OTITIS IN CANINE - A CLINICAL STUDY

THESIS

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BY

KALE SANJAY DIGAMBERRAO
DEPARTMENT OF VETERINARY SURGERY AND RADIOLOGY

College of Veterinary and Animal Sciences,
Parbhani – 431 401.

MAHARASHTRA ANIMAL AND FISHERY SCIENCES
UNIVERSITY, NAGPUR- 440 006.
(INDIA)

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Chapter-I

INTRODUCTION

Dog has been man's most faithful companion since ages. Their close association makes man to notice and attend many disease conditions to permit the pet lead a healthy normal life. However, some diseases especially in sub clinical state are often over looked because the clinical signs are not expressed. Otitis is one such condition which may not become apparent until considerable damage is done to the auditory canal.

Otitis is one of the common clinical problem among dogs, though not usually fatal but cause great discomfort to the affected dog (Kumar 2002). Otitis can be simply classified into three types 1) Otitis externa, 2) Otitis media and 3) Otitis interna.

Otitis externa is defined as a chronic proliferative inflammation characterized by hyperkeratinization, hyperplasia of the sebaceous and ceruminous glands, ceruminous fibrosis and infiltration of plasma cells, lymphocytes and macrophages. Otitis media is an inflammation of the middle ear structures, which includes tympanic membrane, tympanic cavity, auditory or eustachian tube, three auditory ossicles and tympanic nerve and otitis interna is inflammation of the inner ear structures which includes cochlea, vestibule and semi-circular canals.
Though not a life threatening ailment, otitis externa can be a frustrating disease for canine patients and their owners. An estimated 15-20 percent of canine patient have ear disease (Gotthelf and Young, 1997). Many factors predispose the canine ear canal to otitis. There is an increase susceptibility to otitis in the long haired pendulous eared breeds of dog (Joshua, 1958). Choudhary and Mirakhur (2002) reported maximum prevalence during rainy season (36.51 %) and lesser in summer and spring seasons (14.23 %). They further observed that temperature alone did not have any relation with the incidence. However relative humidity (RH) and thermal humidity index (THI) were related with the incidence.

Most of the clinical cases of canine otitis media occur in conjunction with chronic otitis externa (Spreull, 1964, Little, 1987). In the dog development of otitis media by ascending from otitis externa has not been proved. The factors contributing to the pathogenesis of otitis externa are the same predisposing factors for causing otitis media. This shows that descending route of infection is more common to cause otitis. The predisposing factors for the high frequency of otitis include 1) Long, relatively narrow ear canal, 2) The heavy pendent ear flap characteristic of certain breeds, 3) Hair in the ear canal which are abundant in some dog, 4) Skin disease which may effect ear canal epithelium such as atopy and seborrhea, 5) Specific commonsel organisms which in some dogs becomes pathogens like otodectes cynotis mites and pityrosporon spp. yeast. 6) Secondary bacterial infections particularly Proteus and Pseudomonas spp.
Tumors or foreign bodies, and 8) Inadequate or in appropriate treatment by the veterinarian or owner.

The cases of otitis may be successfully treated with medicinal treatment and regular dressing of the affected ear. Some of the cases may stubborn to this medicinal treatment and bring about a temporary relief due to lack of drainage. Surgical intervention is often the only choice of treatment for drainage of affected ear.

Various surgical procedures were developed by the veterinary surgeons to bring about an effective resolution of this dilemma. Formssston and Macunn (1931) described a technique to treat otitis externa. They resected a “v” shaped portion of the lateral wall of the vertical, ear canal. This method was modified by Zepp (1949) in which he devised a procedure for deflecting and grafting a section of the lateral conchal cartilage and tissues of the external ear canal ventral to the meatus.

The treatment of clinical cases of otitis became a tedious task looking to the complexity of etiological factors, emergence of new potential opportunistic pathogens, development of drug resistance, prolonged use of antibiotics and steroids making the ear prone to yeast and fungal infection and lack of awareness and non adoption of preventive measures by the pet owners. Above this the lack of drainage from the affected ear canal is major limitation passing hindrance in the success of the treatment. Thus the obscure etiology lacunae for the diagnostic facilities and difficulty in treatment is a most frustrating
challenge to field veterinarians in handling the canine patients. This warrants a detailed clinical study on the “otitis in canine” which were planned with following objectives to have a better explanation of otitis.

1. To record the incidence of otitis with reference to etiological factors in the clinical cases of canine species.

2. To evaluate the effective treatment of otitis in the clinical cases of canine species.
Chapter-II

REVIEW OF LITERATURE

2.1 Anatomy of ear

The ear is divided into three portions; external ear, middle ear and internal ear. External ear consists of auricle (pinna) and the external auditory meatus, with two skin covered cartilages, auricle (pinna) and the external auditory meatus, with two skin covered cartilages, auricular and anular cartilage. Auricle is a funnel like plate of cartilage which serves to receive air vibrations and transmit them via ear canal to the tympanic membrane (Honda, 1908; Miller and Witter, 1942 and Getty, 1956). It is covered with skin from both sides tightly attached to the perichondrium. Shape of auricle is characteristic of the breed may be erect, semierect or pendulous. Free part of cartilage has two borders anterior and posterior, meeting at the tip of the ear. At the base of anterior border is an irregular projection. Towards lateral part of the narrow basal portion curved spina helicus is present, plate like projections tragus and immediately behind this an antitragus as an irregular process. Cartilage of auricle is auricular cartilage which is pierced by many foramina which permit the passage of blood vessels.

External auditory meatus consists of cartilaginous and osseous tube lined with soft connective tissue, glands and skin (Ellenberger and Baum, 1943). It may also consists of few coarse hair which may differ depending on the breed.
of the dog. The auricular cartilage is attached to the external acoustic process of the temporal bone by means of a small annular cartilage. The annular cartilage is a narrow band of cartilage rolled to form a tube. The proximal end of the cartilage overlaps the osseous external acoustic process, with which it articulates by means of ligamentous tissue. The ear canal therefore is divided into lateral cartilaginous and medial osseous parts. The glands of the ear canal are of two kinds sebaceous and ceruminous. The cells of glands are modified apocrine sweat glands. These secretes a pasty or waxy mucilagenous fluid containing brown pigmented granules. The sebaceous glands open into the head of the hair follicle or they may empty directly on the surface of the skin.

The ear canal in its passage towards the skull takes 100° angle changing its direction from vertical to horizontal. The vertical part of the canal is 3-6 cm in length and the horizontal canal 1-2 cm according to breed (Kusurkar, 1967). Depressor auriculæ muscle lies entirely medial to the pdatysma. The depressor auriculæ arises from the laryngeal fascia ventral to the external maxillary vein, mandibular salivary gland. It inserts in the antitragus of the auricular cartilage.

Middle ear consists of the tympanic membrane, tympanic cavity and three auditory ossicles with associated ligaments and muscles (Getty, 1975). Tympanic membrane is a thin, semitransparent membrane, elliptical in outline, which serves as a common wall between the tympanic cavity and external acoustic meatus. Tympanic cavity is lined by ciliated columnar epithelium,
Fig. 1. Cross sectional diagramatic representation of the external and middle ear structures of the dog

Fig. 2. Diagram of middle ear and inner ear
surrounded by bone and situated on the caudoventral aspect of the skull. Major ventral part of cavity is formed by the tympanic bulla, a rounded prominence consisting of thin bone. A smaller, dorsal extension of cavity is formed by the petrous part of the temporal bone and contains the ear ossicles. There are several openings the largest is the lateral opening which is covered by the tympanic membrane, which separates middle ear cavity from the horizontal canal. On the medial surface of middle ear cavity is the opening of the auditory tube (eustachian tube, which takes a short angled pathway to the nasopharynx. Auditory ossicles are three in number. They are very small bones arranged in a chain to connect the tympanic membrane with the oval window of internal ear. These are malleus, incus and stapes, which form an articulated bony chain from tympanic membrane to inner ear. These ossicles amplify sound waves received by the tympanic membrane and transmit them to the vestibular oval window.

Internal ear is the organ of both hearing and cauillilibrium. Includes cochlea, vestibule and semicircular canals and is enclosed in a petrous portion of the temporal bone. Known as the osseous labryinth. The osseous labryinth lined with membranes form the membranous labryinth, which is a closed duct system filled with endolymph. The labryinth is composed of three parts, vestibule, cochlea and three semi-circular canals. Cochlea is concerned with hearing, while the saccule, utricle, and semicircular canals important in maintaining equilibrium. Membranous labryinth serves as the sensory end organ for the vestibulocochlear nerve and vestibular mechanism, which is a proprioceptive apparatus stimulated
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by changes in position of the head and is used to control tenseness of muscles
maintaining posture.

2.1.1 Blood supply

Great auricular artery arises from external carotid artery which is
the direct continuation of the common carotid is the main blood supply. The great
auricular artery gives rise to the intermediate, deep, lateral and medial auricular
vessels, which run on convex side of the ear and anastomose at the tip of the
pinna. The cutaneous base of ear supplied by the cranial auricular artery, which is
branch of superficial temporal artery.

2.1.2 Nerve supply

Auricular and auriculopalpebral branches of the facial nerve and
from the first and second cervical nerves. The secondary nerves supplied by
superficial temporal branch of mandibular nerve and the auricular branch of
vagus, innervates the ear. Inner nerve supply is via the cochlear and vestibular
branches of the acoustic or eighth cranial nerve.

2.2 Incidence

Grono (1980) observed that the incidence of otitis externa in the
dog was 5 to 12 percent but was rare in the cat with a rate of 2 percent. The
condition has a worldwide occurrence, being prevalence in both temperate and
tropical climates. Breeds with the pendant ears or with hairy external auditory
meatus develop otitis externa more commonly than other breeds. Sex predisposition of the disease does not appear but highest incidence was appeared in dogs between three and seven years of age.

Hayes et al. (1987) observed that the dogs with pendulous ears or having thick hair surrounding the ear canal had significantly more otitis than other dogs. Dogs with erect ears showed less risk of this disease. They also observed that the monthly variation in ambient temperature, rainfall and relative humidity were directly related to the monthly variation in hospital prevalence of canine otitis externa in different geographic areas.

Azmi et al. (1990) reported four cases of otitis media in German Shepherd dogs aged 3-5 years. In each case candida albicans was cultured from ear discharge.

Gothelf and Young (1997) estimated that 15-20 percent of canine patient and as many as seven percent of feline patients have ear disease.

Bache et al. (2002) recorded that most of the dogs affected with otitis were belonging to the age group of 3-6 years. Whereas least prevalence of otitis media (14.66 %) was recorded in dogs above six years of age. Unilateral otitis externa was encountered in 90.66 percent of the cases with more number of acute (57.33 %) than chronic (42.66 %) cases and no marked sex prevalence was noted.
Choudhary and Mirakhur (2002) studied 1565 cases out of that 77 dogs (4.92 %) were seen affected with otitis. The prevalence was maximum during rainy season (36.51 %) and lesser in summer and spring season (14.28 %). It was observed that temperature alone did not have any relation with incidence. However, relative humidity (RH) and thermal humidity index (THI) were related with incidence. An increase in RH and THI resulted in an increase in incidence one to two months after the change rather than immediately after. The age of affected dogs varied between 10 months to 13 years. The highest incidence was observed in the age group of 4-6 years (31.7 %). Of the 77 percent of otitis observed 63.34 percent (49) were males and 36.36 percent (23) were females.

Kumar (2002) observed that infection of external ear canal was more common than the middle or internal ear and 5-20 percent of canine population was affected.

2.3 Etiology

Grono (1969) observed that trauma was a possible aetiological agent in the experimental induction of otitis in dogs.

Blue et al. (1974) studied involvement of pathogens in canine otitis. Streptococcus aureus and Staphylococcus species were the commonest isolates followed by Pseudomonas, Escherichia coli, Enterobacter and Corynebacterium in order of prevalence.
Gedek et al. (1979) noted fungi as the main isolates followed by bacterial pathogens in the cases of otitis. Isolated pityrosporum pachydermatis in 57 percent otitis cases and 17 percent in clinically healthy ears of dogs.

Frank et al. (1981) presented details of neoplasms in ear which were associated with otitis in canines. These neoplasms included papilloma, spinous cell epithelioma, sebaceous adenoma, ceruminoma, basel cell epithelioma and hibernoma.

Chengappa et al. (1983) observed mainly the fungi and yeast in the cases of otitis. Isolated pityrosporum pachydermatis in 72 percent of otitic ears and 36 percent of normal ears of dogs.

Sanguinetti et al. (1983) isolated Malasezia pachydermatis from cases of chronic otitis externa in dogs and observed that the commonest isolate was Malassezia pachydermatis followed by Staphylococcus and Pseudomonas species.

Larson (1987) found Malassezia, Aspergillus, Rhizopus species as pure isolates or in association with otodectes in 110 dogs. In other 105 dogs the ear disease were parasitic (24.3 %).

Ganesh et al. (1988) studied 52 dogs with otitis externa in 1980-81, 31 were due to Staphylococci, 8 were due to Proteus spp., 4 were due to Pseudomonas spp. and 9 were due to fungal infections.
Hobson (1988) noticed inflammatory polyp in cases of otitis externa and remarked that advanced stage of otitis laid to paraaular abscess formation in which prognosis was unfavourable.

McKeever and Tottes (1988) discussed the predisposing causes of otitis externa. These includes atopic dermatitis, endocrine disorders, immunological diseases, foreign bodies and neoplasms.

Little et al. (1991) found cholesteatoma was accompanied by otitis media in 7 of the 62 ears, examined (11 %) during a study of inflammatory middle ear disease in the dog. The clinical, radiological and pathological findings in these animals. The cholesteatoma in the dog is an aggressive lesion which must be differentiated from uncomplicated otitis media.

Rybnicek et al. (1992) examined 296 dogs with otitis externa between 1 July and 31 October, 1991, 157 (53 %) had foreign bodies in their ears, mainly seeds and grain fragments, 73 (73 %) of the 100 cases seen in July, 68 (61 %) of 111 in August, 13 (33 %) of 27 in September and 3 (7 %) of 42 in October, of the 296 cases of otitis externa, 118 and 83 were in poodles and spaniels, with 71 (60 %) and 62 (75 %), respectively, being caused by foreign bodies.

Knottenbelt (1994) reported a case of chronic recurring otitis externa in a 2 year old spayed tibetian spaniel bitch. The bitch had a history of juvenile onset generalised demodectic mange which had first occurred at 8 months of age. From 14 months of age the dog was presented on several occasions
with severe head shaking. Treatment with antibiotics and topical antiinflammatory creams provided temporary improvements. At 2.5 years of age the dog was presented with severe pruritus at the base of the right ear with local excoriation and bleeding. Skin scraping from the area revealed a number of Demodex canis eggs but no adult mites, mites were present in otitic smears.

Pal and Rao (2001) described candida albicans, medically important opportunistic pathogen in the etiology of chronic otitis of a 6 months old female Pomeranian dog which were unresponsive to conventional treatment.

2.3.1 Isolation and antibiogram

Ducha Sardana et al. (1981) studied 60 dogs with otitis. 14 strains of *Streptococci*, 22 of *Staphylococcus aureus*, 11 each of *Staphylococci*, epidermidis, gram positive bacilli and yeast and 1 strains of *Pseudomonas aeruginosa* were isolated. *Escherichia coli*, *Corynebacterium pyogenes* and *Proteus* species were also found. In antibiotic sensitivity studies, all the *Staphylococcus aureus* strains were resistance to penicillin and all the *Streptococci* to kanamycin, and *E. coli* was very resistant to chloramphenicol.

Fachini and Del (1981) isolated *Pseudomonas aeruginosa* from 8, Candida and other yeast from 8, *Staphylococcus epidermidis* from 5, *Staphylococcus aureus* from 3 and *Streptococci* from two, among 20 dogs with otitis. *Pseudomonas aeruginosa* was very sensitive to tobramycin and slightly less sensitive to colistin. Other antibacterials tested included carbencillin,
amikacin, dibekacin, dicloxacillin and cephalosporin, most of the organisms were resistant to some degree.

Marx (1988) cultured ear swabs from 1088 dogs, produced 1392 cultures, 496 of which were Malasezia pachydermatis, 285 cultures were Pseudomonas and 272 were Staphylococci. Only 19 cultures of yeast other than Malassezia were obtained.

Uchida et al. (1994) obtained a large number of isolates not only from otitic canals but also from normal canals in this study. In normal ear canals, more isolates were obtained from dogs than cats and dogs and cats showed differences in cerumen such as colour and volume. This is a very interesting fact when we consider the differences in incidence of otitis externa in dogs and cats. In this study Staphylococci amounted to approximately 60 per cent of isolates from normal canals S. hyicus subsp. chromogenes was identified more often than any other species from both normal dogs and cats. Most microorganisms from normal canals and otitic canals are the same organisms. Only Staphylococcus aureus and Candida spp. were isolated only from otitic canal alone. According to drug sensitivity of Staphylococci from otitic canals, cefazolin, chloramphenicol and gentamicin were good for treatment of otitis otitis cetera when Staphylococci were isolated.

Staroniewicz and Birger (1990) studied bacteriological samples taken from the external auditory canal of 59 dogs with clinical signs of otitis
externa. 41 *Staphylococcus* strains were isolated from 47 dogs, of which 19 were *S. intermedius* and 9 were *S. aureus*. All these 28 strains showed a positive coagulase reaction, whereas coagulase negative strains such as *S. zominis, S. hyicus, S. cohnii, S. haemolyticus* and *S. xylosus* occurred only rarely. The coagulase positive strains were sensitive to Gentamicin and Neomycin but resistant to Penicillin, Ampicillin and Oxytetracycline. 4 vaccine made using the isolated coagulase-positive *Staphylococci* were effective in the treatment of chronic otitis externa caused by *Staphylococci*.

Kiss et al. (1993) investigated microbiologically 273 ear discharges from affected dogs. Malasezia pachydermatis yeast was the most frequent causative agent (in 44.6% of the cases in pure cultures while in 31.2% associated with bacteria). *Staphylococcus aureus* was the most frequently isolated bacterium from the samples, in 11.7 per cent in pure cultures and in 23.8 per cent of cases associated with *M. pachydermatis*. *Pseudomonas aeruginosa* was the third most frequently isolated pathogen (8.8%) while the frequency of other microorganisms was less than 2 per cent. A new preparation was developed for the treatment of otitis externa in dogs (Otex ear drop) containing 100 mg of ketconazole, 50 mg gentamicin sulphate and 50 mg of masiprolone hydrochloride in 10 ml solution. Results of laboratory and field trials obtained on 180 dogs are given after a treatment period of 8.5 days, 97.7 per cent of the dogs recovered.
Staroniewicz et al. (1995) diagnosed otitis externa in 92 dogs of
the following breeds distribution. 44.5 per cent mixed bred (41), 13 per cent
spaniels (120) 9.7 per cent Daschaunds (9), 8.6 per cent Dalmatians (3), 8.6 per
cent German Shepherd dogs (8), 5.4 per cent boxer (5), 4.3 per cent poodles (4),
2.1 per cent Setters (2), 2.1 per cent Pointers (2) and 1.1 per cent Rottveillor (1),
44.5 per cent of dogs were 3-5 years of age. The commonest bacteria isolated
from infected ear are Streptococcus sp. 9.7 per cent, Streptococcus intermedius,
55.4 per cent of the cases, Escherichia coli 14.1 per cent, Proteus vulgaris 8.6 per
cent, Pseudomonas aeruginosa 8.6 per cent, Malassezia pachydermatis was
isolated from 36 cases accounting for 39.1 per cent of dogs. In 27 cases M.
pachydermatis was found in mixed infections of which 21 were cause by S.
intermedius. Gentamicin, amikacin and cepradine were effective against 91.9,
90.3 and 72.6 per cent of the gram positive strains, respectively. Gram negative
strains were sensitive to amikacin (87.1 %), metylmycin (83.8 %) and gentamicin
(67.7 %). All M. pachydermatis strains sensitive to ketonazole, 88.9 per cent to
miconazole and 66.7 per cent to clotrimazole. The results of sensitivity test with
antibiotics and antifungal agents are tabulated.

Gudejia et al. (1997) studied sensitivity of yeast and bacteria,
previously isolated as aetiological agents from dogs with otitis externa to
antifungal agents (miconazole, econazole, ketonazole, S-flucytosine, nystatin
and amphotericin-B) and antibacterial agents (Amoxycillin, Clavulanic acid,
cefotaxim, cloxacillin, enrofloxac, gentamicin, clindamycin and lincomycin)
respectively as analysed 14 bacterial strains were tested 11, *Staphylococcus* one
*Streptococcus* and one *Pseudomonas* and a unidentified gram positive
cocobacillus. Nine yeast strains were tested, one each of *Candida colliculosa,*
*Candida humicola, Cryptococcus albidus, Cryptococcus terreus, Rhodotorula
minuta, Rhodotoruts glutinis, Trichosporum cutaneum, Sacromycyes cerevisial* and
one non-identified strain. Antifungal agents and antibacterial activity tests were
done using the automated system.

Kiss et al. (1997) studied the efficacy of new drug combination for
the therapy of canine otitis externa tested in vivo and in vitro. The combination
contains ketconazole as the antimycotic activity ingredient: Gentamicin sulphate
as an antibacterial component and maripredone hydrochloride as
antiinflammatory constituent. A solvent mixture consisting of propylene glycol,
ethanol and benzyl alcohol was used as the vehicle. In vivo efficacy was tested
on 59 *M. pachydermitis* strains 40 *Staphylococcus intermedius*. Strains isolated
from dogs with otitis externa. In vitor antifungal activity of the combination was
superior to that of ketconazole used alone at the same concentration. The drug
combination was highly effective in treatment of 210 dogs with otitis externa.
94.2 per cent of dogs became symptomless and microbiologically negative 8.5
dogs after the beginning of treatment no adverse reaction was observed.

Kiss et al. (1997) examined 515 dogs of 22 breeds with otitis
externa at the small animal clinic of the University of Veterinary Science in
Budha pest and in 7 local veterinary practices between 1994 and 1995. Otitis
externa was erythematosus ceruminous in 83 per cent and supportive in 17 per cent of dogs. *Erythematous ceruminous* inflammations were characterized by severe pruritis. *Malaseria pachydermatis* was isolated from the ears of 76 per cent of the dogs often in combination with *Staphylococcus*. *Intermedius* (39.22 per cent of cases). *Malassezia pachydermatis* was most sensitive to ketconazole, clotrimazole, miconazole and nystatin, 5 intermedius isolates were most sensitive to Amoxycillin, clavulanic acid, enrofloxacin, cephalaxin and Gentamicin, *Pseudomonas aeruginosa* was isolated (12.62 % of cases) most. Frequently from dogs with supportive otitis externa, whereas proteus, *Streptococcus* and pasturella were isolated in some cases. *Pseudomonas aeruginosa* showed the highest sensitivity to gentamicin, polymyxin B and tobramycin.

Keskin *et al.* (1999) isolated microorganisms from 79 of 81 otitic dogs examined during 1995-98. *Staphylococcus aureus* was the most prevalent (46.9 per cent, followed by *Malassezia pachydermatis* (21.6 %), *Pseudomonas* spp. (9.6 %), *S. epidermidis* (7.2 %), Proteus* spp.* (4.8 %), *Escherichia coli* (2.4 %), *Streptococcus* spp. (2.4 %), *Candida* spp. (2.4 %), *Pasteurella* spp. (1.2 %) and *Citrobacter* spp. (1.2 %), respectively. The percentages of microorganisms susceptible to antibiotic were as follows. 44.4 per cent to Gentamicin, 44.4 per cent to tetracycline, 34.9 per cent to spiramycin, 26.9 per cent to ampicillin, 65.55 per cent to cephalosporin, 20.6 per cent to lincomycin and 32.5 per cent to enrofloxacin. Otitis externa was more common in long haired and pendulous eared dogs than other breeds.
Bache et al. (2002) investigated 25 ear swabs collected from healthy dogs yielded 26 bacterial isolates. Among the isolates coagulase negative *Staphylococcus* (CNS) (19) comprised of *Staphylococcus* saprophyticus (15) *Staphylococcus epidermidis* (2) and *Staphylococcus auricularis* (2) followed by coagulase positive *Staphylococci* i.e. *Staphylococcus aureus* isolates (4) were encountered. Other isolates includes *E. coli* (2) and *Bacillus* spp. (1). Results indicate predominance of CNS as normal ear flora in dogs. On comparison between flora isolated from otitis and normal ear it was observed that *Pseudomonas aeruginosa* and CPS were most frequently associated with disease condition, whereas, normal ear. Flora was dominated by CNS (overall in vitro antibiotic sensitivity of bacterial isolates recovered from cases of otitis externa indicated ciprofloxacin as the most effective antibiotic (81.39 %) followed by Gentamicin (76.79 %), chloramphenicol (27.90 %), neomycin (22.09 %), pefloxacin (18.60 %), amoxycillin (13.95 %), kanamycin (11.62 %), norfloxacin (9.30 %) and least effective tetracycline (4.62 %). Antibiogram of isolates recovered from normal ear canal indicated overall highest sensitivity to ciprofloxacin (80.76 %) followed by gentamicin (76.92 %), neomycin (65.38 %), chloramphenicol (57.69 %), norfloxacin (53.84 %), pefloxacin tetracycline (50 % each), amoxycillin (42.30 %) and least sensitivity to kanamycin (26.92 %). Comparatively bacterial isolates recovered from otitic cases were resistant than those from normal ear canal. Bacterial isolates associated with otitis were highly
sensitive to ciprofloxacin and Gentamicin. Hence, these antibiotics should be preferred for treatment of otitis in canine.

2.4 Symptomatology

Bojrab and Reneger (1981) observed head shaking and rubbing or scratching of the affected ear in otitis externa. Pain was usually the first sign of primary otitis media. An affected dog usually held its head at an angle with the affected ear downward. Otitis interna was uncommon and usually associated with otitis media and externa. Loss of equilibrium and nystagmus were noted. The head was held down and was turned to the affected side. When walking, the animal tends to circle and fall to the affected side.

Lane (1982) suggested that the signs of otitis externa were familiar to most pet owners. They include head shaking, rubbing and scratching of the ear, excoriation of the skin at the base of ear and the eyes. Otorrhea, smell, pain on contact with ear.

Shell (1988) reported signs of head shaking, pawing or rubbing the affected ear, discharge from the external ear canal and increased sensitivity or pain when the head was touched or mouth was open in case of otitis media. Depression, anorexia and fever were uncommon signs. Injury to facial nerve produced drooping of the upper lip or ear dropping of saliva. Homer’s syndrome may be present if injury occurs to sympathetic nerve fibers. In otitis interna, head tilt, circling or rolling to the affecting side.
Gotthelf and Young (1997) opined that the most common clinical signs seen with acute otitis externa included pain, pruritus, exudate and a foul smelling odor from the ear canal. Pain can usually be elicited by palpation of the external ear canal.

Kumar (2002) reported that most common and early indication of otitis externa is aural pruritus and head shaking. The other signs include alopecia, scaling, crusting and erythema of pinna with pruritus and pain on palpation of the ear. Dog may cry on manipulating affected ear. Partial drooping of one or both the affected ears. Dog rubs its ears on the floor, carpet or furniture. Presence of excessive malodorous discharge and head tilt also be seen. In otitis media facial nerve palsy. Horner's syndrome exhibited by ptosis, miosis, Enophthalmous and protrusion of 3rd eye lid. The signs of otitis externa and media with head tilt and circling, peripheral vestibular dysfunction and horizontal or rotatory nystagmus were indicative of otitis interna.

2.5 Diagnosis

Being a painful procedure it was better to resort to a general anaesthetic early in the course of disease (Fraser et al., 1961).

Bojrab (1975) opined that a complete otoscopic examination of each ear including visualization of the tympanum, was imperative for proper diagnosis and assessment of the lesion.
Harvey (1980) suggested that modern otoscopes provided excellent light for good visualization of the ear canal and tympanic membrane. Otoscope cones should be chosen so that they will not abravate the epithelium, cotton tipped applicators should used with caution to avoid packing accumulation debris deeper into the ear canal.

Lane (1982) reported the presence of a discharge in the canal could inhibit otoscopy. Therefore examination could be performed at a later date. He further opined that the role of radiography in the investigation of otitis externa has been limited but abnormalities in this region came to light on radiographic examination. According to him changes which could be seen in the external meatus on radiographs consisted of narrowing of the canal and calcification of the annular and auricular cartilage. Further a small number of patients showed strictures at the aperture of the horizontal canal after aural resections and radiographs could be used to establish the depth of stenosis.

Shell (1988) studied that otoscopic examination detected signs of otitis externa; ruptured, bulging, or discoloured tympanic membrane; or obstruction of the ear canal. The presence of ulcerations, masses, exudate or hyperplastic tissue often hampered the visualization of the tympanic membrane. Lavage of the ear canal with warm normal saline helped to remove exudate and debris.
Boothe (1990) indicated systemic antibiotic if otoscopic or radiographic evaluations supported the presence of fluid or material within the middle ear cavity. Surgery was frequently necessary to allow for proper drainage.

Carlotti (1991) presented a review of otitis externa in dogs and cats. Diagnosis was made in five steps viz., clinical examination, direct examination of cerumen (erythematous ceruminous otitis externa) or bacterial culture and sensitivity testing (suppurative otitis externa), direct impression smears, cleaning and otoscopy and diagnosis of underlying skin disease.

Remedios et al. (1991) compared radiographic versus surgical findings retrospectively in 19 clinical cases of presumptive middle ear disease (16 dogs and 3 cats). False negative radiographic findings found in 4 (25%) of 16 surgically confirmed cases of otitis media. The true negative rate was 100 per cent as all cases that were negative at surgery also lacked radiographic changes. False positive radiographic findings did not occur, all cases showing positive radiographic changes were confirmed at surgery. The true positive rate was 75 per cent as 12 of 16 confirmed cases of otitis media also demonstrated positive radiographic changes. It is concluded that surgical exploration remains the only reliable diagnostic option if ear disease is suspected.

Fingland (1993) discussed otitis externa and otitis media diagnostic and medical aspects, imaging techniques in the diagnosis of middle ear disease, aural neoplasms, the role of lateral ear resection in managing chronic otitis
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Fingland (1993) discussed otitis externa and otitis media diagnostic and medical aspects, imaging techniques in the diagnosis of middle ear disease, aural neoplasms, the role of lateral ear resection in managing chronic otitis
externa, total ear canal ablation and lateral bulla osteotomy for management of end stage otitis, ototoxicity in dogs and cats.

Love et al. (1995) compared computed tomography (CT) and radiography in the identification of canine middle ear disease, 14 dogs underwent a radiographic “bullae series” and CT examination of the tympanic bullae. Confirmation of otitis media was based on surgery. The overall diagnostic accuracy of CT and radiographs for the diagnosis of otitis media was similar. Although a marked difference was not detected between radiographs and CT for detecting otitis media using youden’s index. Values, CT was more sensitive for the detection of otitis media.

Gotthelf and Young (1997) opined that a thorough otoscopic examination is essential for accurate diagnosis and treatment of otitis. General anasethesia is needed to perform a thorough examination and ear cleansing. The ear canal should be examined for the presence of exudate, foreign bodies, masses, ear mites and abnormal conformation. Otoscopic examination should also include evaluation of the condition of the ear canal epithelium. The appearance of the tympanic membrane should also be noted.

Trower et al. (1998) described positive contrast ear canalography briefly in 1973 as a method for detecting rupture of tympanic membrane in dogs with otitis media. The purpose of this study was to evaluate the sensitivity and usefulness of technique. The ears of 10 normal canine cadavers and 31 dogs with
clinical signs of ear disease were examined using otoscopy, radiography and contrast radiography after infusing 2 to 5 ml of positive contrast medium into the ear canals. These examinations were repeated in the cadavers after the tympanic membrane had been ruptured with spreull needle. In the cadavers 14 of 19 (74%) of the tympanic membranes were visible otoscopically, contrast medium did not enter the tympanic bulla of any of the ears before the tympanic membrane was ruptured, but was visible in the bulla in every ear after rupture. In the clinical study, 40 of 61 (66%) of the tympanic membranes were visible otoscopically, and 12 appeared to be ruptured. Radiographic signs of otitis media (increased opacity and/or thickening of the tympanic bulla) were identified in seven ears. Canalography was positive in appeared to be intact otoscopically. In normal canine ears, canalography was a more accurate method for detecting iatrogenic tympanic membrane rupture than otoscopy. In dogs with ear disease, canalography may be more sensitive for otitis media than either otoscopy or survey radiography.

2.6 Treatment

Otitis is one of the most prevalent disease in dogs. The difficulty in treating otitis is due to complexity of and emergence of drug resistance among etiological agent.
2.6.1 Conservative treatment

Blue et al. (1974) treated Pseudomonas aeruginosa inoculated otitis by lavage with a solution of EDTA, tromethamine and lysozyme. This treatment eradicated Pseudomonas aeruginosa in only 36 per cent of dogs, greatly decreased the colonization of the ear canal by the organisms in 46 per cent, but did not elicit any response in 18 per cent of the dogs. Organisms such as Staphylococcus species, Streptococci, Proteus mirabilis Klebsiella, Pseudomonas aeruginosa, Escherichia coli, Enterobacter clostridia, Candida were isolated in case of otitis. However, according to Moreno (1925), Sardana (1981) and Kowalskii (1988) the organisms showed resistance to various drugs.

Wooley et al. (1988) studied the effect of EDTA (ethylene diaminetetra acetate) TRIS [(tris hydroxymethyl) amino methane] and sodium dodecyl sulphate alone or together against Bacillus species, Staphylococcus aureus, Candida species, Pseudomonas aeruginosa, E. coli, Proteus vulgaris, Trichosporum species and Alpha Streptococcus. Combination of three had synergistic antimicrobial activity against Pseudomonas aeruginosa, Proteus vulgaris, E. coli, Bacillus species and Alpha Streptococcus. The combination had additive antimicrobial effect against Staphylococcus aureus, Candida and Trichosporum. In a clinical trial 24 dogs with otitis were given ear wash with EDTA (5 mm), TRIS (50 mm) and SDS (0.05 %). Combination three times a day until the combinations resolved. The ear of 23 dogs healed mostly within week
no irritation of ear canal noticed in treated dogs. The case which did not respond was a mixed *E. coli* and proteus infection.

Harvey (1990) described how medication fails in the treatment of otitis externa as given below. (I) The normal defence mechanism of the skin leads to the thickening of squamous epithelium and the secretion of sebaceous fluid on the surface of ear canal lumen. Lumen is not visible at the external ear canal opening. (II) This causes the epithelial surface to become warmer and moist thus promoting bacterial activity and making resolution of the skin lesions more difficult. (III) With repeated medical treatment the normal skin flora is destroyed and organisms like proteus and *Pseudomonas* that often are impossible to control take on upper hand at this region. Thus on the whole medical treatment often did not prove successful and surgical treatment was thus inevitable.

Uchida *et al.* (1990) determined and tabulated minimum inhibitory and minimum fungicidal concentration of 5 antifungal agents ( clotrimazole, ketoconazole, miconazole, nystatin, pimaricin) against *M. pachydermatis* isolated from dogs with otitis externa. Ketoconazole is recommended for clinical application to the cases of otitis externa associated with *M. pachydermatis*.

Cieslicki (1991) studied the role of glucocorticoids in drug combinations against otitis externa in 144 dogs. Miconazole + polymyxin-B and miconazole + polymyxin-B prednisolone were compared in a double blind study.
The results showed that the glucocorticoid part of the combination did not affect the bacteriological and mycological cure, rate, but caused a quicker clinical healing.

Studdert and Hughes (1991) shown that a topical preparation containing miconazole, polymyxin and prednisolone was more effective in the treatment of otitis externa in 167 dogs than 2 other ear preparation panolog (containing neomycin, thiostreptin, nystatin and triamcinolone) and otema (neomycin, monosulphram and betamethasone) with miconazole, polymyxin and prednisolone, the recurrence rate was 26.7 per cent compared with 72.6 per cent and 54.3 per cent when the other products were used. The mean duration of treatment required to achieve resolution of clinical signs was 9.6 days, compared with 12.2 days, and 13.0 days and no cases failed to respond to treatment, compared with 17.7 and 14.3 per cent Malassezia conis alone (71 %) or in association with bacteria (18 %) was recovered from 44 fo 49 ears cultured. Aspergillus niger was isolated from the ears of one dog.

Carlotti (1991) suggested that medical therapy included cleaning of the external ear canal and local therapy (acaricides, antifungal agents, antibiotics, corticosteroids, other topical agents, the appropriate selection of an optic preparations being essential). Treatment of underlying skin disease was necessary. Otitis externa was in fact a dermatological disease complex (like padadermatis). Although local secondary infections (bacterial and fungal) must be managed in every case.
Albrecht et al. (1992) treated 30 dogs and 21 cats of otitis with a gel containing pyrethrum extract, piperonyl butoxide, neomycin sulphate, clotrimazole and triamcinolone acetonide caused for parasitic otitis, a suspension containing neomycin sulphate, clotrimazole and triamcinolone acetonide caused for non parasitic (otitis) or gel and suspension placebos. The gel preparation and its placebo gave the best results, particularly in cats. Many animals did not tolerate the suspension.

Uchida et al. (1994) obtained satisfactory response in 51 (72.9 %) of 70 dogs with fungal otitis externa treated with 4-5 drops of a 1 % natamycin (pimaricin) suspension into the ear canals twice a day for 2 weeks. The response was very good in 16, good in 35, fair in 12 and poor in 7 dogs.

Parker (1995) diagnosed and treated otitis media in a 2 years old Walker Coonhound. A large volume of fluid was drained from the right tympanic bulla and treated with cephalexin.

Kumar (2002) mentioned that proper cleaning of the ear is certainly important as accumulation of wax and other debris may interfere with physical examination and prevents the contact of medicines with the affected tissues, bacteria or yeast present in the canal. The exudate may produce favourable environment for microorganisms to proliferate and can inactivate certain antibiotics. Hair should also be removed from the ear canal. A thorough
cleaning through the use of ceruminolytics and flushing agents under sedation was needed.

### 2.5.2 Surgical treatment

Hoffman (1892) established drainage in case of otitis externa by making an opening ventro caudally in the auditory tube through which a drainage tube was inserted.

Formston and McCunn (1931) described a technique to treat cases of otitis externa. They resected a 'V' shaped portion of the lateral wall of the vertical canal with its point at the junction of the vertical and horizontal canals. The skin of the outside was then suture to the skin on the inner aspect of the auditory duct along the edges of the incision.

Schnelle (1941) described lacroix method in which two curved forceps were applied with their convex borders facing each other and incisions were made along their convex borders to remove a 'V' shaped section of the lateral wall of the vertical ear canal.

Zepp (1949) devised a procedure for deflecting and grafting a section of the lateral conchal cartilage and tissues of the external ear canal ventral to the meatus. The deflected section of cartilage prevented the granulating and contracting tissue from closing the meatus. It also served as drain board for ear discharge. He observed that drainage of the dissected ears can be established by
complete or partial resection of the ear canal coupled with ventral grafting of the lateral cartilage.

Tuf-vesson (1955) evaluated the Zepp's operation for otitis externa in 353 dogs. Post surgical evaluation of 88 per cent of the animals revealed complete recovery in 49.5 per cent improvement in 15.6 per cent and little or no improvement in 34.9 per cent. The lack of improvement in 34.9 per cent of the cases was attributed to the pathological changes in the remaining part of the ear canal. Thus total extirpation of the ear canal in nine dogs resulted in complete recovery in seven while, one case developed a fistula. The above analysis showed a marked breed and age predisposition to occurrence of the disease though the results of surgical treatment proved to be independent of the dogs breed or age.

Fraser et al. (1961) described a surgical technique involving vertical ear canal ablation for successful treatment of otitis externa. They observed that the appearance of the discharge in affected ears was related to the tissue changes present and the nature of infectious agents.

Coffey (1970) discussed the indications for surgical treatment of otitis externa and compared the conventional methods of lateral wall resection (Zepp, 1949) and vertical canal ablation (Fraser et al., 1961). The advantages of technique and the role of different aids in enhancing the wound healing were reappraised by him.
Bojrab (1975) opined that the purpose of a surgical approach to otitis is to establish drainage, whether by lateral ear resection, myringotomy or bulla osteotomy.

Bojrab and Dallman (1983) indicated that when otitis externa becomes unresponsive to medical therapy, lateral ear canal operation is indicated. Other indications for lateral ear canal resection are frequent recurrence of otitis externa, chronic otitis externa due to inadequate treatment or lack of treatment and external ear canal thickening that does not concurrently obstruct the horizontal portion of the external ear canal. The purpose of lateral ear canal resection is to provide environmental alteration by means of ventilation so that moisture, humidity and temperature are decreased. Lateral ear canal resection also provides drainage for exudates and moisture in the ear canal.

Gregory and Vasseur (1983) reported the results of lateral ear resection for treatment of otitis externa in 26 dogs. After a mean followup period of 4.5 years 17 of the 26 dogs were available for physical examination while the owners of the remaining nine dogs which were dead prior to this review were surveyed by questionnaire. Resolution of the clinical signs was good in 41 per cent improved in 12 per cent and poor in 47 per cent. The authors found good results as elimination of clinical signs with minimal or no care required from owners, an improved status, when it required professional attention due to occasional recurrence of the signs, while a poor result meant no improvement.
Tirgari and Pinniger (1986) described the poll through technique for ablation of the vertical segment of the external auditory canal in dogs and cats. The results of this technique in 11 dogs and one cat were compared with those in seven dogs and were subjected to the traditional vertical canal ablation technique described by Fraser et al. (1961). Fewer skin and tissue incisions produced less haemorrhage and thereby less chances of infection, secondary haemorrhage and wound dehiscence. Though aural resection may cause narrowing, stenosis and skin inversion at the new orifice. There was reduced post operative discomfort and tissue reaction was the irreversibly damaged tissue was completely removed. The decrease number of skin and tissue incisions and the decreased quantity of suture material were the salient features of this technique.

Cox et al. (1989) described a case of otitis media with effusion (glue ear) in a Cavalier King Charles spaniel. Its presentation, diagnosis and surgical management by the insertion of a transtympanic ventilation tube (grommet) is discussed.

Beckman et al. (1990) performed total ear canal ablation combining bulla osteotomy and curettage on 44 dogs (n=72 ears). The most common indication for the surgery was chronic otitis externa with concurrent otitis media. Surgery was successful in alleviation of the signs of otitis in 95 per cent of the ears on the surviving dogs with long term follow up evaluation. Postsurgical complications related to the surgery were observed in only 3 of the 42 surviving dogs. Seven dogs had undergone earlier lateral ear rejection, with
recurrence of otitis that was then resolved by use of total ear canal ablation combining bulla osteotomy and curettage.

McCarthy and Caywood (1992) treated thirty six dogs with end stage otitis externa unresponsive to previous medical and surgical therapy by either unilateral or bilateral vertical ear canal resection. Improvement was achieved in 95 per cent of the ears following surgery as indicated by decreased frequency in medical treatment required to control the disease, increased case of application of topical medication and reports from owners. There was an absence of clinical signs following vertical ear canal resection in 23 per cent of the ears. An overall complication rate of 19 per cent was attributed to incisional dehiscence (12 %), stomal stenosis (7 %), surgical infection (1 %) and facial nerve palsy (1 %).

Menon (1991) evaluated the conventional method of lateral wall resection (Zepp's method) and pull through technique for vertical canal ablation. She treated 14 dogs seven by each method. In lateral wall resection, she found post operative complications such as wound dehiscence and structure of the new aditus by granulation tissue which resulted in incomplete cure or recurrence of the condition. To overcome the dermerits of the above method, a modified pull through technique of vertical ear canal ablation. Turgari and Pinniger (1986) was used and this technique resulted in a better cosmetic effect, with minimal post operative complications such as infection, wound dehiscence, stenosis and inflammatory swelling.
Chapter-III

MATERIALS AND METHODS

Investigation was carried out on fifteen clinical cases of canine of either sex and of various age groups suffering from otitis. Presented at veterinary polyclinic M.A.F.S.U., Parbhani were used as material for present study. These cases were studied under following heads.

3.1 Incidence

3.2 Etiology

3.3 Symptomatology

3.4 Diagnosis

A) Microbiological examination
   a) Identification and Isolation of organism
   b) Antibiogram

B) Otoscopic examination

C) Radiological examination

3.5 Treatment

All clinical cases suffering from Otitis were thoroughly examined to ascertain incidence, etiology, symptomatology, diagnosis and to execute treatment. For treatment purpose cases were treated by using conservative treatment and cases which were not treated by conservative treatment and chronic
cases of otitis stub borne to conservative treatment were treated surgically by
Modified Zepp's technique.

3.1 Incidence

The clinical cases of Otitis presented at veterinary polyclinic were
considered accordingly their breed, age and sex variation and these incidences
were co-related with seasonal and geographic variation.

3.2 Etiology

The detailed history was recorded from the owner in relation to
suffering of patient and investigation was carried out regarding the trauma to the
ear. The ear was thoroughly examined to confirm the depth of involvement,
presence of any parasitic infestation. Detail examination was done to ascertain
nature and volume of ear discharge presence of any pathological lesions over
body was also observed.

3.3 Symptomatology

As per the detailed history retrieved by the owner. The dog were
thoroughly examined externally for pruritus, head shaking, head tilting towards
affected ear, drooping of affected ear and presence of discharge. Dogs were also
examined for presence of nervous symptoms, and evidence of pain on palpation at
the base of ear for presence and nature of swelling.

3.4 Diagnosis

Direct ear examination was a painful procedure. Therefore it was
mandatory to anaesthetise the patient. Dog was sedated by injecting inj. Xylazine
hydrochloride @ 0.5 mg per kg body weight I/V. By keeping affected side up dog was restrained in lateral position. General anaesthesia was induced by injecting propofol @ 3 mg per kg body weight I/V as a bolus dose (Salunke, 2002). After achievement of anaesthesia the diagnostic examinations and treatment was performed.

3.4.1 Microbiological examination

Samples were obtained from the junction of the horizontal and vertical part of ear canal by the sterile technique of Dickson and Love (1983). These samples were subjected for following investigation.

a) Isolation and Identification of organisms

Collected samples were cultured on nutrient agar and nutrient broth. Then it was incubated aerobically in an incubator at 37°C for 72 hrs. for bacterial growth. Frequent observations at 18 hrs, 36 hrs and 54 hrs. post culture was done. The growth obtained was examined for cultural, microscopic and biochemical characterization and identification of bacteria was done as per the Merchant and Packer (1983).

b) Antibiogram

Invitro antibiotic sensitivity of the isolates were conducted by conventional paper disc diffusion method as described by CruickShank et al. (1975). The standard disc supplied by Hi-media (India) were used. The zone of inhibition 15 mm and above was taken into consideration for sensitivity of the organisms (Table 1).
Table 1: Different antibiotic discs used along with their concentration.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Antimicrobial agents</th>
<th>Concentration per disc mcg</th>
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<tbody>
<tr>
<td>1.</td>
<td>Gentamicin</td>
<td>30</td>
</tr>
<tr>
<td>2.</td>
<td>Neomycin</td>
<td>30</td>
</tr>
<tr>
<td>3.</td>
<td>Pefloxacin</td>
<td>5</td>
</tr>
<tr>
<td>4.</td>
<td>Chloramphenicol</td>
<td>30</td>
</tr>
<tr>
<td>5.</td>
<td>Ciprofloxacin</td>
<td>30</td>
</tr>
<tr>
<td>6.</td>
<td>Enrofloxacin</td>
<td>10</td>
</tr>
</tbody>
</table>
3.4.2 Otoscopic examination

A thorough otoscopic examination was done for accurate diagnosis. Instrument used was otoscope. The ear canal was examined for the presence of exudate, foreign bodies, masses, ear mites and abnormal conformation, pathological alteration of the ear canal epithelium was also evaluated. Further examination was made to observe obstruction, ossification, size and patency of the ear canal (Plate 1).

3.4.3 Radiological examination

The chronic cases suspected for otitis media were subjected for open mouth radiograph.

Sedated animal was placed in dorsoventral position by keeping patients mouth on loaded cassette (8 x 10") and directing it towards X-ray tube. Both jaw were extended with the help of bandages. Selecting film to focal spot distance (FFD) at 100 cm, X-ray was shoot at MAS 16 and KVP 52-57 depending on size of the skull (Douglas and Williamson, 1971).

Developed X-ray film was studied to detect faulty mineralisation and neoplastic changes occurred in ear canal. Open mouth projection radiograph also allow visualizing the ulcerations made in tympanic bullae.

3.5 Treatment

Cases of otitis were treated by using conservative treatment and cases which were not treated by conservative treatment and chronic cases of otitis
Plate 1. Showing otoscope in situ for otoscopic examination
stub born to conservative treatment were treated surgically by Modified Zepp's technique.

3.5.1 Conservative treatment

Fifteen cases showing affections of ear were subjected for conservative therapy. Under the influence of anaesthesia, animal restrained in lateral recumbancy placing affected ear up. Excessive hairs were clipped off. Ear pinna and vertical ear canal was thoroughly cleaned with 2% hydrogen peroxide solution. Painting of ear pinna and ear canal was done by 1% mercurochrome. With the help of endosufflation tube 1% mercurochrome was injected in a horizontal ear canal. Depending on the antibiogram, antibiotic were chosen and given intramuscularly for 5 consecutive days and instillation of ear drops till the recovery.

3.5.2 Surgical treatment

When conservative treatment for long standing recurrent, progressive, non-responsive otitis externa fails, Surgical intervention is necessary. Out of fifteen cases three were treated surgically by following conventional method of Zepp's modified technique of lateral wall resection (Zepp, 1949).

3.5.2.1 Preparation of patient

Dogs were prepared by fasting for 24 hours under the influence of tranquilizer Inj. Xylazine1 HCL @ 0.5mg/kg i/v and then Inj. Propofol2 @ 3 mg/kg i/v was given. After development of surgical anaesthesia surgical

1. Intas Pharmaceutical limited, Ahmedabad.
2. Bharat Serum limited, Thane, Mumbai.
procedure was started. Stage of surgical anaesthesia was maintained by split dose @ 0.4 mg/kg/min till the completion of surgical procedure (Salunke, 2002).

3.5.2.2 Procedure

The dog was placed in lateral recumbency with the affected ear up and draped so that the area required for surgical intervention was exposed that is ear pinna and external ear canal.

A probe was inserted into the vertical ear canal to determine its depth. A point slightly below to the junction of the vertical and horizontal canal was marked externally on the skin by taking a small incision. A triangular skin incision was made starting from the inter-tragic notch and tragohelical notch which was united at the apex where the marking was previously made. The ‘V’ shaped skin was reflected by undermining starting from the apex towards the base of the triangle. This flap was kept stretched while the cartilage was cut with the help of scissors. Starting from the intertragic notch and tragohelicine notch running parallel to each other and racing towards the apex. Bleeding points were checked by ligature or forcipressure or electrocautery. Thus cartilage and cutaneous flap was reflected ventrally thus exposing the horizontal canal. Appropriate amount of cartilage was cut and the remainder reflected ventrally so as to provide an optimum drainage board or baffle plate. This was then sutured to the outer skin with simple interrupted pattern by using black braided silk or nylon. Surgical wound was dressed with benzene seal.
3.5.2.3 Post operative care

Wound were dressed with powder povidone Iodine and bandaged post operatively. Antibiotics depending upon antibiogram of ear discharge was given intramuscularly for five consecutive days. antiinflammatory and analgesic Inj. Diclofenac sodium\(^1\) @ 2.5 mg/kg Intramuscularly for three days.

ulcerative lesions in the exposed ear canal was cauterised with 1 % silver nitrate. Antibiotic ear drops according to antibiogram were introduced in horizontal ear canal till the recovery. Stitches were removed after 10\(^{th}\) post operative day.
RESULTS AND DISCUSSION

A total of fifteen clinical cases of otitis in canine were recorded during study period at Veterinary polyclinic, College of Veterinary and Animal Sciences Parbhani. Out of fifteen, twelve (80%) cases were of otitis externa three (20%) were of chronic otitis externa and otitis media and no case of otitis interna was recorded.

Detailed investigations on incidence, etiology, symptomatology, diagnosis and treatment were made. For diagnosis microbiological examination of ear discharge, otoscopic examination of ear canal was performed. In chronic cases radiological examination was under taken to record the changes established in middle ear.

4.1. Incidence

Table 2 and Fig. 3 depict the incidence of otitis in domestic animals, presented during the period of April 2003 to September 2003. Present study revealed incidence of otitis was 1.50 percent in domestic animals presented at Veterinary polyclinic, College of Veterinary and Animal Sciences Parbhani.

The incidence of otitis was more common in dogs (1.18 %) as compare to bovines (0.23 %), ovine and caprine (0.07%). There was no incidence in equine. Out of nineteen cases of otitis fifteen cases (83.33%) were reported in dogs only and three cases (16.6%) in other species.
Table 2. Incidence of otitis in domestic animals presented during the period from April 2003 to September 2003

<table>
<thead>
<tr>
<th>Months</th>
<th>Total No. of cases</th>
<th>Bovine</th>
<th>Equine</th>
<th>Canine</th>
<th>Caprine and Ovine</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>April</td>
<td>222</td>
<td>1</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1</td>
</tr>
<tr>
<td>May</td>
<td>197</td>
<td>--</td>
<td>--</td>
<td>1</td>
<td>--</td>
<td>1</td>
</tr>
<tr>
<td>June</td>
<td>169</td>
<td>--</td>
<td>--</td>
<td>4</td>
<td>--</td>
<td>4</td>
</tr>
<tr>
<td>July</td>
<td>262</td>
<td>--</td>
<td>--</td>
<td>2</td>
<td>--</td>
<td>2</td>
</tr>
<tr>
<td>August</td>
<td>213</td>
<td>2</td>
<td>--</td>
<td>3</td>
<td>--</td>
<td>5</td>
</tr>
<tr>
<td>September</td>
<td>198</td>
<td>--</td>
<td>--</td>
<td>5</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>1261</td>
<td>3</td>
<td>--</td>
<td>15</td>
<td>1</td>
<td>19</td>
</tr>
<tr>
<td>Total Incidence</td>
<td>--</td>
<td>0.23 %</td>
<td>0 %</td>
<td>1.18 %</td>
<td>0.07 %</td>
<td>1.50 %</td>
</tr>
</tbody>
</table>
Fig. 3. Incidence of otitis in domestic animals presented during the period from April 2003 to September 2003.
Table 3 and Fig. 4 depicts the incidence of otitis in canine, presented during the period from April 2003 to September 2003. In 307 cases in canine presented at veterinary polyclinic, College of veterinary animal sciences, Parbhani, during the study period fifteen cases (4.92%) of otitis. Choudhary and Mirakhor (2002) reported 4.92% of incidence of otitis in canine.

Table 4 depicts the breed, age and sex wise incidence of otitis in domestic animals. Otitis was predominantly observed in pure breeds of dogs (73.33%), drooping or erect ears with oozing hair from ears. Out of 100 cases, 90 were of pure breeds and only 10 were of Non-dominant breeds (mongrel dogs). Otitis was mostly seen in German Shepherd breed (31.14%), followed by spitz (29.87%), mongrel (18.87%), Cocker spaniel (6.49%) followed by others.

Fig. 3. Incidence of otitis in domestic animals presented during the period from April 2003 to September 2003.
According to Prem Singh et al. (1988) ear canal infection was frequently prevalent in dogs but they were not so common in bovines. Aher et al. (1992) observed that ear canal infection was common in dogs (Harvey, 1980) but not in bovine because of the typical anatomy of the bovine ear which prevents ascending infections.

Table 3 and Fig. 4 depicts the incidence of otitis in canine, presented during the period from April 2003 to September 2003 present investigation out of 307 cases in canine presented at veterinary polyclinic; college of veterinary and animal sciences; Parbhani during study period fifteen cases (4.88%) were of otitis. Choudhary and Mirakhur (2002) reported 4.92 percent of incidence among canine.

Table 4 depicts the Breed, age and sex wise incidence of otitis in dogs. Otitis was predominantly observed in pure breeds of dogs (73.33%) having drooping or erect ears with dense hair coat. Out of fifteen cases, eleven cases were of pure breeds and only four cases (26.66%) were of Non discript breeds (mongrel dogs). In pure breeds six cases were of German Shepherd (40%), three were of Pashmi (20%) and two were of Pomeranian (13.33%). Highest incidence of otitis was recorded in German shepherd breed (40%).

Choudhary and Mirakhur (2002) recorded highest frequency of otitis in German Shepherd breed (31.14%) followed by spitz (29.87%), Mongrel (18.8%), Cocker spaniel (6.49%) followed by others.
Table 3. Incidence of otitis in canine during April 2003 to September 2003

<table>
<thead>
<tr>
<th>Month</th>
<th>Total No. of cases</th>
<th>No. of otitis</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>April</td>
<td>45</td>
<td>--</td>
<td>0 %</td>
</tr>
<tr>
<td>May</td>
<td>45</td>
<td>1</td>
<td>2.22 %</td>
</tr>
<tr>
<td>June</td>
<td>44</td>
<td>4</td>
<td>9.09 %</td>
</tr>
<tr>
<td>July</td>
<td>67</td>
<td>2</td>
<td>2.98 %</td>
</tr>
<tr>
<td>August</td>
<td>52</td>
<td>3 (1)*</td>
<td>5.76 %</td>
</tr>
<tr>
<td>September</td>
<td>54</td>
<td>5 (1)*</td>
<td>9.25 %</td>
</tr>
<tr>
<td>Total</td>
<td>307</td>
<td>15</td>
<td>4.88 %</td>
</tr>
</tbody>
</table>

* Bilateral case of otitis.
Fig. 4. Incidence of otitis in canine during April 2003 to September 2003
Table 4. Breed, age and sex wise incidence of otitis in dogs

<table>
<thead>
<tr>
<th>Breed</th>
<th>Number of affected dog</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) Breed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. German Shepherd</td>
<td>06</td>
<td>40</td>
</tr>
<tr>
<td>2. Pashmi</td>
<td>03</td>
<td>20</td>
</tr>
<tr>
<td>3. Pomeranian</td>
<td>02</td>
<td>13.33</td>
</tr>
<tr>
<td>4. Others</td>
<td>04</td>
<td>26.66</td>
</tr>
<tr>
<td>B) Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 – 3 years</td>
<td>03</td>
<td>20</td>
</tr>
<tr>
<td>3 – 6 years</td>
<td>08</td>
<td>53.33</td>
</tr>
<tr>
<td>6 – 9 years</td>
<td>03</td>
<td>20</td>
</tr>
<tr>
<td>9 – 12 years</td>
<td>01</td>
<td>6.66</td>
</tr>
<tr>
<td>C) Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>11</td>
<td>73.33</td>
</tr>
<tr>
<td>Female</td>
<td>04</td>
<td>26.66</td>
</tr>
</tbody>
</table>

Bache et al. (2002) observed maximum prevalence of otitis between four to six years (66.17%). Fraser et al. (1961) observed close the present investigation incidence of otitis observed to be higher in males (73.33%) than that of females (26.67%).

Vermis et al. (1979) also reported a higher incidence of males (62%). Males and females were 36.3% and 45% respectively. Vyasashi and Hennassay (1972) recorded 45% incidence of otitis in males per cent.

Unilateral otitis was encountered in thirteen cases (26.66%) while bilateral otitis in two cases (13.33%). Bache et al. (2002) recorded unilateral involvement of ear in otitis is more common.

of age group. But the highest incidence was observed between three to six years of age. Choudhary and Mirahal (2002) observed maximum prevalence of otitis between four to six years (66.17%). Frase et al. (1961) observed maximum prevalence of otitis between four to six years (66.17%).
In the present study long haired and pendulous eared breeds of dogs such as, Pashmi and Non descript dogs were most prone to otitis. Similar findings reported by Muller et al. (1983), Staroniewicz et al. (1995) and Choudhary and Mirakhur (2002).

Present investigation revealed incidence of otitis between one to ten years of age group. But the highest incidence was observed between three to six years (53.33%) of age and the mean age was 5.5 year. Similar finding was recorded by Bache et al. (2002). He observed maximum prevalence of otitis between three to six years of age. Choudhary and Mirakhur (2002) observed highest incidence in the age group of four to six years (31.17%) Fraser et al. (1961) reported the mean age of dogs affected with otitis to be 5.3 years.

In the present investigation incidence of otitis observed was higher in males (73.33%) than that of females (26.67%). Out of fifteen cases, eleven were of males and four were of females. Choudhary and Mirakhur (2002) observed 63.34 per cent males and 36.36 per cent females out of 77 cases of otitis. Houdeshell and Hennessay (1972) had recorded 45% incidence of otitis in males. Verma et al. (1979) also reported a higher incidence in males (62%).

Unilateral otitis was encountered in thirteen cases (86.66 %) where as bilateral otitis in two cases (13.33%). Bache et al. (2002) recorded unilateral otitis in 90.66 percent of cases. The above findings confirm the unilateral involvement of ear in otitis is more common.
4.2 Etiology

Otitis is believed to be caused by microorganisms and parasites and was considered secondary to predisposing factor or other disease in addition to being a primary condition from parasites, trauma to the ear. (Mckeever and Globus, 1995). The etiology of otitis is classified under three subheadings viz. A) Predisposing causes B) Primary causes and C) Secondary causes.

4.1.1. Predisposing Causes

Present investigation revealed that incidence of otitis was higher during August and September, where humidity, high temperature resulted moisture in the ear canal, which promoted otitis (Table 5). Most of the long haired pendulous eared dogs were affected. Hairs in the ear canal promote otitis. In one case there was history of bathing under water pressure pipe which lead to accidental entry of water in the ear canal of dog further leading to swelling, keratinization and stenosis of external auditory meatus which promoted otitis (Plate 2A). In five cases underlying skin lesions were observed. Eczema over tail (one case), over scrotum (one case) and Maggoted wound at elbow joint (one case) and itching all over the body (two cases) respectively. Thus ectoparasites were the predisposing factor in five cases leading to otitis.

These findings were co-related with findings of Kumar (2002), Harvey (1980), Griffin (1981), Hayes et al. (1987). Grahm et al. (1990) observed that Keratinization of integument was directly proportional to incidence of otitis. According to Carlotti (1991) many skin diseases can lead to otitis externa
Table 5 Monthly variation of temperature and humidity during study period from April 2003 to September 2003.

<table>
<thead>
<tr>
<th>Months</th>
<th>Temperature (°C)</th>
<th>Humidity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Max.</td>
<td>Min.</td>
</tr>
<tr>
<td>April</td>
<td>39.75</td>
<td>22.22</td>
</tr>
<tr>
<td>May</td>
<td>42.35</td>
<td>24.22</td>
</tr>
<tr>
<td>June</td>
<td>40.60</td>
<td>27.37</td>
</tr>
<tr>
<td>July</td>
<td>31.30</td>
<td>23.20</td>
</tr>
<tr>
<td>August</td>
<td>29.65</td>
<td>22.55</td>
</tr>
<tr>
<td>September</td>
<td>30.20</td>
<td>21.45</td>
</tr>
</tbody>
</table>
4.1.2. Primary Causes

Present study revealed the predominant factor responsible for otitis was traumatic injury. The trauma resulted from fighting with other dogs and beating by the owner (Plate 9A). Out of fifteen cases four cases had history of dog bite and there was history of beating on ear by the owner in a solitary case. Parasites acted as a primary cause of otitis. In two cases mange were found from skin scrap of medial aspect of ear. Because of parasites scratching of ear by the dog leads to hyperplasia, scaling and excoriation of ear epithelium which were observed in two cases (Plate 3).

According to Kumar (2002) primary causes such as ear mites (Otodectes cynotis); sarcoptic mange; ticks of otobius sp; allergies caused by pollens, moulds etc, flea allergy dermatitis and contact allergies caused by topical applications were responsible for actually inducing or initiating the inflammatory process for otitis. Carlotti (1991) reported ectoparasite, allergic diseases, endocrine disorders, pyodermas, trauma and irritation, contact dermatitis, autoimmune skin diseases, drug eruption, keratoseborrheic skin disease, tumors as primary causes of otitis.

4.1.3. Secondary Causes

Predisposing factors increased the risk of developing disease; where as underlying skin disease as a primary factor directly caused otitis externa this might have allowed secondary microbial infection to contribute the severity and duration of the disease (Hendricks et al., 2002). In the present investigation sixteen ear swabs from fifteen cases were cultured for bacterial isolation from otitis dogs.
Out of fifteen cases of otitis seven were due to *Staphylococcus* *spp.*, four were due to *Pseudomonas* *spp.*, two were due to *Streptococcus* *spp.*, two were due to *Corynebacterium* and one was due to *E.Coli* (Table 8 and 9).


4.2. Symptomatology

Table 6 depicts the record of symptoms depending upon severity of otitis.

Table 7 Shows record of observation of otoscopic examination, discharge, organisms isolated and generalised skin lesions.

In the present investigation fifteen cases of otitis showed following symptoms.

- Head Shaking and aural pruritus were commonly observed in all cases of otitis externa
- Alopecia, Scaling, crusting and erythema of pinna with pruritus was observed in most of the cases (Plate 5A and 6A).
- Pain on palpation of ear was observed in five cases and on opening of mouth in one case of otitis.
- Partial drooping of affected ear was a common observation (Plate 7A). It was bilateral in two cases and unilateral in thirteen cases.
- Rubbing of ear was seen in five cases of otitis externa.
Table 6. Record of Symptoms depending upon severity of otitis.

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Erythema</th>
<th>Pruritus</th>
<th>Head shaking</th>
<th>Drooping of ear</th>
<th>Excoriation</th>
<th>Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>+</td>
<td>*</td>
<td>*</td>
<td>+</td>
<td>--</td>
<td>+</td>
</tr>
<tr>
<td>2.</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>+</td>
<td>--</td>
<td>+</td>
</tr>
<tr>
<td>3.</td>
<td>*</td>
<td>*</td>
<td>**</td>
<td>+</td>
<td>--</td>
<td>+</td>
</tr>
<tr>
<td>4.</td>
<td>*</td>
<td>*</td>
<td>+</td>
<td>+</td>
<td>--</td>
<td>+</td>
</tr>
<tr>
<td>5.</td>
<td>f**</td>
<td>f**</td>
<td>f**</td>
<td>f+</td>
<td>--</td>
<td>+</td>
</tr>
<tr>
<td>6.</td>
<td>*</td>
<td>*</td>
<td>**</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>7.</td>
<td>f*</td>
<td>f***</td>
<td>f*</td>
<td>f+</td>
<td>--</td>
<td>+</td>
</tr>
<tr>
<td>8.</td>
<td>+</td>
<td>*</td>
<td>**</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>9.</td>
<td>*</td>
<td>*</td>
<td>+</td>
<td>+</td>
<td>--</td>
<td>+</td>
</tr>
<tr>
<td>10.</td>
<td>+</td>
<td>***</td>
<td>+</td>
<td>+</td>
<td>--</td>
<td>+</td>
</tr>
<tr>
<td>11.</td>
<td>*</td>
<td>*</td>
<td>+</td>
<td>+</td>
<td>--</td>
<td>+</td>
</tr>
<tr>
<td>12.</td>
<td>*</td>
<td>**</td>
<td>**</td>
<td>+</td>
<td>--</td>
<td>+</td>
</tr>
<tr>
<td>13.</td>
<td>*</td>
<td>*</td>
<td>**</td>
<td>+</td>
<td>--</td>
<td>+</td>
</tr>
<tr>
<td>14.</td>
<td>***</td>
<td>**</td>
<td>**</td>
<td>+</td>
<td>--</td>
<td>+</td>
</tr>
<tr>
<td>15.</td>
<td>*</td>
<td>*</td>
<td>**</td>
<td>+</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

* - Mild  
** - Moderate  
*** - Severe  
f - Bilateral  
+ - Present  
- - Absent
Table 7. Record of observation of otoscopic examination, discharge organisms isolated and generalised skin lesion.

<table>
<thead>
<tr>
<th>Case No.</th>
<th>External Ear</th>
<th>Organism Isolated</th>
<th>Skin lesion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>*</td>
<td><em>Pseudomonas</em></td>
<td>None</td>
</tr>
<tr>
<td>2</td>
<td>*</td>
<td><em>Corynebacterium</em></td>
<td>Eczema on Scrotum</td>
</tr>
<tr>
<td>3</td>
<td>#, +, γ</td>
<td><em>Corynebacterium</em></td>
<td>Eczema at tail</td>
</tr>
<tr>
<td>4</td>
<td>#, f</td>
<td>*Corynebacterium (right ear) Staphylococcus (left ear)</td>
<td>Alopecia at little extent</td>
</tr>
<tr>
<td>5</td>
<td>δ, ●, γ</td>
<td><em>Escherichia Coli</em></td>
<td>Alopecia</td>
</tr>
<tr>
<td>6</td>
<td>*, Λ, ¥</td>
<td><em>Pseudomonas</em></td>
<td>Maggoted wound at elbow</td>
</tr>
<tr>
<td>7</td>
<td>Λ, +</td>
<td><em>Staphylococci</em></td>
<td>Alopecia and Itching of body</td>
</tr>
<tr>
<td>8</td>
<td>Γ, #, + Λ.</td>
<td><em>Pseudomonas</em></td>
<td>None</td>
</tr>
<tr>
<td>9</td>
<td>~, # Λ, +</td>
<td><em>Streptococcus</em></td>
<td>None</td>
</tr>
<tr>
<td>10</td>
<td>++</td>
<td><em>Staphylococci</em></td>
<td>Alopecia and Itching</td>
</tr>
<tr>
<td>11</td>
<td>#</td>
<td><em>Staphylococci</em></td>
<td>Alopecia at little extent</td>
</tr>
<tr>
<td>12</td>
<td>δ, #</td>
<td><em>Staphylococci</em></td>
<td>Alopecia at little extent</td>
</tr>
<tr>
<td>13</td>
<td>δ, #</td>
<td><em>Staphylococci</em></td>
<td>Alopecia</td>
</tr>
<tr>
<td>14</td>
<td>￡, #, Λ</td>
<td><em>Staphylococci</em></td>
<td>Alopecia</td>
</tr>
<tr>
<td>15</td>
<td>*</td>
<td><em>Pseudomonas</em></td>
<td>Alopecia at little extent</td>
</tr>
</tbody>
</table>

* - Purulent yellow discharge,  
δ - ulcerative lesions in vertical and horizontal ear canal,  
● - Black discharge,  
γ - Stenosis,  
x - Maggoted wound,  
~ - Perforation of pinna,  
￡ - Severe congestion of horizontal ear canal,  
¥ - excoriations at the base of ear.
• Presence of excessive discharge observed in nine cases, moderate in four cases and absence of discharge was observed in two cases of otitis.

• Loss of hearing was observed in one case in which excessive keratinization and swelling stenosed the external auditory meatus (Plate 2A).

• Depression and elevation of temperature was observed in one case each.

• Swelling at the base of ear was noticed in four cases. Excoriation of the skin at the base of ear was observed in two cases in which, maggot infestation was a primary cause of otitis (Plate 8B and 9A).

• Foul smell was observed in four cases of otitis.

• Hyperplasia was observed in two cases of otitis in which, primary cause was mange, resulted from pruritus (Plate 3).

Present findings were in accordance with the findings of Bojrab and Reneger (1981), Kumar (2002), Shell (1988) and Lane (1982). They observed head shaking, rubbing, scratching of ear excoriations of the skin at the base of ear and the eyes, otorrhea, smell, pain on contact with ear.

4.4 Diagnosis

In the present investigation detailed history including complete physical and dermatological examination, which may indicate some parasites were made in fifteen cases of otitis. Previous exposure of animal to infectious or
contagious diseases and its pattern should also be taken into consideration. Out of fifteen in five cases parasitic infestation was observed. Out of five in two cases itching all over the body, alopecia to some extent was observed. In one case eczema and alopecia at tail region was noted, in another case eczema at scrotum was noted and in third case maggoted wound at elbow joint was observed. Alopecia at little extent was observed in most of the cases.

Present investigation revealed that the dog did not allow for direct otoscopic examination, collection of ear swab for culture and sensitivity, radiography and medicinal treatment are painful procedures which required general anesthesia. Only sedation /traquilization were not sufficient to perform diagnosis and treatment. The dogs showed sign of pain and interfered while examination and treatment.

These findings are corroborating with the findings of Fraser et.al (1961), Little et al. (1991), Gibbs (1978) However Carlotti (1991) suggested that cleaning and ear examination sometimes required tranquillisation or even short general anaesthesia.

In the present study all fifteen cases were examined and treated under general anaesthesia. Dogs were tranquilized by inj. Xylaxine hydrochloride @ 0.5 mg/kg I/V followed by inj. Propofol lipid free @ 3 mg/kg I/V as a bolus dose. It produced a satisfactory anaesthesia and recovery was faster. All diagnostic procedures and treatment was performed satisfactorily under the influence of
anaesthesia. No anaesthetic risk was observed in all cases. Only the adverse effect observed during induction was transient apnoea noted in most of the cases.

Present finding was in accordance with the finding of Morgon and Legge (1989), who found that apnoea was the commonest adverse side effect during induction of propofol. Salunke (2002) used xylazine @ 0.5 mg/kg I/V as a premedication followed by propofol @ 2.5 mg/kg as a bolus dose and noted satisfactory anaesthesia was developed. Watkins et al. (1987), Muir and Gadawski (1998) noted apnoea and respiratory depression were the common side effects after I/V injection of propofol @ 5mg/kg body weight in dogs.

4.4.1. Microbiological Examination

In the present study sixteen ear swabs from fifteen cases of otitis were collected from junction of vertical and horizontal ear canal by sterile technique of Dickson and Love (1983). For identification and isolation of organisms and antibiogram.

4.4.1.1 Identification and Isolation of Organisms

The swab was cultured on nutrient agar and nutrient broth. It revealed the presence of Gram positive Staphylococci and Streptococci & gram negative Pseudomonas, Corynebacterium and Escheichia coli. Highest bacteria isolated from seven ear swabs were of Staphylococcus Spp. (43.75%) followed by Pseudomonas spp. (12.5%); Corynebacterium from two (12.9%) and E.Coli from one (6.25%) ear swab (Table 8 and Fig. 5). Identification and Isolation of organism was carried out by adopting standard method recommended by
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Antibiotics</th>
<th>No. of Positive isolates</th>
<th>Staphylococcus</th>
<th>Pseudomonas</th>
<th>Corynebacterium</th>
<th>Streptococcus</th>
<th>E. coli</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Gentamicin</td>
<td>16 (100 %)</td>
<td>7 (100 %)</td>
<td>4 (100 %)</td>
<td>2 (100 %)</td>
<td>2 (100 %)</td>
<td>1 (100 %)</td>
</tr>
<tr>
<td>2.</td>
<td>Neomycin</td>
<td>8 (50 %)</td>
<td>1 (14.23 %)</td>
<td>2 (50 %)</td>
<td>2 (100 %)</td>
<td>2 (100 %)</td>
<td>1 (100 %)</td>
</tr>
<tr>
<td>3.</td>
<td>Pefloxacin</td>
<td>14 (87.50 %)</td>
<td>6 (85.71 %)</td>
<td>4 (100 %)</td>
<td>2 (100 %)</td>
<td>1 (50 %)</td>
<td>1 (100 %)</td>
</tr>
<tr>
<td>4.</td>
<td>Chloramphenicol</td>
<td>9 (56.25 %)</td>
<td>4 (57.14 %)</td>
<td>2 (50 %)</td>
<td>2 (100 %)</td>
<td>1 (50 %)</td>
<td>0 (0 %)</td>
</tr>
<tr>
<td>5.</td>
<td>Ciprofloxacin</td>
<td>16 (100 %)</td>
<td>7 (100 %)</td>
<td>4 (100 %)</td>
<td>2 (100 %)</td>
<td>2 (100 %)</td>
<td>1 (100 %)</td>
</tr>
<tr>
<td>6.</td>
<td>Enrofloxacin</td>
<td>16 (100 %)</td>
<td>7 (100 %)</td>
<td>4 (100 %)</td>
<td>2 (100 %)</td>
<td>2 (100 %)</td>
<td>1 (100 %)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>16</td>
<td>7</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
Fig. 5. Showing percentage of bacterial isolates

4.4.2. **Antibiogram**

Table 8 and 9 depicts the sensitivity pattern of the *Staphylococcus, Pseudomonas, Streptococcus, Corynebacterium* and *E. coli* species. Hi-media antibiotic disc concentration Gentamicin 30 mcg, Neomycin 30 mcg, Pefloxacin 5 mcg, Chloramphenicol 30 mcg, Ciprofloxacin 30 mcg and Enrofloxacin 30 mcg was used. Depending upon zone of lysis on agar plate its effectiveness in the present study was taken into consideration for further treatment. The antibiogram revealed that Gentamicin, (100%), Ciprofloxacin and Enrofloxacin (100%) showed cent percent effective against *Staphylococcus, Pseudomonas, Corynebacterium, Streptococcus* and *E. coli* organisms. Followed by Pefloxacin (87.50%). Showed cent percent sensitivity to *Pseudomonas* (100%), *Corynebacterium* (100%) and *Streptococci* (100%) followed by *staphylococci* (85.7%) and resistant against *Escherchia Coli* (0%), followed by Chloramphenicol (56.25%) showed cent percent effective against *Corynebacterium* (100%) followed by *Staphylococci* (57.14%), *Pseudomonas* (50%), *Streptococci* (50%) and resistant against *Escherchia coli*. Neomycin (50%) showed cent percent effective against *Corynebacterium* (100%), *Streptococci* (100%) and *E.Coli* (100%) followed by *Pseudomonas* (50%) and
### Table 9. Showing sensitivity of organisms to various antibiotics

<table>
<thead>
<tr>
<th>Organisms</th>
<th>G</th>
<th>N</th>
<th>Pf</th>
<th>C</th>
<th>Cf</th>
<th>Ex.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staphylococci</td>
<td>+++ +++ + + R</td>
<td>+++ +++ + + R</td>
<td>+++ +++ + + R</td>
<td>+++ +++ + + R</td>
<td>+++ +++ + + R</td>
<td>+++ +++ + + R</td>
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<tr>
<td>Pseudomonas</td>
<td>0 - 2 - 2 - 0</td>
<td>2 - 0 - 0 - 2</td>
<td>2 - 1 - 1 - 0</td>
<td>1 - 1 - 0 - 2</td>
<td>0 - 2 - 2 - 0</td>
<td>0 - 1 - 3 - 0</td>
</tr>
<tr>
<td>Corynebacterium</td>
<td>0 - 1 - 1 - 0</td>
<td>1 - 1 - 0 - 0</td>
<td>1 - 0 - 1 - 0</td>
<td>0 - 1 - 1 - 0</td>
<td>0 - 1 - 1 - 0</td>
<td>0 - 0 - 2 - 0</td>
</tr>
<tr>
<td>Streptococci</td>
<td>0 - 1 - 1 - 0</td>
<td>2 - 0 - 0 - 0</td>
<td>1 - 0 - 1 - 0</td>
<td>1 - 0 - 0 - 1</td>
<td>0 - 1 - 1 - 0</td>
<td>0 - 0 - 2 - 0</td>
</tr>
<tr>
<td>E. Coli</td>
<td>0 - 1 - 0 - 0</td>
<td>0 - 0 - 0 - 0</td>
<td>0 - 0 - 0 - 1</td>
<td>0 - 0 - 0 - 1</td>
<td>0 - 1 - 0 - 0</td>
<td>0 - 0 - 2 - 0</td>
</tr>
</tbody>
</table>


- **Mild sensitivity**
- **++ - Moderate sensitivity**
- **+++ - Total sensitivity**
- **R - Resistant**
least effective against *Staphylococcus* (14.28%). In vitro the result of sensitivity pattern to Gentamicin, Ciprofloxacin and Enrofloxacin were 100 percent and Pefloxacin 87.50 percent, Chloramphenicol 56.25 percent and Neomycin 50 percent (Table 7 and 8).

Present findings co-relate with the findings of Bache *et al.* (2002). He reported that bacterial isolates associated with otitis were highly sensitive to Ciprofloxacin and Gentamicin. Hence these antibiotics should be preferred for treatment of otitis in canines. Uchida *et al.* (1989) suggested Gentamicin, Chloramphenicol and Cefazolin good for treatment of otitis externa when *Staphylococci* were isolated. Duchasardana *et al.* (1981) suggested that *E.Coli* was very resistant to Chloramphenicol. Kiss *et al.* (1997) observed *Staphylococci* isolated were most sensitive to Enrofloxacin and Gentamicin, *Pseudomonas aeruginosa* showed the highest sensitivity to Gentamicin.

### 4.4.3. Otoscopic examination

Otoscopic examination is essential for accurate diagnosis and treatment of otitis. In the present study all fifteen cases were examined thoroughly by using an otoscope. The ear canal should be examined for presence of exudate, foreign bodies, masses, ear mites and abnormal conformation. Out of fifteen cases erythema of ear canal depending upon severity was observed in eleven cases. Ulceration was observed in three cases out of that, in two cases ulcerated spot were noted at dorsal aspect of tympanic membrane. In one case ulcerated spot was noticed at the junction of horizontal and vertical ear canal. Severe congestion
least effective against *Staphylococcus* (14.28%). In vitro the result of sensitivity pattern to Gentamicin, Ciprofloxacin and Enrofloxacin were 100 percent and Pefloxacin 87.50 percent, Chloramphenicol 56.25 percent and Neomycin 50 percent (Table 7 and 8).

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at ventral aspect of vertical ear canal extending towards horizontal ear canal was observed in a solitary case (Plate 15). Exudate was observed in thirteen cases which were varied in colour and character. In three cases purulent yellow discharge was observed and bacterial isolation revealed gram negative infections of *Pseudomonas* and *Corynebacterium spp.* Brown exudate was observed in eight cases and bacterial isolates were *Streptococcus* and *Staphylococcus* spp. In one case discharge was black and thick and bacterial isolate was *E.Coli.* Maggoted wound in a vertical ear canal was observed in one case where discharge was purulent yellow mixed with blood and bacterial isolate was *Pseudomonas spp.* (Table 6 and Plate 8A). Inspection of tympanic membrane was not possible at initial stage because of interference of exudate in the ear canal. Tympanic membrane could be visualised after complete resolution of discharge. Tympanic membrane had a pearly gray translucent appearance. These findings were in accordance with the findings of Gotthelf and young (1997), Harvey (1980), Little (1991).

### 4.4.4. Radiological examination

The radiological examination was carried out to confirm the diagnosis of chronic cases and in recurrence of otitis. The dogs were subjected for open mouth projection radiograph. In present investigation, out of fifteen cases, three cases of otitis externa were chronic and recurrence of otitis was reported. The radiographic findings revealed slight increase in radiodensity of middle ear in two cases (Plate 10 and 11) and radiodensity was normal in one case. The changes in
the radiodensity were not appreciable and in other cases they appeared to be normal.

Present findings were confirmed with findings of Little (1991). He found that middle ear disease was manifested by either an increase in the density of the middle ear or as a disruption of the wall of the tympanic bulla. According to Trower (1998) increased opacity and/or thickening of the tympanic bulla were radiographic findings of otitis media. Gotthelf and Young (1997) opined that otitis media initially result in soft tissue density in bullae, and proliferate and destructive change in bone might become apparent with long standing infection. They further reported that otitis media may be prevented even if tympanic bullae appear normal radiographically. A more sensitive imaging technique for detecting otitis media is computerised tomography (CT Scan).

4.5 Treatment

Total fifteen cases of otitis were treated initially with conservative treatment. Out of these fifteen cases, three cases either did not respond to the conservative treatment or a transient response and recurrence after few days was noticed. Hence these three cases were subjected to surgical treatment by Zepp’s modified technique of lateral wall resection (Plate 15).

4.4.2 Conservative treatment

All fifteen cases of otitis presented during study period were treated by conservative treatment which included cleaning of ear and ear canal which was
extremely important as wax and other debris may interfere with physical
examination and prevents the contact of medicines with the affected tissue and
bacteria (Kumar 2002). Topical application and instillation of 1 per cent
mercuromochrome in ear canal with endosuflation tube provided satisfactory results
in twelve cases and results were unsatisfactory in three cases of otitis externa
(Plate 14A). On second day of treatment in twelve cases exudate became thick
and rough epithelium was smoothened (Plate 14B). Antibiotics were given
parenterally as per the antibiogram from fourth day of treatment for five to seven
consecutive days as microbiological results obtained after 36 hrs, ear drops were
advised according to antibiogram for instillation in ear canal. In four cases in
which otitis externa was erythematous, symptoms like headshaking and scratching
resolved on ninth day of treatment (Plate 5B, 6B and 13B). In five cases where
otitis externa was supportive resolution of symptoms occurred on eleventh day of
treatment (Plate 7B and 9B). In five cases where the primary cause of otitis was
parasites inj. Ivermectin @ 200 μg/kg body weight was given which gave
satisfactory results. In three cases ulceration in a vertical and horizontal ear canal
was observed which was cauterised with 1% silver nitrate provided satisfactory
results in only one case (Plate 2B) and results were unsatisfactory in two cases of
otitis. In solitary case result of 1% mercuromochrome was unsatisfactory (Plate 15).

Present investigation revealed that 1% mercuromochrome was effective as an
antimicrobial agent. Those findings co-relate with findings of Carlotti
(1991) observed that topical therapy of antimicrobials particularly
after cleaning was effective in treatment of otitis. Blue et al. (1974), Wooley et al. (1988) used EDTA, TRIS and Sodium dodecyl sulphate for cleaning the ear in otitis externa cases and got satisfactory results in twenty three cases out of twenty eight.

4.5.2. Surgical Treatment

Out of fifteen cases three cases of chronic otitis externa which were not treated by conservative treatment, subjected for surgical intervention by Zepp’s method (Plate 15). Out of three cases reactions like head shaking, rubbing and scratching were seen post-operatively in one dog. Inflammatory swellings were seen around the wound edges by the second post operative day in all cases which persisted for five days. In one case the dog removed the sutures by scratching on ground and with paw, toe resulting in perforation of surgical wound on next day. The delayed wound healing was observed in this case and took fifteen days for complete healing. Preventive measures to avoid scratching and removal of suture were followed. Healing of surgical wound occurred by twelfth day in two cases. The discharge appeared by second day and continued till tenth day. After healing, cosmetic appearance was observed and found that there was no notable change (Plate 16), one case showed partial closure of the new auditus by twelfth day.

Zepp’s technique improved the drainage of the external ear canal. Tympanic membrane could not be visualised before surgery. After Zepp’s modified technique i.e. lateral wall resection tympanic membrane by otoscopic examination was visualised clearly. In two cases ulcerative lesions were observed
over dorsal aspect of tympanic membrane. In one case severe congestion extended in a horizontal canal (Plate 15). Ulcerative lesions cauterized with 1 per cent silver nitrate easily. Antibiotics and ear drops used were of Gentamicin and Ciprofloxacin which showed 100 per cent sensitivity against organisms isolated from otitic exudate (Table 8 and 9). After tenth day discharge and signs of otitis were completely resolved.

Lateral wall resection (Zepp’s technique) was described by the Zepp 1949) and modified by Tufve sson (1955), Coffey (1970), Fraser et al. (1970), Lane (1982). Gregory and Vasseur (1983) noted similar findings as scratching, head shaking, inflammatory swelling and wound dehiscence of surgical wound.
Plate 2A. Case No. 5 Showing swelling keratinization and stenosis of external auditory meatus.

Plate 2B. Case No. 5 Showing resolution of swelling and complete opening of stenosed ear after conservative treatment.
Plate 3. Case No. 10 Showing hyperplasia of integument of external auditory meatus.

Plate 4. Case No. 15 Showing purulent yellow exudates with excoriation at the base. Arrow indicates dog bite wound at medial aspect of pinna.
Plate 5A. Case No. 4 Showing severe erythema purulent brown discharge, scalling of right ear in bilateral case of otitis

Plate 5B. Case No. 4 Showing resolution of signs on 9th day of conservative treatment
Plate 6A. Case No. 4 Showing severe erythema, scaling with brown purulent discharge in left ear in bilateral case of otitis.

Plate 6B. Case No. 4 Showing complete resolution of signs on 9th day of conservative treatment.
Plate 7A. Case No. 8 Showing drooping of affected ear

Plate 7B. Case No. 8 Showing erection of ear on 12th day of conservative treatment
Plate 8A. Case No. 6 Showing maggot infestation followed by dog bite wound with purulent yellow discharge mix with blood

Plate 8B. Case No. 6 Showing excoriation of skin at the base of ear due to migration of maggots
Plate 9A. Case No. 8 Showing maggot wound due to dog bite. Arrow indicates hole in the cartilage formed by maggot.

Plate 9B. Case No. 8 Showing complete resolution of signs and healing of maggot wound on 12th day of conservative treatment.
Plate 10. Case No. 12 Open mouth projection radiograph showing increase in radiodensity of middle ear (Right side)

Plate 11. Case No. 13 Open mouth projection radiograph showing increase in radiodensity of middle ear (Left side)
Plate 13A. Case No. 3 Showing erythema and stenosis of ear canal with swelling

Plate 13B. Case No. 3 Showing complete resolution of opening of stenosed ear on 9th day of conservative treatment
Plate 14A. Case No. 15 Showing painting of ear and instillation of 1% mercurochrome in the ear canal.

Plate 14B. Case No. 15 Showing thickening of discharge on 3rd day after instillation of 1% mercurochrome.
Plate 15. Case No. 14 Showing modified Zepp’s technique. Arrow indicate severe congestion of horizontal ear canal.

Plate 16. Case No. 12 Showing cosmetic appearance of ear 30th day after modified Zepp’s technique.
Plate 15. Case No. 14 Showing modified Zepp’s technique. Arrow indicate severe congestion of horizontal ear canal

Plate 16. Case No. 12 Showing cosmetic appearance of ear 30th day after modified Zepp’s technique
Chapter-V

CONCLUSIONS

The study on fifteen cases of otitis was conducted at veterinary polyclinic, college of veterinary and Animal Sciences, Parbhani. Following conclusions were drawn from the result of the study.

1. The incidence of otitis was higher in canines.

2. Incidence of otitis in erect or pendulous eared, long haired pure breeds of dogs was more than that of mongrel dogs.

3. Unilateral otitis was commonly observed than that of bilateral otitis.

4. Adult dogs between 3 to 6 years age group were more prone to otitis.

5. Incidence of otitis in males was higher than that of females.

6. Predisposing factors humidity, increase in temperature, hairs in the ear canal and any underlying skin disease promotes otitis.

7. Microbial infection was not a direct cause of otitis it was secondary to predisposing and primary causes of otitis.

8. Trauma caused by dog bite and parasite was common primary cause of otitis.

9. Staphylococci, Pseudomonas, Streptococci, Corynebacterium, and E. coli were causative organism isolated and identified successfully from otitic exudate.

10. Head shaking, drooping of affected ear, scratching and oozing of discharge are characteristic clinical signs of otitis.
11. Otoscopic examination was not a satisfactory method in inspection of tympanic membrane during initial stage of otitis.

12. Colour and character of otitic discharge could furnish an idea regarding the organisms invaded in ear canal.

13. Open mouth projection radiograph of affected ear was found important in the diagnosis of otitis media.

14. Topical application of antibacterial agents with proper parenteral administration provided satisfactory results in treating otitis externa.

15. Gentamicin, Enrofloxacin and Ciprofloxacin were choice of antibiotics while treating cases of otitis.

16. Erythematous and suppurative otitis externa could be treated successfully by conservative treatment.

17. Ulcerative otitis externa warrant need cauterization with one per cent silver nitrate, the surgical technique of lateral wall resection helped for cauterization of ulceration.

18. Zepp's modified technique improved the easy drainage and application of medicaments in otitis media.
Chapter-VI

SUMMARY

Fifteen clinical cases of otitis in canine reported at Veterinary Polyclinic College of Veterinary and Animal Sciences, Parbhani were studied. Out of fifteen cases twelve were of otitis externa and three were of otitis media, no case of otitis interna was recorded.

Maximum cases were reported in the months of August and September. The incidence of otitis in domestic animals was 1.50 per cent, in canine 1.18 per cent in bovine 0.23 per cent, in ovine and caprine 0.07 per cent and no incidence was recorded in equine. Incidence of otitis in pure breeds was 73.33 per cent and in mongrel dogs was 26.66 per cent. Dogs having drooping, erect or pendulous eared with long dense hair coat were more prone to otitis. Incidence of otitis between 3 to 6 years of age was 53.33 per cent and the mean age was 5.5 year. In males, 73.33 per cent and in females 26.67 per cent of incidence was recorded. Unilateral otitis was encountered in 86.66 per cent of cases and bilateral was in 13.33 per cent of cases.

Etiology of otitis is classified under three sub headings viz. A) Predisposing causes, B) Primary causes, C) Secondary causes.

Predisposing causes included humidity and high temperature leads moisture in the ear canal; hairs in the ear canal promotes otitis; regular bathing leads to accidental entry of water in ear canal further causes swelling, stenosis and
keratinization promoted otitis observed in one case. Generalized skin lesions as a predisposing cause of otitis observed in five cases such as eczema and alopecia over tail (1 case), over scortum (1 case), maggoted wound at elbow joint (1 case) and itching all over the body (2 cases).

Primary causes included trauma and parasites Trauma such as dog bite (4 cases) and beating by the owner (1 case) observed in five cases. Parasites like mange were identified under microscope in two cases.

Secondary causes included bacteria isolated and identified from 16 ear swabs of fifteen otitis cases. *Staphylococci* Spp. was highest isolated from 43.75 per cent cases. Followed by *Pseudomonas*. Spp. from 25 per cent, *Streptococci* Spp. from 12.5 per cent, *Corynebacterium* from 12.5 per cent and *E. coli* from 6.25 per cent cases.

Otitis externa was clinically characterised by head shaking, aural pruritus, drooping of affected ear, rubbing of affected ear, presence of discharge, alopecia, scalling, crusting, erythema of pinna, swelling at the base of ear, foul smelling and hyperplasia. In case of otitis media pain on palpation at the base of ear in addition to above symptoms was noticed.

Diagnosis of otitis was made by microbiological examination, otoscopic examination and in addition radiological examination in chronic cases suspected for otitis media. Microbiological examination included isolation and identification of organisms and antibiogram. Sixteen ear swabs were cultured from fifteen otitis cases. Out of sixteen ear swabs maximum *staphylococci* Spp.
isolated from seven followed by *Pseudomonas* Spp. from four, *Streptococci* and *Corynebacterium* from two each and *E.coli* from one case. Antibiogram revealed 100 per cent sensitivity to Gentamicin, Ciprofloxacin and Enrofloxacin followed by Pefloxacin showed 87.50 per cent, Chloramphenicol 56.25 per cent and Neomycin 50 per cent.

Otoscopic examination was essential for accurate diagnosis and treatment of otitis. It revealed erythema, ulcerations and exudate in the ear canal. Tympanic membrane was not observed in cases of otitis due to interference of exudate. It was visualized after complete resolution of discharge having pearly gray translucent appearance. Discharge in the ear canal compared with bacterial isolation. Purulent yellow discharge revealed from gram negative *Pseudomonas* and *Corynebacterium* spp., brown discharge revealed from *Staphylococcus* and *Streptococcus* spp. and black discharge revealed from *E.coli* organisms.

Radiological examination was found important in the diagnosis of otitis media. Open mouth projection radiograph of affected ear in chronic cases suspected for otitis media revealed increased radio density of middle ear. The changes in the radio density were appreciable in two cases, however in one case it appeared to be normal.

Total fifteen cases of otitis were treated by using conservative treatment and chronic cases of otitis stub born to conservative treatment were subjected for surgery by Zepp's modified technique (Lateral wall resection). Conservative treatment included cleaning of ear canal with 2 per cent hydrogen
peroxide, topical application of 1 per cent mercurochrome, instillation of 1 per cent mercurochrome in the ear canal and parenteral administration of antibiotics for 5-7 consecutive days and instillation of ear drops of same antibiotics in ear canal were carried out. It revealed satisfactory results in twelve cases where as results were found unsatisfactory in three cases of otitis (out of fifteen cases). Parasitic infestation was identified as a primary cause in five cases out of these twelve cases, Inj. Ivermectin @ 200 μg/kg Body weight subcutaneously was given in five cases. Ulceration in the ear canal were cauterized by instillation of 1 per cent silver nitrate. It gave satisfactory results in one case and results were unsatisfactory in two cases.

Surgical treatment included improvement of drainage by Zepp’s modified technique (Lateral wall resection). Out of three cases surgical complications were observed in 1 case such as wound dehiscence and removal of sutures by scratching. After lateral wall resection it was easier to inspect the tympanic membrane and application of medicaments. Ulcerative lesions were observed in two cases, which were cauterized by 1 per cent silver nitrate. In one case where severe congestion extending towards horizontal ear canal treated by parenteral administration of antibiotics and topical instillation of ear drops according to antibiogram. Symptoms and ulcerative lesions were resolved within ten days and sutures were removed after twelfth day of operation in two cases. In one case fifteen days were required for healing of surgical wound where wound dehiscence and removal of sutures by scratching was noted.
peroxide, topical application of 1 per cent mercurochrome, instillation of 1 per cent mercurochrome in the ear canal and parenteral administration of antibiotics for 5-7 consecutive days and instillation of ear drops of same antibiotics in ear canal were carried out. It revealed satisfactory results in twelve cases where as results were found unsatisfactory in three cases of otitis (out of fifteen cases). Parasitic infestation was identified as a primary cause in five cases out of these twelve cases, Inj. Ivermectin @ 200 µg/kg Body weight subcutaneously was given in five cases Ulceration in the ear canal were cauterized by instillation of 1 per cent silver nitrate. It gave satisfactory results in one case and results were unsatisfactory in two cases.

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Being a painful procedure diagnosis and treatment of otitis required general anaesthesia. Dogs were sedated with inj. Xylazine 0.5 mg/kg i/v. followed by general anaesthesia with inj. Propofol @ 3mg/kg Body weight i/v. as a bolus dose. During surgical procedure, maintenance of anaesthesia was done with propofol at the dose rate of 0.4 mg/kg/min. The anesthesia was satisfactory for conducting diagnostic procedure and surgical intervention.
LITERATURE CITED


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