SECOND EDITION

ATHLETIC TAPING AND BRACING

DAVID H. PERRIN

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Athletic Taping and Bracing

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To Kip Smith—
Thank you for the opportunity at the
University of Pittsburgh in 1977 and
for your enduring friendship and support.

Preface

Mastering the art and science of athletic taping and bracing requires students of athletic training to develop the psychomotor skills associated with the craft and learn the scientific principles that guide its application. Educators seeking to convey this dual emphasis face the daunting task of teaching students the anatomical architecture of the major joints and muscle groups as well as specific taping and bracing techniques associated with particular injuries.

I wrote *Athletic Taping and Bracing, Second Edition,* as both a guide for instructors and an aid to students. The book includes concise descriptions of anatomy and detailed anatomical illustrations (of the quality usually found in advanced anatomy texts) integrated with discussions of injury mechanisms and nearly 400 photographs depicting the taping and bracing techniques for each major joint and body region. I believe that this approach will not only encourage skill development but also help ensure familiarity with the underlying anatomical landscapes.

Because exercise plays an equally important role in an athlete's safe return to competition, I also include a presentation of the basic stretching and strengthening exercises associated with specific injuries. Although these exercises should not replace other therapeutic methods, they can help the rehabilitated athlete maintain strength and flexibility. The methods I present apply to the athlete who has completed a rehabilitation program and met the criteria for returning to competition. My approach to this material emphasizes that athletic taping and bracing and the associated exercises serve as an adjunct, rather than a panacea, to the athlete's total rehabilitation. By using this multifaceted treatment approach we can minimize an athlete's chance of reinjury. Be advised, however, that rehabilitation and therapeutic exercise are disciplines distinct from the treatments that I discuss in this book.

In chapter 1 I establish athletic taping and bracing (hereafter referred to generally as athletic taping) within the context of the multifaceted practice of athletic training. The chapter stresses the importance of learning anatomy as the foundation to athletic taping and understanding the effect of taping on athletic performance. Students will also learn the necessity of following the rules of the governing sport organizations for the application of tape and braces.

In chapters 2 through 7 I address and illustrate anatomy, injury mechanisms, taping and bracing techniques, and associated stretching and strengthening exercises for each region of the body. Chapter 2 focuses on the foot-ankle-leg complex and, besides presenting several techniques for taping, describes how orthotics can accelerate an injured athlete's return to competition. Chapter 3 overviews the knee and describes the instabilities associated with ligament injury, as well as the role of preventive, rehabilitative, and functional bracing in injury management. Chapter 4 concerns the treatment of hip and thigh injuries, and chapter 5 moves on to the anatomy and injury mechanisms for the shoulder and arm. Chapter 6 presents the techniques available to the clinician when treating the elbow and forearm. Chapter 7 serves a similar purpose for wrist and hand injuries while also presenting the method for splinting tendon ruptures in the fingers.

In this four-color second edition you will find state-of-the-art illustrations of anatomy and injury mechanisms, produced by Primal Pictures, Ltd. The quality of the photography is unsurpassed, and the edges of the tape have been darkened for easier visualization of the taping patterns. Additions in this edition include the technique for making a protective pad from orthoplast, McConnel taping for acromioclavicular joint injury, and several variations to the taping procedures illustrated in the book. Key palpation landmarks have also been identified and illustrated.

Good luck as you embark on your journey into this exciting area of athletic training. The clinician skilled in the art and science of athletic taping quickly earns an athlete's confidence. But

becoming proficient at these skills is a challenge, and you should realize that achieving a high level of proficiency comes only after many hours—even years—of practice. I urge you always to visualize the underlying anatomy that you need to support and the mechanism of injury that you seek to prevent. You may feel frustration as you attempt to master these skills. But with concentration and practice, you can become highly adept at athletic taping and bracing.

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Kip Smith served as a consultant for the photoshoot session and helped to illustrate several of the procedures in the book. John Cottone provided excellent suggestions for additional content, and Mary Allen Watson and Tony Kulas helped with the new key palpation landmarks.

Jatin Ambegaonkar, Kimberly Herndon, Tony Kulas, and Yohei Shimokochi enthusiastically served as models for the photo shoot. James Shipp provided access to the University of North Carolina at Greensboro athletic training facility and selected materials and supplies.

Contents

CHAPTER 1

Introduction to Taping and Bracing

The National Athletic Trainers' Association Education Council has identified 12 athletic training educational competencies for the health care of the physically active. To become a competent athletic trainer, the student should perfect the cognitive, psychomotor, and affective competencies integral to each domain. These three abilities—which concern the development of knowledge, physical skill, and attitudes toward the athlete and the sport or physical activity in which he or she is engaged—are also necessary for the application of tape and braces. For that reason, I have structured the information in this text using the 12 domains.

Athletic Training Educational Competencies for the Health Care of the Physically Active

1. Risk management and injury prevention
2. Assessment and evaluation
3. Acute care
4. General medical conditions and disabilities
5. Pathology of injury and illness
6. Pharmacological aspects of injury and illness
7. Nutritional aspects of injury and illness
8. Therapeutic exercise
9. Therapeutic modalities
10. Health care administration
11. Professional development and responsibilities
12. Psychosocial intervention and referral

Adapted, by permission, from National Athletic Trainers' Association, 2005, *The 12 Educational Competencies* (Online). Available at www.nataec.org/html/content_areas.html.

ANATOMY AS THE FOUNDATION TO TAPING AND BRACING

A sound understanding of **human anatomy** is necessary for mastering the art and science of taping and bracing. You must understand the anatomical structures that you are attempting to support with the application of tape or a brace. Anyone can learn the psychomotor skills required to tape (the art), but you must also understand the link between the anatomical structure, the mechanism of injury, and the purpose for which tape is applied, such as immobilization, restriction of motion, or support of a ligament or muscle (the science). This book illustrates the most pertinent anatomical structures and mechanisms of injury for each of the body parts that you will learn to support with tape or a brace. You should also be able to identify and palpate these anatomical structures through your understanding of **surface anatomy.** You will find a list of the key palpation landmarks in each chapter of the book.

You will also need to learn and adopt the use of anatomical terminology in describing the position, planes, direction, and movement of the body. The **anatomical position** is the reference

human anatomy—Study of structures and the relationships among structures of the body.

surface anatomy—Study of the form and surface of the body.

anatomical position—Erect position with the arms at the sides and palms of the hands facing forward.

point for use of this terminology. The median plane bisects the body into right and left halves, and any plane parallel to the median plane is the sagittal plane. The coronal plane bisects the body into anterior (toward the front) and posterior (toward the back) portions. The transverse (axial) plane divides the body into superior (upper) and inferior (lower) parts.

In describing the limbs, proximal (closer to) and distal (farther from) identify structures nearer to or farther from the attachment of the limb to the torso. The position of the paired bones of the extremities is often used to describe anatomical location. For example, the thumb is on the radial side of the forearm, and the great toe is on the tibial side of the lower extremity. Palmer and plantar are used to describe the anterior surfaces of the hand and foot, respectively, and dorsal describes the other side in both the hand and foot.

Specific terms also describe movements of the body. Flexion means bending in a direction that usually reduces the angle of a joint, and extension is the opposite movement. Abduction means movement away from the midline, and adduction is the opposite motion. Rotation is movement of a bone around its long axis, and it occurs in the medial (inward) or lateral (outward) direction. Joint-specific terms describe movements at the forearm and foot. Supination and pronation describe movement of the forearm to position the palm up and down, respectively (with the elbow at 90° flexion). Inversion and eversion move the sole of the foot inward or outward, respectively. Circumduction is a combination of movements at joints that permits flexion, abduction, extension, and adduction.

Anatomical Position

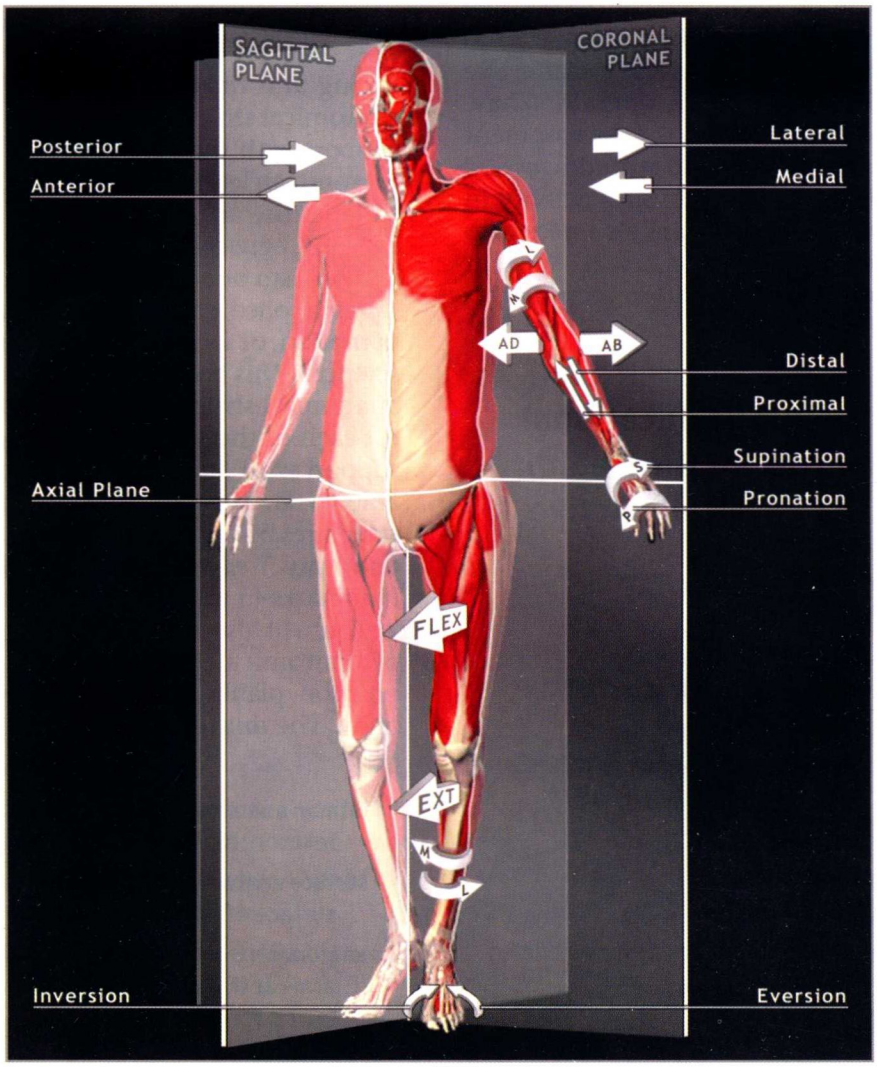


Image courtesy of Primal Pictures.

The taping, wrapping, and bracing techniques that you will learn in this book are designed to support and protect injuries to the bones, ligaments, tendons, muscles, nerves, and joints of the body. Some of the more common injuries for which you will apply tape and wraps are illustrated throughout the text.

Knee Joint

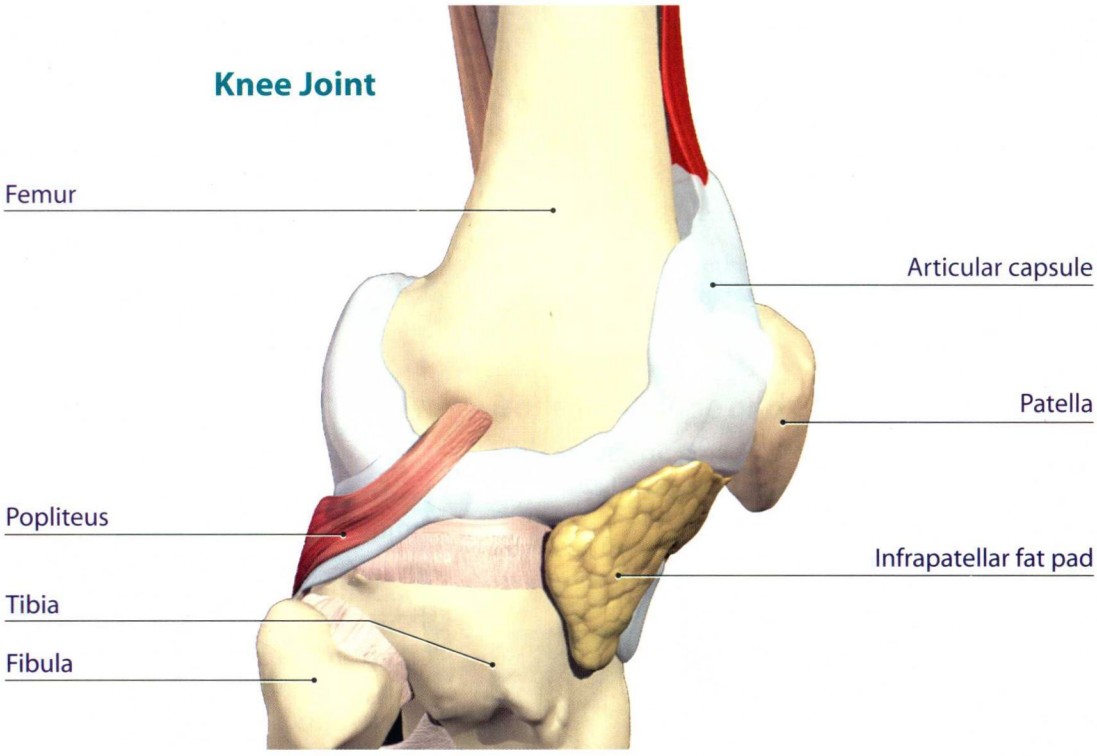


Image courtesy of Primal Pictures.

Shoulder Complex

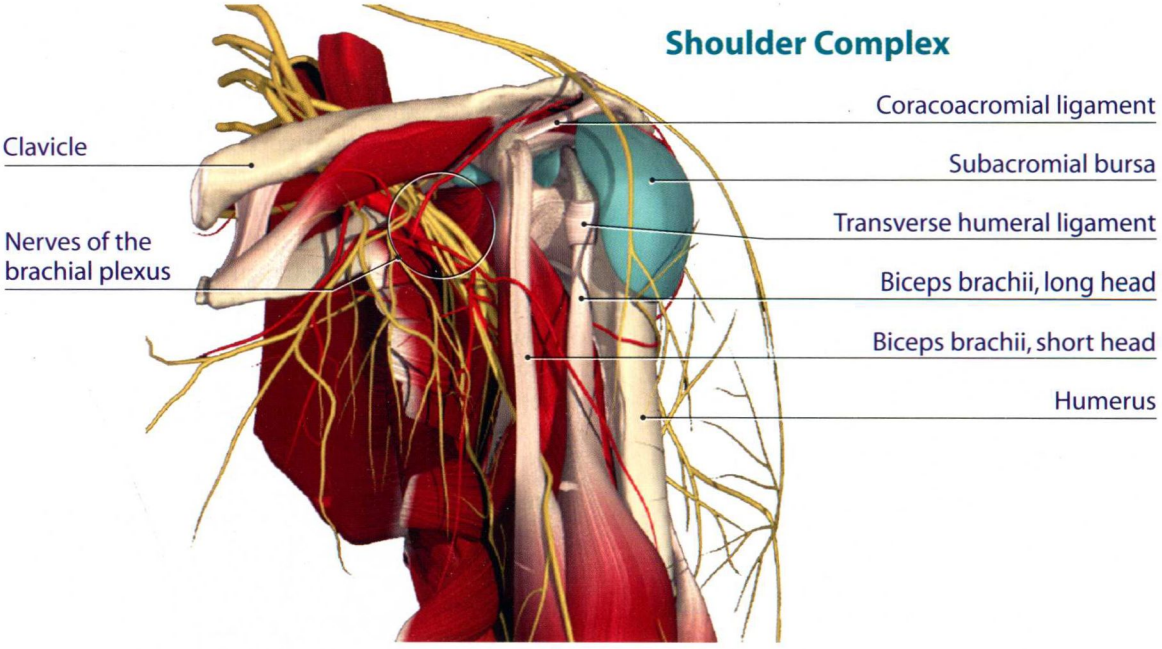
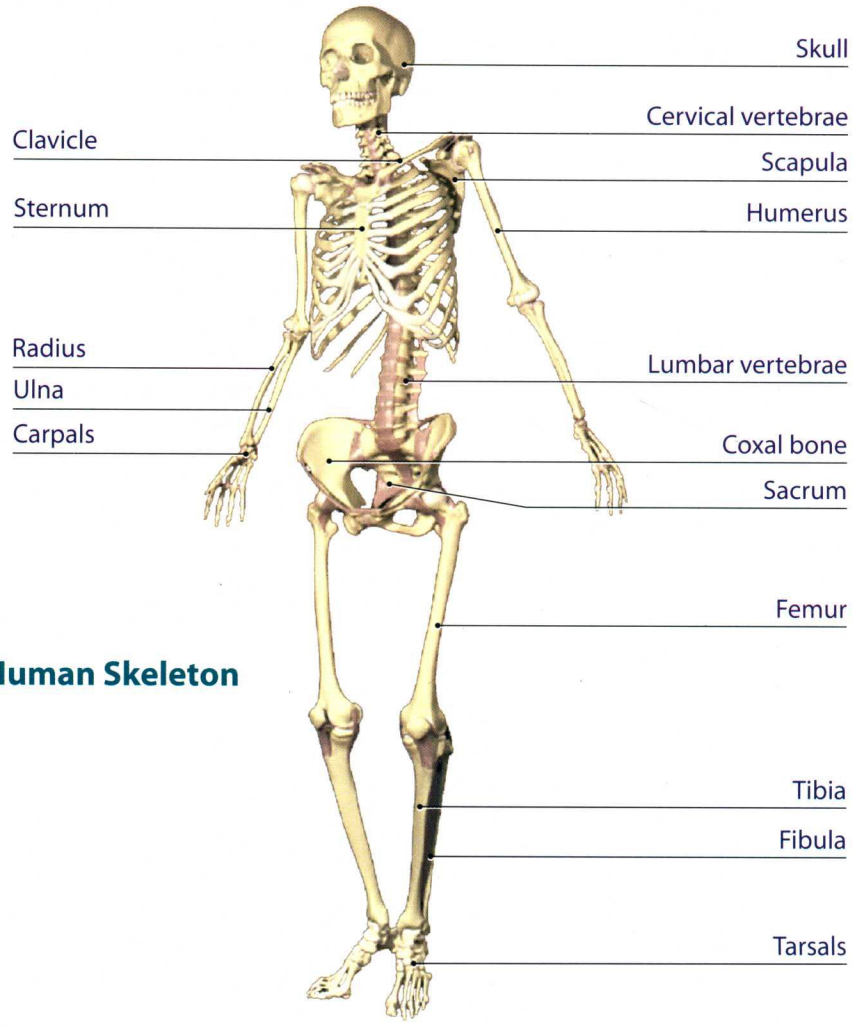


Image courtesy of Primal Pictures.



Human Skeleton

Image courtesy of Primal Pictures.

ROLE OF TAPING AND BRACING

Although the National Athletic Trainers' Association's structure for the domains of athletic training lists taping as only one of several abilities necessary for athletic trainers to function effectively, it is one of the most important, and most visible, skills. You can quickly earn an athlete's confidence through proficient application of athletic tape. Learning to master this task, however, will be both rewarding and frustrating. As with any psychomotor skill, taping requires a great deal of practice before one achieves excellence.

Athletic taping and bracing can prevent injury or facilitate an injured athletes' return to competition. In general, the tape should limit abnormal or excessive movement of a **sprained** joint while also providing support to the muscle that the sprain has compromised. Many clinicians attribute the value of taping to the enhanced proprioceptive feedback that the tape provides the athlete during performance. For example, athletes who have injured the anterior cruciate ligament and suffer from rotary instability in the knee may receive sensory cues from the brace before it limits rotary movement. This early **proprioceptive** feedback may enable the athlete subconsciously to contract the muscles that control rotary instability. Similarly, athletes involved in volleyball and basketball may receive sensory cues from a taped ankle that experiences inversion while airborne.

sprain—An overstretching (first degree), partial tearing (second degree), or complete rupture (third degree) of a ligament.

proprioception—Awareness of the position of a body part in space.

Athletic Training Educational Competencies Pertinent to Athletic Taping and Bracing

Risk Management and Injury Prevention

- *Cognitive Domain:* Describes the principles and concepts relating to prophylactic taping, wrapping, and bracing and protective pad fabrication.
- *Psychomotor Domain:* Selects, fabricates, and applies appropriate preventive taping and wrappings, splints, braces, and other special protective devices that are consistent with sound anatomical and biomechanical principles.
- *Affective Domain:* Understands the values and benefits of correctly selecting and using prophylactic taping and wrapping or prophylactic padding.

Therapeutic Exercise

- *Cognitive Domain:* Compares the effectiveness of taping, wrapping, bracing, and other supportive and protective methods for facilitation of safe progression to advanced therapeutic exercises and functional activities.

Tape, in this instance, can be more effective in providing proprioceptive feedback than in actually limiting excessive inversion.

Regardless of how tape and braces work, they should not substitute for exercise. Routine taping of the ankle in the absence of preactivity exercise provides the athlete with substandard health care. For this reason, taping should work in conjunction with stretching and strengthening techniques. As a matter of policy, you should tape or brace only those athletes willing to comply with your requests to attain and maintain optimal joint range of motion and muscle strength.

Apparatus of Taping and Bracing

A variety of tools are needed to cover the different taping and bracing needs of injured athletes. These include elastic (figure 1.1) or nonelastic (figure 1.2) athletic tape, cloth, wraps, and braces. Manufacturers produce and market athletic tape in many sizes and textures.

Purposes of Taping and Bracing

- Support the ligaments and capsule of unstable joints by limiting excessive or abnormal anatomical movement.
- Enhance proprioceptive feedback from the limb or joint.
- Support injuries to the muscle-tendon units by compressing and limiting movement.
- Secure protective pads, dressings, and splints.

Nonelastic Tape and Cloth

Use nonelastic tape to provide optimal joint support and to restrict abnormal or excessive joint motion. For example, nonelastic white tape applied directly to the ankle can prevent excessive inversion.

Figure 1.1 Application of elastic tape to support the knee.

Nonelastic white tape is normally porous and is available in 15-yard (13.7-meter) rolls with widths of 1, 1.5, or 2 inches (2.5, 3.8, or 5.1 centimeters). The size of the athlete, the anatomical site, and the preference of the athletic trainer will dictate which width to use.

Although nonelastic tape provides the best support, it has the disadvantage of being the most difficult to use. When applying nonelastic white tape you will find that the contours of the body can easily cause the tape to wrinkle. You will need a great deal of practice to master the smooth and efficient application of nonelastic tape.

Nonelastic cloth wraps can provide support independently or in combination with white tape (figure 1.3). Cloth wraps, although not as convenient as tape, provide acceptable support at considerable cost savings; consider them if your budgetary resources are limited.

Figure 1.2 Application of nonelastic tape to support the arch.

Figure 1.3 A cloth wrap provides inexpensive ankle support. The cloth wrap is also an excellent way to practice the figure-eight and heel-lock techniques presented in chapter 2.

Elastic Tape and Wraps

Apply elastic tape or wraps to support body parts that, unlike most joints, require great freedom of movement. For example, when it is necessary to support the hamstring muscle group by encircling the thigh, use elastic tape to permit normal muscle contraction without restricting blood flow. Elastic tape and wraps will also secure protective pads to the body (figure 1.4). An athlete with thigh, hip,

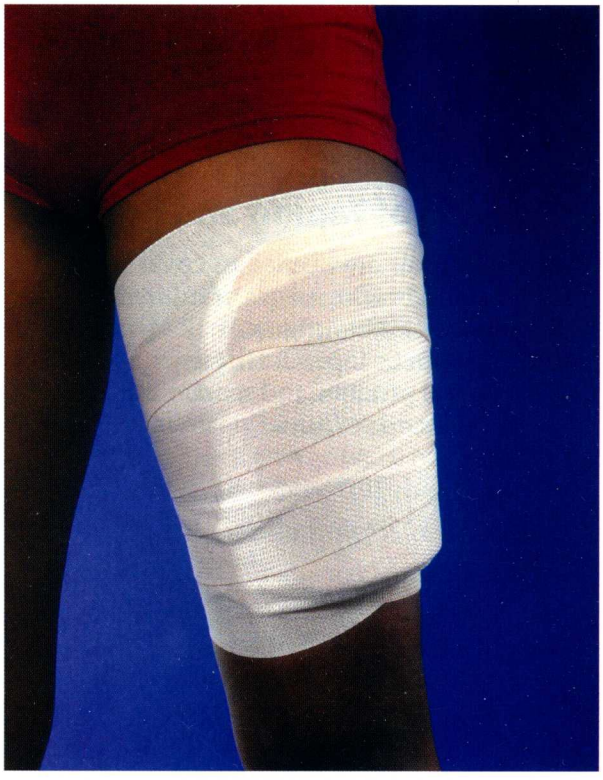


Figure 1.4 An elastic wrap to secure a protective pad to the anterior thigh. The metal clips used to fasten an elastic wrap should be covered with tape or removed for participation.

or shoulder **contusions** often requires this extra protection; I will discuss the technique further in chapters 4 and 5.

Elastic wraps prove especially useful when applying compression to an area that has suffered an **acute injury.** Compression, frequently combined with ice, helps control the swelling that accompanies soft-tissue injuries (figure 1.5).

contusion—A bruise.

acute injury—A recent, traumatic injury.

Figure 1.5 *(a)* Elastic wrap to secure an ice bag to the ankle. Apply the ice directly to the skin for no longer than 20 minutes per hour. *(b)* The elastic wrap can also be used in combination with a horseshoe pad to apply compression to an acutely sprained ankle.

When treating athletes with this technique, you should always advise them about the potential risks of applying elastic wraps to acute injuries that will, inevitably, swell. In particular, you should warn the athletes to watch for signs of restricted circulation by monitoring the color of fingernail or toenail beds. A dark blue appearance in a nail bed indicates impaired circulation. If the elastic wrap is necessary, be certain to remind the athlete to elevate the injured joint and apply the wrap loosely if used at night.

Elastic tape, like nonelastic tape, comes in textures and widths for every body part. Elastic tape can be 1, 2, 3, or 4 inches (2.5, 5.1, 7.6, or 10.2 centimeters) wide. Elastic wraps may have widths of 2, 3, 4, or 6 inches (5.1, 7.6, 10.2. or 15.2 centimeters); they are also available in double lengths to accommodate large body areas, such as the hip and trunk. Elastic wrap quality varies. Because you reuse elastic wraps, unlike tape, you could save money by buying the better, often more expensive, product. The cheaper, low-quality wraps do not work well for continued reapplication.

Protective Devices in Combination With Tape and Wraps

Protective splints and pads are frequently used to limit motion, protect a body part, or dissipate forces away from the injured area. Athletic tape and wraps can often be used to hold the protective splints and pads in place. The protective materials include foam, felt, thermoplastics, thermofoams, and other materials such as fiberglass, silicone rubber, and neoprene. The book will provide selected examples of these protective materials and the use of tape and wraps to hold them in place.

Athletic Braces

Braces prevent injury to healthy joints and support unstable joints. A variety of braces is available in the athletic marketplace. In fact, you can find a brace for every joint of the body, although, for athletic purposes, you will most commonly need to apply braces for the ankle, knee, shoulder, elbow, and

wrist. I will not supply a comprehensive review of braces; I will focus, instead, on those used to treat common ligament injuries in the ankle and knee, and overuse injuries in the elbow and wrist. In addition, I provide illustrations for ankle, knee, wrist, elbow, and shoulder braces in their respective chapters.

Braces can supplement or replace athletic tape. Some braces, such as those for the ankle, can save money because, unlike athletic tape, they are reusable. Braces, however, can be expensive. Functional knee braces, for example, cost from $500 to $700.

KNOWING THE SPORT, ATHLETE, AND INJURY

To become an effective athletic trainer you must learn both anatomy and the **mechanisms of injury** and master the psychomotor tasks for appropriate athletic taping. In addition, you should understand the rules of the sport regarding taping and bracing and the needs of your individual athletes.

Regulation of Taping and Bracing in Sport

Most governing athletic associations regulate the degree of restriction you can provide through taping and bracing as well as the materials that you use to protect an injured part. They enforce these mandates because the application of tape can give the wearer an unfair advantage during competition, especially in sports such as wrestling. Protective devices and braces can also injure other participants. Most associations prohibit hard and inflexible materials unless you cover them with a soft, pliable padding.

Sport associations also regulate the management of athletic injuries during organized competition. Wrestling, for example, permits only a short time to treat an injured athlete. Many other sports require you to remove the athlete from competition, regardless of the severity of the injury. You must also follow universal precautions if the athlete is bleeding, so you should become very familiar with these procedures. These and other rules affect how you evaluate an injured athlete and apply a brace or tape. I advise you to consult the guidelines of your appropriate governing organization, such as the National Collegiate Athletic Association or a state or regional high school athletic association.

Knowing the Athlete

Some athletes cannot perform with even a small degree of restricted movement, whereas others do quite well with a great deal of limitation. A significant amount of restriction on the hands and fingers of a football offensive or defensive lineman may not inhibit the athlete's performance. In contrast, the same, or lesser, degree of restriction would dramatically compromise the dexterity of a quarterback or receiver. Taping a shot-putter's ankle requires you to use a technique different from the one you apply when supporting the ankle of a sprinter. These examples show that to master the art and science of taping, you must understand the different needs of your athletes.

Examining and Treating the Injury

You must have a thorough mastery of injury assessment and rehabilitation to tape and brace effectively, including knowing when it is safe to return an athlete to practice and competition.

Injury Examination

Under no circumstance should you tape or brace an athlete's injury without first knowing the injury mechanism and its underlying anatomical structure. By understanding the mechanism of injury you will be able to apply tape in a manner that will help prevent further damage. To determine the injury mechanism and know whether the injury is acute or **chronic,** you must obtain an athlete's history. Be systematic in your evaluation by using the injury assessment protocol on page 9. For more information on injury assessment consult the reading list at the end of the book, which includes an excellent text that addresses how to evaluate musculoskeletal injury.

Role of Exercise

As an athletic trainer, you must do more than tape or brace an injured athlete; you have a responsibility to provide the athlete with appropriate stretching and strengthening exercises. Preventing injury or eliminating its recurrence will be possible only when the athlete has achieved normal strength, flexibility, and range of motion! I discuss in this book exercises that require minimal equipment. Have the rehabilitated athlete who has met the