

TABLE OF CONTENTS

Techniques in Small Animal Wound Management

List of Contributors xv

Foreword xvii

Preface xix

1 The Skin 1

M.S. Amarendhra Kumar

Cutaneous Immune Barrier 3

Pigmentation 5

The Normal Keratinization Process 11

The Abnormal Keratinization Process 12

Dermis 15

The Hypodermis (Subdermis or Subcutis or Superficial Fascia) 17

Connective Tissue and Fascia 23

Skeletal Muscle 26

Skeletal Muscle Trauma and Regeneration 28

References 30

2 Physiology of Wound Healing and Clinical Considerations 37

Daniel J. Lopez

Stages of Wound Healing 37

Proliferative Stage 41

Inherent Detriments to Wound Healing 46

Conclusion 49

References 49

3 Postoperative Complications 53

Ryan P. Cavanaugh

Introduction 53

Seromas 54

Wound Dehiscence (Indolent Pockets, Pseudo Healing) 57

Biofilms 65

References 68

4 Wound Types and Terminology 73

Desiree D. Rosselli

Classifications of Veterinary Wounds 73

Wound Closure 80

References 82

5 Patient Presentation and Evaluation of Wound 85

Colin Chik

Initial Stabilization of the Wound Patient 85

Acute Critical Wound Patients 85

Stable and/or Chronic Wound Patients 89

Evaluation of Patient Factors 90

Evaluation of Wound Factors 92

Initial Treatment 93

Decision-Making for Primary Closure 95

Debridement 95

Drain and Bandage Placement 98

References 101

6 Cleansing Solutions 103

Julia P. Sumner

Cleansing Solutions 103

Tap Water 106

Isotonic Intravenous Crystalloid Fluid Preparations (e.g., 0.9% Saline, Lactated Ringer's Solution, Hartman's Solution, Plasmalyte, Normosol) 106

Antiseptic Solutions 106

References 109

7 Topicals 111

Nicole J. Buote

Hydrogels 111

Zinc-Oxide Hydrophilic Pastes 113

Honey/Sugar 114

Antimicrobials (Nitrofurazone, Triple Antibiotic, Silver Sulfadiazine) 117

Triple Antibiotic (Neomycin, Polymixin B, and Bacitracin) 118

Silver Sulfasalazine 119

Oxygen 120

Nitrous Oxide 120

Miscellaneous Topicals 121

References 123

8 Wound Dressings 127

Nicole J. Buote

Moist Wound Healing 127

Characterization of Dressings 127

Adherent Dressings – Woven Gauze and Lap Sponges 131

Non-adherent Semiocclusive (Porous-Dry or Petrolatum-Impregnated) 132

Absorbent 133

Moisture Retentive Dressings 135

Antimicrobial 138

Bioelectric Dressings 141

Xenograft Dressings 143

Miscellaneous 149

References 150

9 Drains: How and When to Place Them 155

Angela C. Banz

Passive Drains 155

Closed-Suction/Active Drains 158

References 163

10 Vacuum-Assisted Bandages (Negative Pressure Wound Therapy) 165

Kathryn A. Pitt and Bryden J. Stanley

Physiology 165

Increased Granulation Tissue 165

Reduced Bacterial Load 166

Increased Blood Flow 167

Decreased Hematoma and Seroma Formation 168

Increased Cytokines/Growth Factors 168

Microdeformation with In-Vitro Modeling 168

Indications of NPWT 168

Description of Technique 169

Postoperative Care 173

Outcomes/Complications 173

References 174

11 Biologic Treatments 177

Subsection A: Medicinal Leech Therapy 177

Celine S. Kermanian and Nicole J. Buote

Anatomy and Physiology 177

Indications 179

Description of Technique 181

Postoperative Care 185

Outcomes/Complications 186

References 188

Subsection B: Maggot Therapy 191

Megan Mickelson

Background/Physiology 191

Indications 192

Description of Technique 193

Post-Procedural Care 195

Outcomes/Complications 196

References 200

12 Bandages 205

Kristin A. Coleman and Nicole J. Buote

Introduction 205

Light or Modified Robert Jones Bandage 205

Wet-to-Dry or Dry-to-Dry Bandages 208

Tie-Over Bandages 210

References 214

13 Hyperbaric Oxygen Therapy 215

Cheryl Braswell

Introduction 215

Physiology 215

References 224

14 Low Level Laser, Photobiomodulation and Electromagnetics for Wound Therapy 225

Nicole J. Buote

Low Level Laser Therapy 225

Photobiomodulation 226

Pulsed Electromagnetic Field Therapy 228

References 231

15 Platelet Rich Plasma and Stem Cell Therapy 233

Aarthi Rajesh, Rebecca M. Harman, and Gerlinde R. Van de Walle

Platelet Rich Plasma (PRP) Therapy 233

Stem Cell Therapy 241

Combinational Therapy Using PRP and Stem Cell Therapy 246

References 247

16 Reconstructive Techniques for Wounds 253

Jill K. Luther and Nicole J. Buote

Equipment 253

Basic Tissue Handling Tenants 256

Skin Tension 257

Tension-Relieving Techniques 258

Triangular, Square, Rectangle Wounds 264

Circular and Crescentic Wounds 266

Skin Flaps 267

Specific Axial Pattern Flaps 272

Skin Grafting 281

References 285

17 Specific Wounds 289

Subsection A: Bite Wounds – A Case Study 289

Nicole J. Buote

Presenting Signs 289
Examination and Initial Wound Characteristics 289
Diagnostics 289
Initial Therapy and Procedure 289
Follow-up Bandage Care 290
Surgical Procedure 292
Outcome 292
Prognosis 292
Clinical Lessons 293

Subsection B: Penetrating Wounds 295

Galina Hayes

Clinical Presentation 295
Triage and Imaging 297
Management Plans 298
Prognosis 301
References 301

Subsection C: Abscess Case Study 303

James D. Crowley and Julia P. Sumner

Presenting Signs 303
Outcome 305
Prognosis 305

Subsection D: Burns 309

Galina Hayes

Clinical Presentation 309
Anatomy and Physiology of Burns 309
Comparative Aspects of Burn Physiology 309
Acute Management Plan 310
Bandage Management 312
Split Thickness Grafts 312
Possible Complications 313
Future Directions 313
Prognosis 313

References 314

Subsection E: Wounds Over Joints 315

Galina Hayes

Clinical Presentation 315

Specific Challenges 315

Management Plans 316

Prognosis 317

References 319

Subsection F: Shearing Wounds – Case Study 321

James D. Crowley

Presenting Signs 321

Outcome 323

Prognosis 323

Subsection G: Necrotizing Fasciitis (Necrotizing Soft Tissue Infections) 327

Nathan Peterson

Presenting Signs 327

Wound Characteristics 327

Physiologic Effects 328

Shock/Sepsis 329

Prognosis 332

References 332

Subsection H: Snakebites 335

Nathan Peterson

Presenting Signs 335

Wound Characteristics 335

Physiologic Effects 337

Treatment 339

Possible Complications 340

Prognosis 340

References 342

Subsection I: Pythiosis 343

Kristin A. Coleman

Introduction 343
Presenting Signs 343
Diagnosis 344
Wound Characteristics 344
Physiologic Effects 345
Treatment 345
Possible Complications 349
Prognosis 349
References 349

Subsection J: Eyelid Wounds 351

Brian Marchione

Introduction 351
Presenting Signs 352
Physiologic Effects 354
Treatment 354
Possible Complications 356
Prognosis 359
References 359

Subsection K: Lip Wounds 361

Nicole J. Buote

Introduction 361
Anatomic Considerations 361
Wound Characteristics 362
Surgical Treatments 362
Avulsion Injuries 365
Primary Repair 365
Wedge Resection Techniques 365
Full-Thickness Advancement Flaps Full-Thickness 365
Postoperative Care 367
Complications 369
Prognosis 369

References 369

Subsection L: Pinna Wounds 371

Nicole J. Buote

Anatomic Considerations 371

Wound Characteristics 371

Surgical Treatments 372

Postoperative Care 374

Complications 376

Prognosis 377

References 377

Subsection M: Circumferential Wounds – A Case Study 379

Nicole J. Buote

Introduction 379

Case 1 379

Other Examples of Circumferential Injuries 383

Case 2 383

Case 3 383

Clinical Lessons 384

References 385

Subsection N: Preputial Reconstruction – Hypospadias Case Study 387

Galina Hayes

Presenting Signs 387

Examination and Wound Characteristics 387

Diagnostics 387

Surgical Procedure 387

Outcome 388

Prognosis 388

Clinical Lessons 388

Index 393.