ATLAS OF
Small animal surgery

THORACIC, ABDOMINAL, AND SOFT TISSUE TECHNIQUES

Richard E. Hoffer

SECOND EDITION

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Foreword

It is a pleasure to compose a foreword to Dr. Hoffer's surgical atlas. Dr. Hoffer was associated with Auburn University from 1961 through 1963 in a Master of Science program in surgery. While at Auburn, Dr. Hoffer pioneered in esophageal surgery and modern gaseous anesthetic methods and equipment. His contributions in these areas have been exceptional.

After leaving Auburn University, Dr. Hoffer continued his surgical and educational experiences at the University of Pennsylvania Medical School and the University of Missouri Veterinary College and is currently at New York State Veterinary College at Cornell University in Ithaca, New York. He is a diplomate of the American College of Veterinary Surgeons.

This surgical atlas for small animals has been greatly enhanced by the descriptive accompanying illustrations. Dr. Hoffer's surgically sound methods have been briefly and graphically presented and should be a valuable reference for students and graduate veterinarians. Dr. Hoffer is to be complimented on a most exceptional contribution to veterinary surgical literature.

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Preface TO SECOND EDITION

The *Atlas of Small Animal Surgery* has been republished without the stereoscopic reels with the thought that the book will now be more accessible to both veterinary students and veterinary practitioners.

As is typical of surgical techniques, some of those presented in the first edition have been modified and clarified. Two new procedures, lobectomy and scrotal urethrostomy, which I felt would benefit the student as well as practicing veterinarians, have been added.

The new drawings have been done by George Batik. I wish to remind the readers that the original drawings were taken from three-dimensional photographs provided by Dr. Harlan Jensen.

I am again indebted to my wife, Willie, for her continued help with typing and everything else.

Richard E. Hoffer

Preface TO FIRST EDITION

The *Stereoscopic Atlas of Small Animal Surgery: Thoracic, Abdominal, and Soft Tissue Techniques* has been written to fill the need of veterinarians and veterinary students for a text that details each phase of the surgery. Through photography, artwork, and three-dimensional reels, Dr. Jensen and I hope to clarify the instructions for each surgical step. We feel the clearly shown anatomical relationships in the stereoscopic reels are of special value.

This is not intended to be a composite of all the surgery techniques, and we have not attempted to review or acknowledge the literature on soft tissue surgery. These are not original operations. Many of them have been used for years and are basic, standard procedures, but some of them have been modified to suit our needs. We present a workable and fundamental approach to each surgical problem and expect the individual surgeon to be inspired to modify them to suit his needs.

The methods and techniques are those that have proved successful for us. When more than one technique is described, the reader should select the one most applicable to his problem.

All the original drawings were done by Ronald Cherkas, biological artist and photographer. The stereo photography was done by Dr. Wayne Wingfield and Dr. Jensen with the Donaldson stereo camera.

I feel especially indebted to Dr. B. F. Hoerlein of Auburn University, Dr. L. E. Evans of Oklahoma State University, and Dr. R. L. Leighton of the University of California at Davis for their instruction and inspiration during my professional career. I am also grateful to many other colleagues who have read the manuscript and given constructive criticism prior to its publication.

I am indebted to my wife, Willie, for her help with the typing and to Naomi Jensen for her help in editing the text.

Richard E. Hoffer

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PART ONE

GENERAL CONSIDERATIONS

1
Preoperative and postoperative care

Preoperative and postoperative care may make the difference between success and failure of the surgical procedure.

Preoperative care includes evaluation of the patient's physical and physiological status in relation to the anticipated surgery. It should also include the determination of any additional therapy the patient may need during the surgical procedure and the careful choice of the anesthetic agent.

Postoperative care begins when the incision is closed and continues until the patient is discharged. It includes treatment of any problems resulting from surgical manipulation, maintenance of the water, electrolyte, and nutritional balance by parenteral administration of fluids, and all therapy necessary to restore the patient to a normal physical and physiological status.

Although brief descriptions of some of the principles of preoperative and postoperative considerations are presented, the reader is referred to the references for more abundant information in the various areas.

PREOPERATIVE CARE

All patients should receive a thorough physical examination prior to surgery. The physical examination should include auscultation and palpation. Ideally all patients should be evaluated by clinical pathological data, including a complete blood count (CBC), blood urea nitrogen evaluation (BUN), urinalysis, and heartworm check. If the patient is over 5 years of age, a serum glutamic transaminase evaluation should also be done. These procedures give the surgeon a baseline on which to evaluate the patient's postoperative progress. Many times a good preoperative evaluation will uncover other conditions that may lead to reassessment of the advisability of surgery or that may influence the result of surgery, for example, congenital heart defects, early systemic disease, or heartworms.

Before surgery, patients should have a catheter placed in the cephalic or jugular vein to receive appropriate fluids during the surgical procedure. Fluids to be replaced include those lost during the preoperative fasting period, as well as those lost in the critical patient through vomitimg or diarrhea. Also, if it suddenly becomes necessary to administer blood or drugs

during the surgical procedure, the intravenous catheter will have maintained an opening into the cardiovascular system.

The choice of anesthesia must be considered a part of the preoperative decision. All the procedures described in this atlas are performed with either methoxyflurane and oxygen or halothane and oxygen anesthesia. Generally the anesthesia is induced with a short-acting barbiturate after premedication with atropine. A cuffed endotracheal tube is placed in the trachea, and during the procedure the anesthesia is maintained with the gas mixture.

There are numerous methods of monitoring the blood pressure, heart rate, and urine output. The equipment necessary to do this varies in sophistication and may cost from a few dollars to thousands of dollars. Generally the monitoring of central venous pressure in addition to electrocardiogram (ECG) will give the surgeon much information at a relatively small cost. This type of monitoring is very important.

POSTOPERATIVE CARE

Postoperative care of the patient is one of the most important facets of surgery. This is especially true of the geriatric patient and the patient critically ill prior to surgical intervention.

The most important aspect of postoperative care is close observation of the patient. Standard parameters that should be observed are body temperature, urine output, capillary refill, respiratory rate and character, pulse rate and character, and heart sounds.

ECG monitoring and measurement of central venous pressure will add additional information that is especially important after thoracic surgery. The postoperative administration of fluids can be more closely regulated when central venous pressure is monitored.

The objective of immediate postoperative observation is to anticipate postoperative complications such as shock, pulmonary edema, cardiac arrhythmias, or renal shutdown and to prevent their occurrence. It is easier on the patient to prevent a complication than to administer emergency treatment in an attempt to reverse the complications. The more sophisticated the equipment the surgeon has available, the more parameters that can be monitored. However, even without sophisticated equipment, the percentage of postsurgical survival can be greatly increased by just closely observing the vital signs of the patient. Additional postoperative procedures such as aspiration of chest tubes or peritoneal lavage and dialysis will be dictated by the procedures performed.

The immediate postoperative period ends after the animal has recovered from the anesthetic and the vital signs have stabilized. The rest of the postoperative treatment will depend on the procedure performed, the animal's response to the surgery, and the condition that warranted the surgery.

This period of time is especially important in the geriatric patient. The surgeon should not forget that not only does the surgical problem have to be treated but also the patient has to be maintained in a good physical and physi-

ological state in order to recover and heal. The possible loss of the older patient from such secondary factors as renal failure or congestive heart failure following the stress of surgery and subsequent hospitalization must be anticipated and prevented.

In summary, postoperative care of the patient includes the following:

1. Immediate treatment of postsurgical and anesthetic complications
2. Anticipation, prevention, or treatment of possible postsurgical problems resulting from the stress of surgery, the predisposing disease that required the surgery, or the animal's physiological response during the period of hospitalization

The above can be accomplished with a minimum amount of equipment but requires the time and interest of the surgeon.

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2
Aseptic surgery

The procedures presented in this atlas are performed utilizing standard aseptic surgical principles, which are discussed and well illustrated in many textbooks of surgery. Following is a brief review of the methods of preparation of the patient and surgeon for aseptic surgery.

PATIENT PREPARATION

The hair in the operative area is clipped with a fine surgical blade. It is good practice to clip at least twice the area thought to be necessary for performing the surgical procedure. In this way, if a larger incision is required to recover from a surgical emergency, it can be made without contaminating the surgical field. Preparation of a large area also eliminates the problem of contamination that could result if the surgical drapes should become displaced.

The area is scrubbed at least three times with a germicidal soap, and liberal quantities of water are used to rinse the site. The animal is carefully transported to the operating room, where an antiseptic is applied to the prepared surgical area.

PREPARATION OF THE SURGEON AND ASSISTANTS

Caps, masks, and hoods are donned before the operating room is entered. The linen packs are placed on a table and opened. The instrument pack is placed on a Mayo operating stand and partially opened. The wraps are spread appropriately to minimize contamination from the top of the instrument table.

After the surgeon first scrubs his hands and forearms with a germicidal soap, he cleans his fingernails. The final surgical scrub employs a brush or disposable soap-impregnated sponge. The basic rule to follow is to start with the fingers and fingernails, using twenty strokes of the brush on each surface of the fingers, hands, and forearms and twenty strokes on the fingernails. The hands are rinsed, allowing the water to run off the elbows, and are dried with a sterile towel.

After the surgeon has gowned, he puts on the gloves so that the un-

gloved hand touches only the inside of the glove. The gloves are smoothed over the hands, and the patient is draped.

The surgical site can be draped by a variety of methods. A four-quadrant draping method using 48-inch by 48-inch double-thickness muslin drapes may be used. The drapes are placed on the patient by folding the edge of the drape over the hand to prevent contamination of the gloves. The posterior drape continues up over the Mayo stand. The drapes are fixed to the patient at each corner of the anticipated incision site with towel clamps. Additional towel clamps are used where necessary to prevent sagging or gapping of the drapes. An additional shroud or adhesive plastic drape is frequently used.

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PART TWO

THORAX