what is referred to as end-stage otitis.<sup>1</sup> Although chronic deep-seated infection with ear canal epithelial hyperplasia, stenosis, and calcification is the most common end-stage ear condition seen by practitioners, unresponsive middle ear infection, cholesteatoma, neoplastic infiltration of the ear canal or middle ear, and severe trauma to the ear canal may also represent indications for surgical therapy.<sup>1-7</sup>

Total ear canal ablation (TECA) with lateral bulla osteotomy (LBO) remains the gold standard treatment of most end-stage ear diseases.<sup>7,8</sup> Up to 70% of dogs with chronic otitis externa have clinical evidence of otitis media,<sup>9</sup> so exploration of the tympanic

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cavity via LBO is now routinely performed with TECA.<sup>10</sup> As proliferative epithelial hyperplasia associated with chronic deep-seated ear canal infection expands into the ear canal, it out pouches or ruptures through the tympanic membrane, allowing abnormal epithelial migration into the tympanic bulla.<sup>6</sup> It is this displaced metaplastic epithelium that has been found as the nidus in many dogs afflicted with persistent deep infection following TECA.<sup>11,12</sup>

For the TECA-LBO to be successful long-term, the entire external ear canal is excised, and all debris and abnormal epithelium lining the external auditory meatus and tympanic cavity must be carefully and completely removed. This salvage procedure is demanding for even experienced surgeons because it requires tedious dissection to avoid important neurovascular structures that are not readily identified nor exposed during surgery.<sup>13</sup> In addition, a stenotic ear canal cannot be prepared well for aseptic surgery because debris and contaminants are not often completely removed during standard skin preparation and canal irrigation before surgery. During the surgical approach, because the affected ear canal is isolated and excised, and the lateral bulla wall is removed, substantial contamination of the exposed soft tissues is inevitable.<sup>14</sup>

Consequently, although recent retrospective studies have shown a decreasing trend in postoperative complications, especially acute wound infections following TECA-LBO, the procedure in the past has been associated with relatively high overall complication rates (up to 82% in some studies<sup>15</sup>), with most complications arising in the early postoperative period.<sup>16</sup> Incisional complications, such as prolonged wound drainage, incisional dehiscence, hematoma, seroma, and infection, have been reported to occur up to nearly one-third of TECA-LBO procedures.<sup>16</sup> Most of these wound complications are self-limiting and respond within days to weeks after antibiotic treatment and proper local wound management, including, in some cases, drainage, debridement, and even open wound management.<sup>15,17</sup>

When signs of infection persist or recur following local wound management, or signs appear well after the wound has healed successfully, deeper sources of infection should be investigated. The purposes of this article are to review the literature surrounding persistent or recurrent deep infection following TECA-LBO and to develop a diagnostic and therapeutic strategy for veterinarians who encounter this complication.

## **RATE OF DEEP INFECTION AFTER TOTAL EAR CANAL ABLATION AND LATERAL BULLA OSTEOTOMY**

Deep infection manifested as chronic or recurrent fistulation adjacent to the TECA site, or abscessation deep to the subcutaneous tissue plane is reported to occur in up to 2% to 14% of dogs after TECA-LBO.<sup>11,12,15,17–20</sup> The actual rate may be even higher than this range because many retrospective studies do not provide long-term (more than 1 year) follow-up, and this complication may occur up to several years after TECA-LBO.<sup>8,11,12,16</sup> The risk of deep infection increases dramatically (up to 53%) when TECA-LBO is performed for dogs with end-stage ear disease and middle ear cholesteatomas because this expansile middle ear epithelial cyst is challenging to completely excise.<sup>6</sup> (Please see [Risselada M: Diagnosis and Management of Cholesteatomas in Dogs](#), in this issue.)

The author could not find reports of chronic deep infection following TECA-LBO in cats.<sup>21–23</sup> Perhaps the reason for this difference is that TECA is performed more commonly for treatment of ear canal neoplasia in cats,<sup>21,23</sup> whereas in dogs chronic end-stage ear disease with deep seated bulla osteitis is by far the most common indication.<sup>10</sup> Cats have been reported to develop epithelial hyperplasia in response to

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