

CONTENTS

PREFACE	i
LIST OF CONTRIBUTORS	ii
CHAPTER 1 INTRODUCTION	1
<i>Apoorva Mishra, Randhir Singh, Babita Das and Shobha Jawre</i>	
INTRODUCTION	1
ANATOMY OF A DOG'S EAR	2
Outer Ear (Pinna)	2
Middle Ear	2
Inner Ear	2
COMMON EAR DISEASES IN DOGS	3
Otitis Externa	4
Otitis Media	4
Otitis Interna	4
Aural/ Ear Hematomas	4
Ear Tumors	5
CAUSES OF EAR DISEASES	5
Primary Factors	6
Predisposing Factors	6
Perpetuating Factors	6
DIAGNOSIS OF EAR DISEASES	6
Physical Examination	7
Common Symptoms of Dog Ear Infections	8
<i>Ear Cytology</i>	9
<i>Ear Culture and Sensitivity</i>	9
<i>Imaging</i>	9
<i>Biopsy</i>	10
Treatment of Ear Diseases	10
<i>Medications</i>	10
<i>Cleaning</i>	10
<i>Surgery</i>	10
<i>Lifestyle Adjustments</i>	10
<i>Long-Term Management</i>	10
Preventive Measures for Ear Diseases	10
<i>Regular Cleaning</i>	11
<i>Regular Veterinary Visits</i>	11
<i>Allergen Management</i>	11
<i>Parasite Control</i>	11
<i>Prompt Treatment</i>	11
<i>Gentle Handling</i>	11
CONCLUSION	12
REFERENCES	12
CHAPTER 2 NORMAL STRUCTURE AND FUNCTION OF EARS	14
<i>Jasvinder Singh Sasan, Shalini Suri and Kamal Sarma</i>	
INTRODUCTION	15
EXTERNAL EAR	16
Auricle	16
External Acoustic Meatus	20
Tympanic Membrane	20

MIDDLE EAR	21
Tympanic Cavity (Cavum Tympani)	21
Auditory Ossicles	22
Auditory Tube (Eustachian Tube)	24
INNER EAR	24
Vestibular Labyrinth	26
SACCULE (SACCULUS) AND UTRICLE (UTRICULUS)	27
Semicircular Ducts (Ductus Semicirculares)	27
Cochlear Labyrinth (Pars Auditiva Labyrinthi)	27
Organ of Corti (Organum Spirale)	29
CONCLUDING REMARKS	29
REFERENCES	30
CHAPTER 3 PHYSIOLOGY OF EAR AND HEARING	31
<i>Archana Mahapatra, Satish Kumar Pathak, Prasanta Kumar Koustasa Mishra and Thulasiraman Parkunan</i>	
INTRODUCTION	32
STRUCTURAL COMPONENTS OF THE EAR	32
PHYSIOLOGY OF HEARING	32
Function of the Outer Ear in Hearing	33
Function of the Middle Ear in Hearing	34
Function of the Inner Ear in Hearing	35
Function of Vestibular System in Maintenance of Equilibrium	36
CONCLUSION	37
REFERENCES	37
CHAPTER 4 MICROBIOLOGY OF EAR	40
<i>Anju Nayak, Vandana Gupta, Sanjay Shukla, Ajay Rai and Poonam Shakya</i>	
INTRODUCTION	40
Etiology and Classification of Otitis	41
Bacterial Etiology of Otitis	42
Clinical Signs	42
Relationship between Otitis and Breed of Dogs	43
Relationship between Otitis and Gender of Dogs	44
Fungi and Yeast Etiology of Otitis	44
CONCLUDING REMARKS	44
ACKNOWLEDGEMENTS	44
REFERENCES	44
CHAPTER 5 CYTOLOGY OF EAR IN HEALTH AND DISEASES	46
<i>Sirigireddy Sivajothi, Bhavanam Sudhakara Reddy and Dadireddy Narmada Raghavi</i>	
INTRODUCTION	47
When to Perform the Cytology	48
Indications of Ear Cytology	48
Samples Collection and Processing	49
Results of the Ear Cytology	52
<i>Inflammatory Cells</i>	53
<i>Neutrophils</i>	53
<i>Eosinophils</i>	53
<i>Lymphocytes</i>	54
<i>Mast Cells</i>	54
<i>Parasites</i>	54

<i>Fungi</i>	55
<i>Bacteria</i>	56
CONCLUSION	59
REFERENCES	59
CHAPTER 6 PROCEDURE OF CLEARING OF EXTERNAL EAR CANAL	62
<i>Alok Kumar Chaudhary</i>	
INTRODUCTION	62
UNDERSTANDING THE EXTERNAL EAR ANATOMY	63
Pinna (Auricle)	63
Ear Canals (External Auditory Meatus)	63
<i>Vertical Ear Canal</i>	63
<i>Horizontal Ear Canal</i>	63
Glands	63
Hair	64
Tympanic Membrane (Eardrum)	64
IMPORTANCE OF EAR CLEANING	64
Common Etiology and Predisposing Factors Associated with Ear Discharge in Dogs	64
<i>Bacterial Agents</i>	64
<i>Parasites</i>	64
<i>Dermatophytes</i>	65
<i>Hypersensitivity</i>	65
<i>Endocrine Disorders</i>	65
<i>Foreign Bodies</i>	65
<i>Autoimmune Disorders</i>	65
<i>Glandular Disorders</i>	65
<i>Benign and Malignant Tumors</i>	65
PREDISPOSING FACTORS	65
Anatomy	66
Swimming or Bathing	66
Poor Ear Cleaning	66
Previous Ear Infections	66
Excessive Hair in Ear Canals	66
Poor Air Circulation	66
Immunosuppression	66
Behavioral Factors	66
Age	67
Poor Diet	67
PATHO-PHYSIOLOGY OF EAR DISCHARGE IN DOGS	67
Overproduction	67
Inadequate Drainage	67
Foreign Bodies	67
Allergic Reactions and Inflammation	68
CLINICAL SYMPTOMS	68
Purulent Discharge	68
Foul Odor	68
Waxy Discharge	69
Bloody Discharge	69
DIAGNOSTIC APPROACH	69
External Ear Canal Cytology	69
Diagnostic Imaging of Ear Canal	69

<i>Otoscopy</i>	69
<i>Computed tomography (CT)</i>	69
<i>Magnetic resonance imaging (MRI)</i>	69
<i>Radiograph</i>	70
DIFFERENTIAL DIAGNOSIS	70
BASIC PRINCIPLE OF EXTERNAL EAR CLEANING	70
Restraint and Handling	70
Observation	71
Cleaning	71
<i>Manual Cleaning of Ear Canal</i>	71
<i>Cleaning of Ear Canal by Using Digital Otoscopy</i>	72
<i>Cleaning of Ear Canal by Suction Pump</i>	72
<i>Cleaning of Ear Canal by Using Solution or Agents</i>	73
DEEP EAR CLEANING	74
PREVENTION	75
CONCLUSION	75
REFERENCES	76
CHAPTER 7 AURAL HAEMATOMA AND ITS CLINICAL MANAGEMENT	77
<i>Ram Niwas, Dinesh I and Sandeep Kumar</i>	
INTRODUCTION	77
SURGICAL ANATOMY	77
ETIOLOGY	78
BREED PREDISPOSITION AND OTHER RELATED FACTORS	79
CLINICAL SIGNS AND DIAGNOSIS	79
ANESTHETIC CONSIDERATION	80
TREATMENT PROTOCOLS	80
Non-surgical Procedure	80
Surgical Procedure	81
COMPLICATIONS	85
CONCLUSION	86
REFERENCES	86
CHAPTER 8 TRAUMATIC INJURIES AND ITS CLINICAL MANAGEMENT	88
<i>Apoorva Mishra, Apra Shahi, Randhir Singh and Diva Dhingra</i>	
INTRODUCTION	88
Aural Hematoma	89
Ear Laceration	90
Foreign Body	91
Otitis	91
Frostbite	93
Broken Ear Cartilage	94
Tympanic Membrane Rupture	95
Injury to Ear Tip	95
Auricular Avulsion Injuries	95
Fly Bites and Maggot Wounds	97
Separation of traumatic and annular cartilage	98
Ear Burn	99
Dog Bites	100
Ear Cropping or Ear Trimming or Cosmetic Otoplasty	100
Insect Bites	101
Tympanic Bullae Fractures	102

Vehicular Accidents	103
Facial Pruritus	103
Exposure to Allergens	104
CONCLUSION	105
REFERENCES	105
CHAPTER 9 DISEASES OF PINNA AND ITS CLINICAL MANAGEMENT	109
<i>Jigar Raval, Pranav Anjaria, Santanu Pal and Tanmoy Rana</i>	
INTRODUCTION	110
IMPORTANCE OF UNDERSTANDING PINNA DISEASES	111
ANATOMY AND FUNCTION OF THE PINNA IN DOGS	113
COMMON INFECTIOUS DISEASES OF THE PINNA	115
Bacterial Infections	115
Fungal Infections	116
Parasitic Infections	116
Viral Infections	116
ALLERGIC AND IMMUNOLOGIC DISORDERS OF THE PINNA	117
TRAUMATIC INJURIES TO THE PINNA	119
NEUROLOGICAL DISORDERS AND SENSORY DYSFUNCTION OF THE PINNA	119
BREED-SPECIFIC AND AGE-RELATED PINNA DISEASES	121
Breed-Specific Pinna Diseases	121
Age-Related Pinna Diseases	121
DIAGNOSTIC TECHNIQUES FOR PINNA DISEASES	121
Clinical Examination	122
History Taking	122
Cytology and Culture	122
Biopsy and Histopathology	122
Imaging	122
Allergy Testing	123
Endoscopy	123
Diagnostic Imaging (MRI/CT)	123
TREATMENT APPROACHES FOR PINNA DISEASES	123
PREVENTION AND PROGNOSIS OF PINNA DISEASES	124
CONCLUSION	125
REFERENCES	125
CHAPTER 10 FOOD ALLERGY AND OTITIC PRURITUS	127
<i>Abhishek Kalundia</i>	
INTRODUCTION	127
CANINE ADVERSE FOOD REACTIONS - BRIEF	128
CANINE FOOD ALLERGIC OTITIS - BRIEF	129
DIAGNOSIS OF FOOD ALLERGIC OTITIS	130
TREATMENT	132
PROGNOSIS	135
PREVENTION	135
CONCLUSION	135
REFERENCES	136
CHAPTER 11 CERUMINOUS OTITIS AND ITS CLINICAL MANAGEMENT	140
<i>S.K. Maiti, Shraddha Sinha and Varun Kumar Sarkar</i>	
INTRODUCTION	140
ETIOLOGY	141

Principal Elements	141
Contributing Variables	142
Perpetuating Factors	142
DIAGNOSIS	142
TREATMENT	145
PREVENTION	147
CONCLUSION	147
REFERENCES	147
CHAPTER 12 CERUMINOLITHS AND ITS CLINICAL MANAGEMENT	149
<i>S.K. Maiti, Varun Kumar Sarkar and Shraddha Sinha</i>	
INTRODUCTION	149
Normal Anatomy of Ear Canal in Dog and Cat	149
<i>Epithelial Migration</i>	150
CERUMINOLITHS	151
Causes of Ceruminolith	152
<i>Overproduction</i>	152
<i>Obstruction</i>	152
<i>Failure of Epithelial Migration</i>	152
Diagnosis	152
<i>Otic Exam</i>	152
<i>Sample for Mites</i>	152
<i>Otic Cytology</i>	153
<i>Video Otoscopy</i>	153
<i>Diagnostic Imaging</i>	153
Management	153
CONCLUDING REMARKS	156
REFERENCES	157
CHAPTER 13 RUPTURED EAR DRUMS AND ITS CLINICAL MANAGEMENT	160
<i>Amitava Roy and Tanmoy Rana</i>	
INTRODUCTION	160
HOW TO SPOT A RUPTURED EARDRUM IN THE DOG?	161
WHAT IS EARDRUM RUPTURE?	161
Symptoms of Eardrum Rupture in Dogs	161
<i>Pain</i>	161
<i>Discharge</i>	162
<i>Neurological Signs</i>	162
<i>Hearing Loss</i>	162
<i>Visible Symptoms</i>	162
Common Signs of a Ruptured Eardrum in Dogs	163
<i>Pain</i>	163
<i>Otosclerosis of the ear canal</i>	163
<i>Odour</i>	163
<i>Hearing loss</i>	163
<i>Ear discharge</i>	163
<i>Nystagmus</i>	163
<i>Stumbling</i>	163
<i>Head tilt</i>	163
<i>Drooping face</i>	164
Causes of Eardrum Rupture in Dogs	164
What to Know About the Eardrum	164

<i>Ear Infections</i>	164
<i>Loud Noises</i>	165
<i>Trauma</i>	165
<i>Polyps or Masses</i>	165
<i>Drastic Changes in Atmospheric Pressure</i>	165
<i>Foreign Object in the Ear</i>	165
Diagnosis of Eardrum Rupture in Dogs	165
Techniques to Assess the Eardrum	166
<i>Use of a Catheter</i>	166
<i>Tympanometry</i>	166
<i>Fluorescein Solution or Diluted Povidone-iodine Solution</i>	166
<i>Video Otoscope</i>	166
<i>Positive Contrast Canalography</i>	166
Treatment of Eardrum Rupture in Dogs	166
Recovering from a Ruptured Ear Drum	167
How to Stop the Eardrum in R Dog from Rupturing	168
CONCLUSION	168
REFERENCES	169
CHAPTER 14 OTITIS EXTERNA AND ITS CLINICAL MANAGEMENT	170
<i>G. Saritha</i>	
INTRODUCTION	170
OTITIS EXTERNA	171
Epidemiology	171
Etiology and Pathogenesis	172
Primary Causes	172
Secondary Causes	174
Potential Risk Factors	176
Perpetuating Factors	176
<i>Otitis Media</i>	176
<i>Pyrexia and Systemic Diseases</i>	177
<i>Obstructive Ear Diseases</i>	177
PROGRESSIVE PATHOLOGICAL CHANGES IN EAR CANAL	177
Essential Diagnostic Procedures	178
<i>History</i>	178
<i>Symptomatology</i>	178
<i>Examination for Mites</i>	178
<i>Cytological Examination</i>	179
<i>Otic Inspection</i>	179
<i>Otoscopy</i>	179
<i>Visual Inspection</i>	180
<i>Orthotic Cytology</i>	180
<i>Culture and Sensitivity of Bacteria</i>	181
<i>Imaging Techniques for Diagnostics</i>	182
<i>Treatment</i>	183
<i>Education of the Clients and Follow-Up Visits</i>	187
<i>Home Care for Ear Maintenance and Prevention</i>	188
<i>Surgical Management</i>	188
CONCLUDING REMARKS	188
REFERENCES	188
CHAPTER 15 OTITIS MEDIA AND ITS CLINICAL MANAGEMENT	190

Nidhi S. Choudhary, H. K. Mehta, V. Agrawal, Sumit Gautam and Rakesh Dangi

INTRODUCTION	191
ETIOLOGY	191
PATHOPHYSIOLOGY	193
CLINICAL SIGNS	194
DIAGNOSIS	196
History	196
Physical Examination	196
Otoscope Examination	196
Video-otoscopy	197
Cytology and Bacterial Culture and Susceptibility Testing (C/S)	198
Radiograph	198
Computed Tomography Scan	199
Biopsy	200
TREATMENT	200
Accessing the Middle Ear	201
Flushing and Suctioning the Bulla	201
Myringotomy	202
Bulla Infusion	202
TOPICAL TREATMENT	202
Topical Antibiotics	202
Other Topical Antimicrobials	203
Antifungal Agents	204
Topical Glucocorticoids	204
Topical Acaricides	204
SYSTEMIC TREATMENT	204
Systemic Antibiotic	204
Antimycotics	205
Glucocorticoids	205
CONCLUSION	205
REFERENCES	206

CHAPTER 16 OTITIS INTERNA AND ITS CLINICAL MANAGEMENT 207

Bhavanam Sudhakara Reddy, Kambala Swetha and Sirigireddy Sivajothi

INTRODUCTION	207
OTITIS INTERNA	208
Etiology and Pathological Changes	209
Clinical Signs	210
Diagnosis	211
History	211
Otic Examination	211
Physical Examination	213
Otic cytology	213
Bacterial Culture and Sensitivity	213
Diagnostic Imaging Techniques	215
Deep Ear Flushing	215
Treatment	217
Surgical Management	217
Lateral Ear Canal Resection	217
Total Ear Canal Ablation with Lateral Bulla Osteotomy (TECA/LBO)	218
Vertical Ear Canal Ablation (VECA)	219

<i>Laser Surgery Options</i>	220
PROGNOSIS	221
CONCLUSION	221
REFERENCES	222
CHAPTER 17 PARADIGM OF EAR CANAL ABLATION (ECA) AND CLINICAL RESULTS OF BULLA OSTEOTOMY	225
<i>K. Manoj Kumar, D. Sai Bhavani and B. Prakash Kumar</i>	
INTRODUCTION	225
PREOPERATIVE CONSIDERATIONS	227
Owner Education	227
Physical Examination	227
Otoscope Examination	227
Imaging Evaluation	227
Preoperative Antibiotic and Analgesia Regimens	228
Patient Preparation	228
Patient Positioning	228
Anesthetic Considerations	229
Surgical Equipment and Suture Materials	229
TOTAL EAR CANAL ABLATION (TECA)	230
Surgical Procedure	230
<i>Sub Total Ear Canal Ablation</i>	231
Surgical Procedure	233
<i>Modified Total Ear Canal Ablation in Cats</i>	233
BULLA OSTEOTOMY	234
Lateral Bulla Osteotomy (LBO)	236
<i>Surgical Procedure</i>	236
Ventral Bulla Osteotomy	237
<i>Surgical Procedure</i>	238
Subtotal Bulla Osteotomy	238
<i>Surgical Approach</i>	239
POSTOPERATIVE CARE AND ASSESSMENT IN EAR CANAL RESECTION OR ABLATION	240
COMPLICATIONS	241
Nerve Damage and Horner Syndrome	241
Facial Nerve Damage	242
Hemorrhage	243
Wound Dehiscence	243
Auditory Function	243
CONCLUSION	243
REFERENCES	244
CHAPTER 18 NEUROLOGICAL DISTURBANCES	247
<i>Chinmoy Maji, Kruti Debnath Mondal and Arkaprabha Shee</i>	
INTRODUCTION	247
NEURO ANATOMY AND NEUROLOGICAL PATHWAYS RELATED TO EAR DISEASES	248
DEVELOPMENT OF NEUROLOGICAL DISTURBANCES	252
THE MICROBIAL ENVIRONMENT OF THE EAR CANAL IN RELATION TO HEALTH AND DISEASE	252
VESTIBULAR DISEASE	253
RISK FACTORS	254

Breed	254
Age	254
Body Weight	255
Sex	255
CLINICAL SIGNS	255
Peripheral Vestibular Disease	255
Difference of Clinical Signs between Peripheral Vestibular Disease vs. Central Vestibular Disease	257
Causes of Peripheral Vestibular Dysfunction	258
<i>Otitis Interna or Media</i>	258
<i>Neoplasia</i>	259
<i>Nasopharyngeal polyps and aural/otic polyps</i>	259
<i>Ototoxicity</i>	259
<i>Hypothyroidism</i>	259
<i>Congenital Vestibular Disease</i>	259
<i>Idiopathic Vestibular Disease</i>	260
DIAGNOSIS	260
Otoscopy	260
Endoscopy	260
Myringotomy	261
Radiography	261
Canalography	261
CT	261
Ultrasonography	262
MRI	262
TREATMENT AND MANAGEMENT	263
Meningitis	263
HORNER'S SYNDROME	264
HEMIFACIAL SPASM	265
FACIAL NERVE PARESIS OR PARALYSIS-	266
Deafness	268
DRUG INTERACTION RELATED TO EAR DISEASES	269
CONCLUSION	270
REFERENCES	270
CHAPTER 19 OTOTOXICITY AND ITS CLINICAL MANAGEMENT	272
<i>J. Jyothi, M. Bhavya Sree and T. Jayanth Sai Kumar Reddy</i>	
INTRODUCTION	272
INNER EAR PATHOLOGY	274
Incidence	275
PREVENTION OF OTOTOXICITY	276
CONCLUDING REMARKS	277
REFERENCES	277
CHAPTER 20 PARA-AURAL ABSCESS AND ITS MANAGEMENT	278
<i>Urfeya Mirza, Ufase Bin Farooq, Habbu Aishwarya Sunder and Priyanka Pandey</i>	
INTRODUCTION	278
MANAGEMENT	280
Total Ear Canal Ablation (TECA)	280
<i>Surgical Technique</i>	281
Lateral Bulla Osteotomy	283
<i>Surgical Technique</i>	283

VENTRAL BULLA OSTEOTOMY	284
Surgical Technique	284
PERIOPERATIVE MANAGEMENT	286
Peri- And Postoperative Analgesia	286
<i>Principles of Effective Pain Management</i>	287
Peri- And Postoperative Antibacterial Therapy	290
<i>Antimicrobial Prophylaxis</i>	291
<i>Postoperative Antibiotic Treatment</i>	292
Postoperative Nutritional Management After Surgery	292
Postoperative Dressings And Wound Management	294
CONCLUDING REMARKS	295
REFERENCES	295
CHAPTER 21 ANALGESIA AND PAIN MANAGEMENT	302
<i>Sanjiv Kumar, Rajesh Kumar and Ritesh Patel</i>	
INTRODUCTION	302
TYPES OF PAIN	303
THE NEGATIVE EFFECTS OF PAIN	304
PHYSIOLOGY OF PAIN	305
Pathway of Pain	305
Etiology of Otitis	305
Symptoms	307
PAIN MANAGEMENT	307
PHARMACOLOGICAL AGENTS FOR CONTROL OF PAIN	309
Corticosteroids	311
Adjunctive Drugs	311
CONCLUDING REMARKS	312
REFERENCES	312
CHAPTER 22 DIAGNOSTIC PERSPECTIVES	314
<i>Deepak Kumar and Savita Kumari</i>	
INTRODUCTION	314
Parasites	315
Micro-organisms	316
Hypersensitivity (Allergies)	316
Seborrhea	316
Hormonal Disorders	316
Nasopharyngeal Polyp	317
Auto Immune Diseases	317
Uncommon Causes	317
Otitis Externa	317
Otitis Media (Middle Ear Infection)	318
DIAGNOSIS	318
CONCLUSION	319
REFERENCES	319
CHAPTER 23 LASER SURGERY: A PRACTICAL GUIDE	321
<i>Falguni Mridha</i>	
INTRODUCTION	321
Laser Surgery to Treat Canine Aural Haematoma	324
Laser Surgery to Treat Feline Aural Haematoma	326
Laser surgery for lateral ear canal resection	327

Laser Surgery to Treat Aural Granuloma	328
Laser Surgery for Ablation of Skin Mass Over Ear	329
<i>CO2 Lasers</i>	329
<i>Recent Advances in Laser Aural Surgery</i>	330
CONCLUDING REMARKS	331
REFERENCES	331
CHAPTER 24 PREVENTION AND CONTROL STRATEGY	334
<i>Bhavanam Sudhakara Reddy, Sirigireddy Sivajothi and Kambala Swetha</i>	
INTRODUCTION	335
Identification of Primary/Predisposing Factors	336
Systemic Therapy	337
<i>Antibiotic Therapy</i>	337
<i>Antifungal Therapy</i>	337
<i>Anti-inflammatory Therapy</i>	337
<i>Topical Therapy</i>	339
Management of Ectoparasites	342
Swimmers Ear	344
Management of Malassezia Infection	344
MANAGEMENT OF NEOPLASIA	345
EAR HEALTH SUPPLEMENTATIONS	345
Polyunsaturated Fatty Acids	346
Probiotics	346
Vitamins and Minerals	347
MANAGEMENT OF ALLERGIC CONDITIONS	347
Changes in the Diet	347
Flea Allergies	347
Inhalant Allergies	347
Allergic Dermatitis	347
Bathing	348
Medications	348
REMOVAL OF FOREIGN BODIES	348
EARLY INTERVENTION OF HORMONAL DISORDERS	349
Cushing's Disease (Hyperadrenocorticism)	349
Hypothyroidism	349
CARE OF FLOPPY EARS BREEDS	349
CONCLUSION	350
REFERENCES	350
SUBJECT INDEX	355