Illustrated Guide to Equine Diseases

Sameeh M. Abutarbush
BVSc, MVetSc, Diplomate ABVP, Diplomate ACVIM
Assistant Professor, Large Animal Internal Medicine
Department of Veterinary Clinical Sciences
Faculty of Veterinary Medicine
Jordan University of Science and Technology
Irbid, Jordan
To my father Mohammad who passed away after a long battle with cancer while I was writing this book. He was a man of principles and had a strong belief in science and pursuing higher degrees. He nurtured my ambitions, supported my aspirations, and had a strong belief in me. This book is also dedicated to my dearest mother Fatima, my beloved brothers and sisters, Nidal, Reem, Khalid, Mai, Omar, and Mahmoud, and to my loving wife Marah. They are outstanding people who have worked hard, made sacrifices, guided me, and lent their unending support to allow me the opportunity to pursue the career of my dreams. Their patience and support throughout my personal and professional life is immeasurable. Professor Otto M. Radostits had a great influence on my life and career. He was my mentor during my internship and residency at The Western College of Veterinary Medicine, University of Saskatchewan. He guided me through my higher education and ongoing professional training. I hope that this book meets your expectations.
You will make more mistakes not looking than not knowing.

Professor Otto M. Radostits
Contents

Preface ix
Contributors xi

Chapter 1 Diseases of the Gastrointestinal Tract and Liver 3
Author: Sameeh M. Abutarbush
Contributors: Mary S. Delory, Montague N. Saulez, Ben Buchanan, Janice E. Sojka

Chapter 2 Diseases of the Cardiovascular System 119
Author: JoAnn Slack
Contributors: Sameeh M. Abutarbush, Susan J. Ashburner, Janice E. Sojka

Chapter 3 Diseases of the Respiratory System 175
Author: Laurent L. Couëtil
Contributors: Sameeh M. Abutarbush, Montague N. Saulez, Ben Buchanan

Chapter 4 Diseases of the Nervous System 211
Author: Sameeh M. Abutarbush
Contributors: Montague N. Saulez, Wendy Marlene Duckett

Chapter 5 Diseases of the Integumentary System 255
Authors: Susan J. Ashburner, James L. Carmalt, Wendy Marlene Duckett
Contributors: Sameeh M. Abutarbush, Montague N. Saulez, Janice E. Sojka

Chapter 6 Diseases of the Muscles 343
Author: Sameeh M. Abutarbush
Contributor: Ben Buchanan

Chapter 7 Diseases of the Bones, Joints, and Connective Tissues 353
Author: Patricia L. Rose
Contents

Chapter 8  Diseases of the Reproductive System  445
Author: Rob Löfstedt

Chapter 9  Diseases of the Endocrine System  507
Author: Janice E. Sojka
Contributors: Sameeh M. Abutarbush, Ben Buchanan

Chapter 10  Diseases of the Eye  529
Author: Bruce Grahn

Chapter 11  Diseases of the Urinary System  559
Author: Sameeh M. Abutarbush
Contributor: Ben Buchanan

Chapter 12  Diseases of the Neonates  579
Author: Jane Elizabeth Axon
Contributors: Patricia L. Rose, Sameeh M. Abutarbush

Index  663
It has been said that “a picture is worth a thousand words.” It is the fundamental idea behind this illustrated guide. One cannot study veterinary medicine and be a good clinician without seeing clinical cases. Knowledge is likely to be retained for a longer period of time when given a contextual basis (i.e., when connected to photographic data). In addition, some diseases are rare and one may not see them more than once in a professional lifetime.

The aim of this illustrated guide is to provide the reader with the clinical picture of a disease or syndrome, presenting signs, diagnostic procedures, and a brief synopsis. There are 12 chapters, 11 of which are based on the different body systems. The twelfth chapter embraces diseases and conditions of the neonate, which are not shared with the adult horse.

Although it is impossible to include all diseases of the horse in one volume, this illustrated guide covers hundreds of internationally recognized diseases and conditions, some of which prevail in specific geographic areas. Moreover, it not only approaches disease from a clinical point of view, but also embraces additional diagnostic modalities, where applicable, such as radiology, nuclear scintigraphy, CAT scan, cytology, histopathology, and postmortem findings. Chapter 7, Diseases of the Bones, Joints, and Connective Tissues, focuses mainly on diagnostic imaging that is available for most of the diseases, since clinical signs alone are of limited value in the diagnosis of the different lesions associated with these structures. Presentation of such options is one of the features of this illustrated guide. Each chapter is followed by a list of readings that are believed to be helpful to the reader.

The illustrated guide is not intended to be heavily texted. It contains over a thousand educational photographs, singular and compound. The photographs used on these pages are highly informative and of excellent quality and resolution.

The contributors to this volume are experts in their disciplines and well-known authors. Their efforts contribute to the high quality of the material presented here. To see, diagnose, and treat a condition is one thing; to document a condition photographically is entirely another.

This book is intended to be helpful to veterinary medicine students, technicians, clinicians, and specialists, as well as horse lovers.
Finally, I would like to pass on the advice that I have taken from my phenomenal mentor, Professor Otto M. Radostits, who advised me to have a camera handy and carry it around whenever I practice veterinary medicine. I never knew how valuable that advice was until I began work on this project.

Sameeh M. Abutarbush
Contributors

Sameeh M. Abutarbush, BVSc, MVetSc, Diplomate ABVP, Diplomate ACVIM; Assistant Professor, Large Animal Internal Medicine; Department of Veterinary Clinical Sciences, Faculty of Veterinary Medicine, Jordan University of Science and Technology, Irbid, Jordan

Susan J. Ashburner, DVM; Clinical Associate, File Service; Department of Large Animal Clinical Sciences, Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, SK, Canada

Jane Elizabeth Axon, BVSc (hons), Diplomate ACVIM; Director, Scone Veterinary Hospital, Clovelly Intensive Care Unit, Scone, NSW, Australia

Ben Buchanan, DVM, Diplomate ACVIM, Diplomate ACVECC; Clinician, Intensive Care, Internal Medicine; Brazos Valley Equine Hospital, Navasota, TX, USA

James L. Carmalt, MA, VetMB, MVetSc, MRCVS, Diplomate ABVP, Diplomate ACVS; Associate Professor, Large Animal Surgery, Department of Large Animal Clinical Sciences, Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, SK, Canada

Laurent L. Couëtil, DVM, PhD, Diplomate ACVIM; Professor, Department of Veterinary Clinical Sciences, School of Veterinary Medicine, Purdue University, West Lafayette, IN, USA

Mary S. Delory, DVM; President, Northwest Equine Dentistry, Inc., Kettle Falls, WA, USA

Wendy Marlene Duckett, DVM, MSc, Diplomate ACVIM; Associate Professor, Department of Health Management, Atlantic Veterinary College, University of Prince Edward Island, Charlottetown, PEI, Canada

Bruce Grahn, DVM, Diplomate ACVO, Diplomate ABVP; Professor, Department of Small Animal Clinical Sciences, Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, SK, Canada

Rob Löfstedt, BVSc, MSc, Diplomate ACT; Professor, Theriogenology; Department of Health Management, Atlantic Veterinary College, University of Prince Edward Island, Charlottetown, PEI, Canada

Patricia L. Rose, DVM, MS, Diplomate ACVS, Diplomate ACVR; Assistant Professor, Department of Companion Animals, Atlantic Veterinary College, University of Prince Edward Island, Charlottetown, PEI, Canada
Contributors

Montague N. Saulez, MS, PhD, BVSc, Diplomate ACVIM; Section Head, Equine; Onderstepoort Veterinary Hospital, Faculty of Veterinary Science, University of Pretoria, Onderstepoort, South Africa

JoAnn Slack, DVM, MS, Diplomate ACVIM; Assistant Professor, Large Animal Cardiology & Ultrasound, Department of Sports Medicine and Imaging, School of Veterinary Medicine, University of Pennsylvania, Philadelphia, PA, USA

Janice E. Sojka, VMD, MS, Diplomate ACVIM; Associate Professor, Department of Veterinary Clinical Sciences, Purdue University; West Lafayette, IN, USA
Illustrated Guide to Equine Diseases
Diseases of Teeth
  Wave Malocclusion
  Rostral Hook
  Caudal Hooks or Ramps
  Stepped Tooth
  Step Mouth
  Hooks or Ramps
  Shear Mouth
  Overlong Distal Portion of the Third Incisor
  Diagonal Incisor Malocclusion
  Incisor Curvature
  Irregular Incisor Malocclusion
  Supernumerary Incisor
  Overbite (Parrot Mouth)
  Underbite (Sow or Monkey Mouth)
  Periodontal Disease, Diastema, and Enamel and Cemental Decay
  Geriatric Wear
  Teeth Eruption and Retained Deciduous Teeth “Cap”
  Wolf Teeth
  Deviation of the Maxilla
  Asynchronous Teeth Eruption
  Fractured Tooth
  Lingual and Buccal Laceration and Bit Pressure (Injury)
  Gingival and Lingual Ulceration of Systemic Origin
  Supernumerary Canine Tooth
  Polydontia
  Dysplastic Teeth
  Abnormal Tooth Wear

Diseases of the Mouth
  Squamous Cell Carcinoma
  Oral Foreign Body
  Glossitis

Diseases of the Esophagus
  Esophageal Obstruction (Choke), Primary
  Esophageal Obstruction (Choke), Secondary

Diseases of the Abdominal Region
  Abdominal Pain (Colic)
  Diseases of the Stomach
    Gastric Dilatation
    Gastric Impaction
    Gastric Ulcers
  Diseases of the Small Intestine
Simple Obstruction of the Small Intestine
  Ileal Impaction
  Ileal Hypertrophy
  Ascarid Impaction
  Meckel’s Diverticulum
Strangulating Obstruction
  Mesodiverticular Band
  Small Intestinal Volvulus (Mesenteric Torsion)
  Small Intestinal Strangulation Caused by a Pedunculated Lipoma
  Epiploic Foramen Entrapment of the Small Intestines
  Diaphragmatic Hernia
  Incarceration of the Small Intestine Through the Gastroplenic Ligament
  Intussusception
Functional Obstruction of the Small Intestine
  Duodenitis-Proximal Jejunitis (DPJ) (Anterior or Proximal Enteritis)
  Proliferative Enteropathy (Lawsonia Intracellularis)

Diseases of the Large Intestine
  Large Colon Volvulus (LCV)
  Large Colon Displacement (LCD)
    Right Displacement of the (Left) Large Colon (RDLC)
    Left Dorsal Displacement of the Large Colon (LDLC)
  Large Colon Impaction (LCI)
  Large Intestinal Intussusception
  Salmonellosis
  Strongylosis
  Cyathostomiasis
  Nonsteroidal Anti-Inflammatory Drugs (NSAIDs) Toxicity
  Grain (Carbohydrate) Overload
  Small Colon Impaction
  Intralumenal Obstruction of the Small Colon with Enteroliths, Fecaliths, or Foreign Bodies
  Idiopathic Inflammatory Bowel Disease
  Antibiotic Induced Colitis

Miscellaneous
  Abdominal Abscession
  Abdominal Adhesions
  Peritonitis
  Enterocutaneous Fistula and Parietal (Richter’s) Hernia
  Omental Hernia
  Grass Sickness (Equine Dysautonomia)

Hyperlipemia and Hyperlipidemia
**DISEASES OF TEETH**

**Figure 1.1** Illustration for the Triadan numbering system for equine dentition. The permanent dentition is described by 1–400s while the deciduous dentition is described by the 5–800s.

**Figure 1.2a** Wave malocclusion involving the 200 and 300 arcades in a middle-aged patient. The 206 is overlong. The 207 and 208 exhibit progressively shorter clinical crown to the 208/9 junction. Note that the gingival margin is displaced dorsally at this point and dips ventrally again at the 209/10 junction where the 210 is overlong. This involvement of the gingival margin is an indicator of chronicity and signals probable bony remodeling. Patient age and amount of clinical crown and gingival margin/bony changes collectively determine the amount of correction possible at a single session. Some wave malocclusions cannot be normalized but are best maintained to minimize progression and deterioration.
Figure 1.3 Mesial portion of 206 is overlong due to malocclusion with 306. Commonly referred to as a “rostral hook,” this abnormality is often seen in class 2 malocclusions commonly known as “parrot mouth.” Early recognition and reduction of the excessive crown is recommended to avoid large or staged reductions.

Rostral Hook

Figure 1.2b Same patient in fig. 1.2a. View of 300 arcade “wave” abnormality. Note that the distal 308 is the tallest point in the 300 arcade and the 309 is not visible at all.
Figure 1.4  Large amount of excessive crown at the mesial portion of 106 in a 10-year-old quarter horse stallion. This abnormality is common in class 2 malocclusions (parrot mouth) although this patient has normal incisor occlusion. Commonly referred to as a “rostral hook,” it is progressive, can traumatize soft tissue, may exacerbate malocclusions elsewhere in the mouth, and may interfere with normal masticatory function. Overlong crown of this magnitude requires staged reductions to avoid pulpar exposure or thermal injury.

Figure 1.5 Overlong crown at distal 311 due to malocclusion with 211. Commonly known as “caudal hooks or ramps,” these abnormalities are progressive, can injure soft tissue, predispose to other malocclusions and periodontal disease, and may interfere with normal masticatory motion. Commonly, though not exclusively, seen in class 2 malocclusions (parrot mouth).
Stepped Tooth

Figure 1.6 Overlong 209 due to missing 309. Commonly referred to as a “stepped tooth.” Regular crown reductions may be necessary to maintain normal rostral/caudal mandibular movement.

Step Mouth

Figure 1.7 Abrupt, severe changes in crown height along an entire arcade pair is commonly known as a “step mouth.” Normal mastication is significantly compromised with such malocclusions. Severe cases require serial crown reductions for safe correction.
Figure 1.8  The 306 and 406 with excessive mesial crown commonly referred to as hooks or ramps. They are caused by malocclusion with the maxillary 6s. They are progressive and can cause soft tissue injury, biting pain, periodontal disease, and abnormal mastication.

Figure 1.9  “Shear mouth” in an 8-year-old quarter horse mare. Note the slightly steeper table angle of the 200 arcade in comparison to the 100 arcade. Gradual reduction of the steep table angle can be helpful. If left unchecked, many cases will worsen to the point of abnormal mastication.
Overlong Distal Portion of the Third Incisor

**Figure 1.10a** Distal portion of 103 is overlong caused by a malocclusion with 403. Such areas of excessive crown are progressive and can cause interference with normal lateral excursion of the mandible and thereby affect functional occlusion of the cheek teeth.

**Figure 1.10b** Rostral view of overlong distal 103. Same horse in fig. 1.10a
Figure 1.11  Diagonal incisor malocclusion (DGL3) in an aged horse. Note the progressively increasing length of clinical crown from the 203 right to the 103 and from the 403 left to the 303. There is also a mandibular offset to the horse’s left. Etiology can be difficult to determine and may be multifactorial. This malocclusion is progressive and early detection and correction are beneficial. Correction in some cases can be harmful. A thorough understanding of equine mastication biomechanics is critical for successful correction and maintenance.

Figure 1.12  Dorsal incisor curvature in a juvenile. Etiology may be asynchronous eruption of the 1s or a cribbing/rubbing habit that is causing selective wear to 101 and 102.
Figure 1.13 Ventral incisor curvature in an aged horse. This malocclusion is usually progressive and can cause abnormal lateral excursion. Overlong incisors should be reduced as necessary to maintain normal lateral excursion and to prevent progression of the malocclusion.

Irregular Incisor Malocclusion

Figure 1.14 Irregular incisor malocclusion in which the occlusal plane undulates in a wave pattern. In this case, probably initiated by the abnormal positions of 101/201. As with any incisor malocclusion, lateral excursion and therefore efficient mastication may be affected.
Figure 1.15  A 14-year-old Peruvian Paso mare with supernumerary and displaced incisors. Feed was collecting between the grossly displaced incisor and the ones lingual to it causing periodontal disease and dental decay. Extraction of the displaced incisor and reduction of other overlong incisor crowns to restore normal lateral excursion was beneficial.

Figure 1.16  A 16-year-old Warmblood/Thoroughbred mare with a class 2 malocclusion (parrot mouth). Minimal occlusal contact occurs at the 3s.
Figure 1.17a  Class 2 malocclusion in a yearling. Commonly referred to as “parrot mouth” or “overbite.” Early detection and removal of resultant overlong clinical crowns can be curative in mild to moderate cases. More severe cases may require orthodontic treatment.

Figure 1.17b  Same horse in 1.17a, rostral view of class 2 malocclusion.
**Underbite (Sow or Monkey Mouth)**

*Figure 1.18*  Class 3 malocclusion (sow mouth or monkey mouth) in a 2 1/2-year-old. Early recognition and treatment to release the promaxilla from behind the mandible may allow for normal growth and resolution. Advanced cases may not be correctable but benefit greatly from regular reduction of overlong crowns and restoration of normal mastication biomechanics.

---

**Periodontal Disease, Diastema, and Enamel and Cemental Decay**

*Figure 1.19a*  A 2-year-old Thoroughbred with feed packed between 506 and 507 and between 806, 807, and 808. This presentation is a strong indicator of periodontal disease and should prompt further examination. The 806 is also overlong due to a missing opposing tooth in the upper right arcade. The overlong crown may be contributing to the feed packing distal to it due to abnormal occlusal forces.
Same horse in fig. 1.19a; large periodontal pocket after cleaning trapped feed from interproximal space. Pockets of this size likely indicate bony involvement and radiography is warranted to assess the severity of the disease.

Figure 1.19b  Same horse in fig. 1.19a; large periodontal pocket after cleaning trapped feed from interproximal space. Pockets of this size likely indicate bony involvement and radiography is warranted to assess the severity of the disease.

Figure 1.19c  Same horse in fig. 1.19a; diastema and periodontal pocket between 506 and 507 after feed material was cleaned out. The grey tissue deep within the pocket is actually a free-floating “foreign body.” Histological examination revealed that it was bone.
Figure 1.20  A 5-year-old paint mare with lingually displaced 308. The mirror is placed between 307 and 308. Feed is trapped at the lingual aspect of that interproximal space causing periodontal disease.

Figure 1.21  A 9-year-old Warmblood mare with lingual periodontal pocket at 410/11. Packed feed is visible in both views: the lingual (mirror) and the buccal aspect view. An overlong distal 411 has already been reduced. Excessive crown at the distal 311 or 411 may predispose to interproximal small diastema formation due to abnormal occlusal forces. Correction of malocclusions is sometimes curative. In other cases, primary treatment of the periodontal disease is also necessary.