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SHORT COMMUNICATION ijvs

Total ear canal ablation with bulla osteotomy for management of end-stage otitis externa-media in four dogs

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This study reported the successful management of end-stage otitis externa-media in four dogs using total ear canal ablation (TECA) combined with bulla osteotomy and curettage. All animals were premedicated with atropine, butorphanol, and diazepam. General anaesthesia was induced with propofol and maintained with isoflurane in oxygen. TECA with partial lateral bulla osteotomy was performed in all cases, followed by thorough curettage to ensure complete removal of infected and necrotic tissue. Postoperative care included administration of antibiotics, analgesics, and nervine tonics, along with daily antiseptic wound management. Follow-up evaluations over six weeks demonstrated complete clinical recovery in all dogs, with no observed complications such as facial nerve paralysis or fistula formation. These findings support TECA combined with bulla osteotomy and curettage as an effective and reliable surgical approach for the treatment of advanced otitis externa and media in dogs.

Keywords: Bulla osteotomy, Dog, Total Ear Canal Ablation, Tympanic cavity

Total ear canal ablation along with bulla osteotomy is the gold standard technique for chronic end-stage otitis externa and media (Chaithra *et al*., 2024). This surgical procedure involves the removal of both vertical and horizontal ear canals for chronic otitis externa, and if the disease involves the middle ear, it is approached by tympanic bulla osteotomy to provide drainage of the middle ear (White and Pomeroy, 1990). The present paper describes total ear canal ablation with bulla osteotomy for management of end-stage otitis externa-media in four dogs.

Four dogs of different breeds (American Pitbull, Lhasa Apso, Labrador Retriever, German Shepherd) were presented with a history of purulent aural discharge, head tilt with shaking, otalgia unresponsive to the medical management lasting a few months. Clinical examination revealed severely stenotic ear canal along with sero-sanguinous discharge (Fig. 1A), auricular mucosal hyperemia and pain on palpation. Radiographic observations revealed ossification of ear canal and loss of air density of tympanic bulla (Fig. 1B). Otoscopic examination was challenging due to stenotic ear canal and could only be performed in two cases, which revealed presence of tumorous mass in ear canal (Fig. 1C). Serum biochemistry profile and haematology were found to be normal along with normal physiological parameters.

Due to the chronic nature of the condition and unresponsiveness to medical management, surgical management by TECA and bulla osteotomy was decided to be performed after taking informed consent mentioning all the risk associated with surgery to the owner. The ear swab was taken for the antibiotic culture sensitivity test to provide appropriate antibiotic therapy. All the animals were premedicated with atropine sulphate (0.04 mg/kg body weight, s.c.), butorphanol (0.2 mg/kg, i.v.), and diazepam (0.5 mg/kg, i.v.). General anaesthesia was induced with propofol (5 mg/kg, i.v.) and maintained using isoflurane with oxygen. The external ear was prepared for surgery by repeated lavage with 0.1% chlorhexidine gluconate solution and the dog was positioned in lateral recumbency with a support below the neck.

A T-shaped skin incision was made over the vertical part of the aural canal immediately below the external auditory meatus, extending the incision around the margins of the aural integument. The cartilage of the external auditory meatus was separated from the surrounding soft tissue and the annular cartilage was separated from the auricular muscle and connective tissue by careful blunt dissection freeing the entire auricular canal. Care was taken to identify the facial nerve lying caudoventral to the horizontal ear canal and to retract it gently to the ventral side. The ear canal was resected at the osseous external auditory prominence while the remainder of the aural integument lining the meatus was carefully removed by curettage. Using rongeur a window was created in the lateral wall of the tympanic bulla. Subsequently, the tympanic cavity was thoroughly cleaned and debris were removed from the tympanic bulla by a combination of curettage and gentle irrigation with normal saline solution, which was then removed through suction.The auricular muscles were closed over the osteotomy site with simple interrupted sutures using polyglactin 910 (Vicryl) and the skin closed with monofilament nylon and drain was placed (Fig. 2 A-F).

All four dogs were examined 48 hr postoperatively for any sign of neurological abnormalities referrable to the surgical intervention and at the end the surgical drains were removed. Postoperative care consisted primarily of analgesic and antibiotic therapy based on culture sensitivity results, and regular antiseptic

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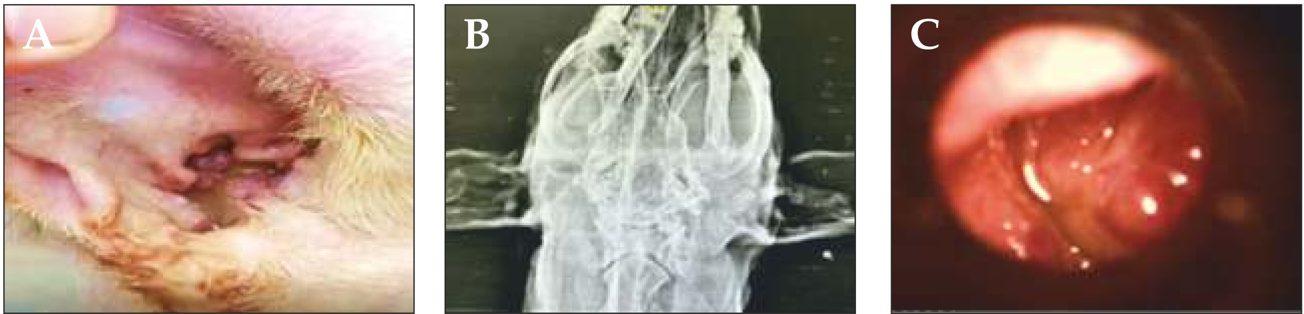

Fig. 1: (a)Sero-sanguinousdischarge with chronic proliferative changes of ear canal, (b) Ossification of ear canal and loss of air density of tympanic cavity, (c) Otoscopic examination revealed mass in ear canal.

wound dressing. The skin sutures were removed after 14 days. The animal owners were contacted six months after surgery and asked to comment on the status of the animal, any complications of wound healing and any persisting neurological abnormalities. All the four dogs recovered without any complications. Histopathological examination of the resected mass revealed ceruminous adenocarcinoma in three cases (Lhasa apso, German Shepherd, American Pitbull) and only calcification was present in another case (Labrador Retriever).

Primary indications for TECA/LBO are chronic proliferative otitis of the aural canal, persistent middle ear infection, ear canal neoplasia, and complete canal stenosis (White and Pomeroy, 1990). TECA/LBO is considered the most effective treatment option in cases of chronic irreversible stage of otitis externa, facilitating improved comfort for the animal through the excision of infected tissue (Devitt *et al.*,1997). Neoplastic and non-neoplastic disorders can impact the pinna and ear canal, often resulting in mass-forming lesions (Matz and Bellah, 2023), with approximately 40% of canine ear neoplasms being benign. These benign tumours include inflammatory polyps, basal cell tumours, histiocytomas, papillomas, fibromas, and adenomas of the ceruminous and sebaceous glands. Adenocarcinomas of the ceruminous gland are disproportionately prevalent, with malignant neoplasms of the canine ear occurring more frequently than benign tumours. While the diagnosis of otitis externa is often straightforward based on clinical signs and physical examination, a comprehensive investigation is essential to identify the underlying dermatological cause, as otitis externa frequently reflects such conditions, with radiography serving as a valuable tool in detecting changes like ear canal stenosis and cartilage calcification (Devitt *et al.*,1997; Krahwinkel, 2003). Total ear canal ablation and lateral bulla osteotomy are technically complex procedures associated with a high complication rate due to the potential for iatrogenic injury to critical structures surrounding the external ear canal and tympanic bulla, including the facial nerve, ear ossicles, external carotid artery, maxillary vein, and retro-auricular vein

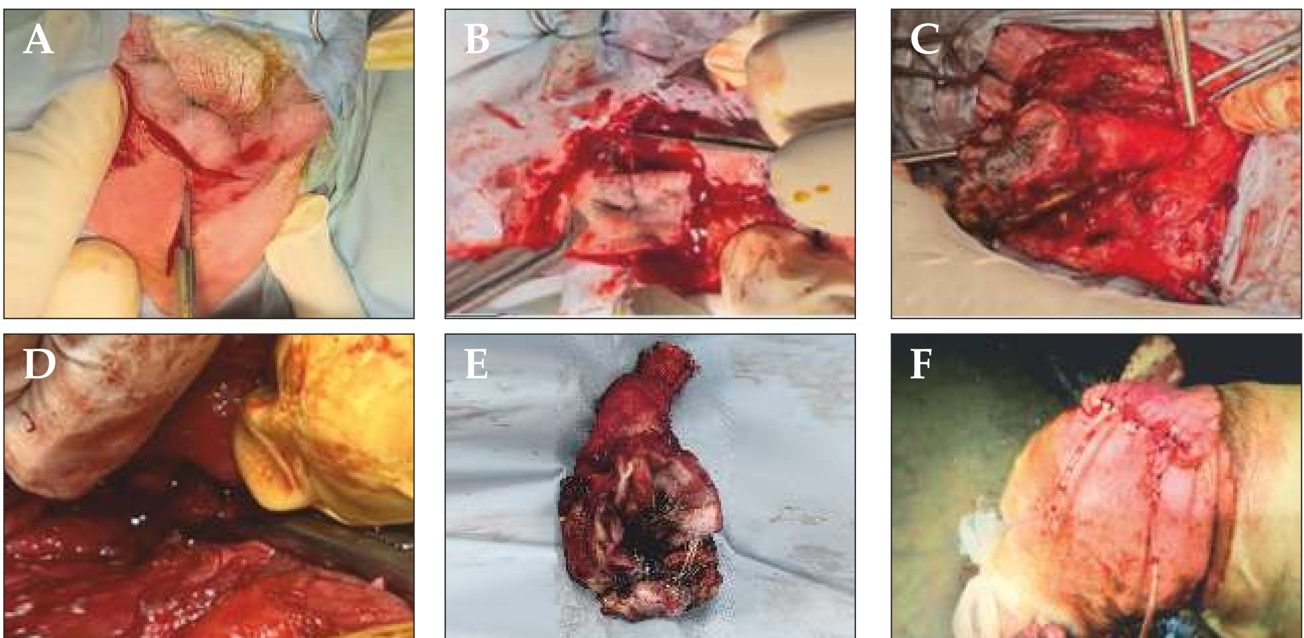

Fig.2:(a)T-shaped skin incision, (b) and (c)dissection of annular cartilage from surrounding tissue, (d) amputation of ear canal,lateral bulla osteotomy andcurettage and irrigation, (e) resected outcomplete ear canal, and (f) double layer suturing and placement of drain

(White and Pomeroy, 1990; Smeak and Inpanbutr, 2005). Keeping the tympanic membrane intact during total ear canal ablation (TECA) can lead to several complications. It can cause the tympanic cavity to reform, impede soft tissue to grow inward, and create conditions for epithelialized cavities and keratinized debris to accumulate. These factors increase the likelihood of deep infection occurring later (McAnulty *et al*., 1995). To mitigate these risks, it is advised to extract the tympanic membrane and the epithelial lining of the bony ear canal when performing a lateral bulla osteotomy in conjunction with TEC (Smeak and Inpanbutr, 2005). After performing lateral bulla osteotomy, it is crucial to meticulously remove all exudates, thoroughly, irrigate the site with sterile saline solution, and administer suitable antibiotics to prevent postoperative para-aural abscessation and fistulation (Vogel *et al*., 1999), while refraining from curettage of the tympanic cavity's dorsal surface to avoid damaging the promontory area and causing inner ear injury and leads to vestibular disorder. Postoperative facial nerve dysfunction, lip drooping and Horner syndrome are commonly identified by auriculopalpebral paralysis (White and Pomeroy, 1990), were not observed in this study.

Total ear canal ablation (TECA) combined with lateral bulla osteotomy (LBO) must be performed with great care to prevent inadvertent damage to surrounding structures and minimize the risk of post-operative abscessation and fistulation. In the cases described, the procedure was performed successfully, with the dogs recovering without incident and showing no signs of facial nerve injury, highlighting the potential for excellent outcomes when this technique is executed properly.

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