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CONTENTS

Using Analgesic Balm on Athletic Injuries — Clint Thompson ........ 6
Does the National Athletic Trainer's Association
Need a Certification Examination — J. Lindsey McLean, Jr. .......... 10
Recent Athletic Training Literature ...................................... 12
Bits and Pieces — Clyde Stretch ........................................... 18
Calendar .............................................................................. 20
National Notes — Jack Rockwell ........................................... 22

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Using Analgesic Balm on Athletic Injuries

Clint Thompson
Assistant Trainer
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The role of the athletic trainer is ancient but the profession of athletic training is relatively recent. Due to the evolution of the profession in a manner that was perhaps unavoidable, many empirical practices are present in the care and treatment of athletic injuries. It has been only recently that any attempt to standardize these procedures has been made.

The education that a physical therapist receives is a giant step in the right direction for an athletic trainer in an attempt to learn the basis for treating and caring for injury. The point here is not to say that the empirical measure are necessarily unsound or that one should be a physical therapist to be effective; but that the emphasis should be put on the fact that a great many trainers do not know whether or not a certain treatment or procedure has a sound physiological basis or just exactly what is happening to the athlete when treatment is carried out. They have only their empirical education to guide them. Not unless the trainer has had some physical therapy education or has taken it upon himself to spend a lot of time filling the knowledge gap in his undergraduate education does he know when certain procedures are physiologically beneficial or whether certain procedures are better than others under given circumstances.

With the preceding thoughts as a sort of motivation, the examination of one example where the enlightenment of the training profession, and others concerned, would clarify a procedure that is extensively used throughout the athletic training profession and in athletics in general.

Delving into the different beliefs and suppositions allied with the use of the analgesic balm pack, the general opinion is that the application of an analgesic pack is the same as applying heat to the area. As anyone who is familiar with the treatment of recent musculo-skeletal injuries knows, the first modes of treatment are pressure, cold and elevation. Certainly heat is contraindicated. Therefore, under these assumptions, it would be most unwise to apply an analgesic pack covering the injured area.

But there are those who do advocate the application of an analgesic balm pack to an injury as soon as thirty minutes after the injury and certainly in most cases it is an overnight procedure. Evidently, the severity of the injury is not necessarily a contributing factor in the decision to apply a pack.

NO CLEAR-CUT ANSWER

Which theory is valid? Is one application more detrimental or beneficial to the injury than the other? Not many athletic trainers can back up their answers. In fact, a sampling of medical doctors will not give a clue one way or the other. The outstanding fact is that there does not appear to be a clear-cut answer available.

The question was so intriguing that a questionnaire was sent to 207 athletic team physicians in the professional, collegiate, and high school ranks in an effort to gather information concerning the proper use of the pack in athletics. Letters of explanation were sent along with self-addressed postcards with three questions to be answered. The letter stated that there was a great deal of confusion present with regard to the proper use of the analgesic pack in athletics. A 49.7% return of the postcards was experienced.

The questions required only a Yes or No answer, and were as follows:

1) When treating a strain of the biceps femoris with an analgesic balm pack, does the pack have a vasodilating affect on the arterial vessels of the concerned muscle? (48.4% - yes; 51.6% - no)

2) Would you give the same answer when the injury involves the ligamental area of a moderately sprained ankle or knee? (70.9% - yes; 29.1% - no)

3) Do you advocate the wearing of such a pack during a workout or during competition? (25.8% - yes; 74.2% - no)

Seven physicians stated that they did not use rubefacients at all, although they did answer the questions. Eleven physicians mentioned the psychological aspects of treating with the analgesic pack and the eleven seemed to agree that perhaps
this was the biggest reason for using the packs. One physician stated that “some of the value is psychological and would be lost if the treatment were de-odorized.”

As for the results of the questionnaire, many assumptions can be drawn; but the outstanding fact that appears is that there seems to be a great deal of misinterpretation of the known facts— even among the medical doctors who serve as team physicians—with reference to the use and function of an analgesic pack. The response to the first question of the questionnaire was split nearly down the middle—51% no and 49% yes.

What does an analgesic pack do? There are at least three probable ways by which a pack may have an effect on an injury, depending upon the ingredients of the balm: 1) the relief of pain by counter-irritation; 2) the possible vasodilation of the arterial vessels in the injured area (which is very desirable in the healing process but undesirable in the immediate treatment of the injury); and 3) the effect produced by absorbing an analgesic through the skin to act upon the injured area.

The theory of counterirritation has been studied and discussed (4) (9). Skeletal muscle injury or visceral abnormality stimulates the pain fibers in the affected area. The stimulus travels to the spine where a reflex arc is initiated with the motor nerve fibers in the affected area (9) as well as a conscious awareness being elicited by the centers in the brain. The muscle fibers of the area go into a reflex spasm which in turn causes more pain and a complete cycle of pain-spasm-pain is propagated. The counterirritant works in such a way that it stimulates the free nerve ending in the skin. The impulses from the skin swamp or obliterate those from the injured area and break up the cycle of pain-spasm-pain. (Figure 1)

It is known that a neuron may be stimulated at its center and transmission will proceed in both directions. But stimulate a nerve at its extremities simultaneously and the two impulses extinguish each other. Through counterirritation, the skin impulses initiated from a source other than
that of the injury, and the injury pain impulses meet at a junction either in the nerve trunk or in a cell station, extinguishing each other, breaking up the reflex arc to the motor neuron and relieving the spasm and pain at the injury site. To be sure, if the injury or disorder is severe enough the impulses from the counterirritation will not be great enough to constantly disrupt the cycle.

Analgesic balm used by Athletic Trainers for topical application are made of a combination of chemicals including ingredients called rubefacients. A rubefacient is a chemical that causes reddening of the skin through irritation (7). Counterirritation on the skin is caused by the rubefacients. Turpentine, camphor, chloroform, ammonia, and methyl salicylate are examples of rubefacients (7). Mustard and capsicum plasters are also rubefacient in action. Perhaps the most effective rubefacient is some form of nicotinic acid (6) (8).

HEAT-PACK A MISNOMER

The commonly used term ‘heat pack’ is actually a misnomer. The idea that heat is being elicited from a pack is a fallacy. Johnson & Johnson, when discussing their Back Plaster containing capsicum, said, “no significant heat at the interface between the adhesive portion of the tape and skin is produced” (12). The sensation of heat is produced by the rushing of blood through the skin capillaries as a response to the exciting of the pain fibers by the rubefacient irritation.

The reddening or hyperemia of the skin after application of a rubefacient is the vasodilation (dilation of a blood vessel) of skin capillaries caused by the stimulation of the pain fibers in the skin eliciting the well-known axon reflex (2). When the ending of the sensory (afferent) nerve branch in the skin is stimulated, in this case by the irritant, the centrally conducted impulses pass antidromically (opposite the normal nerve conduction direction) to the vasodilator branch to the blood as well as dromically (normal nerve conduction direction) to the parent fiber, to the central nervous system. It is this peripheral conduction from one branch to the other that is called an axon reflex.

Could this axon reflex act on tissue as deep as skeletal muscle? Skeletal muscles do have the afferent (sensory) pain pathways leading to the central nervous system. There is a junction between muscle afferents and skin afferents prior to the neuron entering the spinal cord, at which the phenomenon of counterirritation takes place. When comparing the difference in numbers of pain fibers distributed to skin and muscle, there is a preponderance of pain fibers present in the skin as compared to that of muscle, a few hundred as compared with thousands in muscle tissue of comparable size. Also, as far as is known, vasodilator nerve (efferent) fibers are distributed entirely to blood vessels of the skin (3).

A sensory impulse elicited at the periphery will: 1) travel to the central nervous system and synapse with efferent fibers out of the spinal column which in turn stimulate the motor sections for muscle movement; 2) will travel, afferently, from the skin to the central nervous system; to the brain where there is a center that controls vasomotion (dilation or constriction) through the sympathetic nerve chain to the vessels of the muscles; or by secretion of chemical substances into the blood for a general body reaction (14) (15). This vasomotor control would appear too general for our investigation, but it has been shown that pain fiber stimulation may markedly increase the epinephrine fraction in the blood and even small physiological concentrations of epinephrine can induce almost maximal vasodilation in skeletal muscle (5) which is accompanied by body sweating. Post (10) did show that rubefacients applied to the skin do have an effect on muscle by increasing the time required to fatigue a working muscle. Forearm flexor muscle temperature rose slowly over a 90 minute period to a mean average of 2.6° C above the temperature of the muscles before a rubefacient was applied (11).

There is yet another way that topical application of an analgesic may act upon the deeper
tissues. This is called percutaneous absorption. It is theorized that the rubefacient is absorbed by the skin and into the bloodstream, eventually acting upon the muscle vessels. It has been shown that methyl salicylate, one of the more commonly used rubefacients in analgesic balms, does not penetrate the skin appreciably (16). It is used primarily for irritation and is not meant to be exposed to the ‘raw’ tissues of the body. But it has been shown that certain rubefacients have a penetrating action and are thought to affect the circulation of the vessels in the muscles (10). One non-irritating analgesic, triethanolamine salicylate, is absorbed by the skin into the blood without any vasodilation and is meant to relieve pain in much the same manner as an analgesic such as aspirin (16). A pertinent example of percutaneous absorption would be the use of DMSO (dimethyl sulfoxide) in treating injuries. DMSO has been shown to very readily disperse into the skin and act as a vehicle for a number of substances that would otherwise not penetrate the skin (1) (13).

To gain information about the effect of analgesic balm, several pharmaceutical companies that produce a balm were contacted for data and opinions concerning the effects of their product when used in the athletic injury situation. Only two of ten companies gave a definitive answer as to the results of the application of their product on the skin. Some were quick to hypothesize on the action of their product, and some honestly said that they had no data, or had no way of collecting data concerning the effects of their product and therefore could not give an answer.

It appears that the topical application of an analgesic balm pack to the site of a recent traumatic musculo-skeletal injury does not have any adverse effects upon the injury within the deep tissues, but the counterirritating properties of the balm may provide a certain degree of relief from pain. Research is presently being carried out on animals to measure any dilation of muscle vessels due to the topically applied analgesic balm, and future research is planned for trials with human subjects.

BIBLIOGRAPHY


Does the National Athletic Trainer's Association Need A Certification Examination?

Athletic training as a profession has come a long way in the years since the National Athletic Trainer's Association was founded in 1950. The active membership requirement for a college degree and apprenticeship under an active member as well as suggested academic curriculums certainly are marks of professional advancement of which we can all be justly proud. This steady amelioration was recognized officially by the American Medical Association's Board of Delegates in 1967, and it is a tribute indeed to the many untiring leaders in the profession during the critical initial two decades of organization.

THE PROBLEM

Do these past accomplishments mean that the NATA has "arrived" or just initiated its climb to responsibility and respectability as a paramedical profession? Critical self-evaluation most likely indicates that we have only made a good sound beginning.

Each year some of the best qualified trainers leave the profession for either financial reasons or due to unfavorable working conditions unconsidered and, therefore, uncorrected by superiors. Annually, many graduating young trainers of exceptional potential are denied opportunities for employment because their qualifications go unrecognized. In some instances employment still depends upon who you know — not what you know. The continued existence of such situations obviously does not reflect a truly mature profession in need of no further advancement or reexamination. Realistically, athletic training still has a long way to go if it is to become the profession most of us hope it will.

Education always is one of the most pressing problems to be analyzed as any profession attempts...
to advance. This certainly is true in the field of athletic training. Certification in physical therapy has many advantages, but it has become obvious that it is not a realistic or perhaps desirable goal for all trainers to pursue. A master's degree likewise should appeal to many, but not all, members of such a highly diversified profession. To adequately prepare trainers for teaching positions on the secondary and collegiate level as well as specialized positions on the university and professional levels, flexibility in educational objectives must always be recognized and encouraged. The value of apprenticeship as an educational experience has been recognized, and it is perhaps the one present evaluation of professional competence all trainers currently approve and recommend.

Athletic training curriculums on both the graduate and undergraduate level are already in full operation at several institutions. They offer definite promise in providing the academic recognition and a common educational background the profession so vitally needs. Yet it is unreasonable to expect such quality curriculums to grow in sufficient numbers to meet the pressing educational needs of our profession in the immediate future. Would this mean that the student trainer at an educational institution without such a curriculum but possessing a fine athletic trainer with a complete athletic program might never hope to be certified? Obviously, many problems remain to be solved.

A POSSIBLE SOLUTION

In recent years there has been much discussion of a possible certification examination for the NATA. Many feel that such a practical and written evaluation is the best answer for the immediate problems of professional preparation within the Association when all alternatives are considered. With such an evaluation of competence, the individual student trainer could plan his academic curriculum with the aid of his undergraduate advisor (and head athletic trainer) in such a manner that he could take such an examination with confidence upon graduation. Since all present active members of the NATA will be certified in 1972, only future applicants for active membership would face such an evaluation.

The content of the examination would obviously require careful consideration. The course of study as recommended by the Professional Advancement Committee should logically be evaluated first for the excellent guidelines it contains. Certainly such topics as anatomy, physiology, and kinesiology should be well covered. Questions concerning recognition of serious injury, first aid, physical therapy techniques, reconditioning exercise, diet, and the prevention of injury all have obvious merit. A short practical demonstration of elementary adhesive strapping ability, massage techniques, etc., might also be included. The test should not be so difficult to preclude a variety of academic backgrounds. It should, however, be of sufficient specialty to require definite curriculum planning and more than casual intellectual pursuit. As our educational standards improve this could be reflected in a gradual upgrading of the "athletic training boards." Those unable to satisfactorily complete the test on the initial try could be accorded associate membership until such time as they were successful. Likewise, long time associate members of exceptional ability but who do not qualify for active membership under the present By-Laws might be allowed to use such an examination to elevate their membership status.

The mechanics of preparing and administering such an examination could easily be worked out. Perhaps an organization such as the Professional Examination Service (American Public Health Association) might be contracted to prepare and grade the test to ensure complete fairness and professional conduct. The cost of this service would be borne by the applicant. The examination could be given regionally each year under supervision of district directors within the NATA as well as at the national convention each June. These, of course, are only possibilities.

IMMEDIATE AND LONG RANGE BENEFITS

The results of a certification examination for trainers might be immediate and dramatic. What
if the National Federation of High School Athletic Associations looked to the NATA exam as minimum standard of competence for all secondary school athletic programs? On the collegiate level, team physicians and administrators would then have a firm basis for demanding that only certified NATA members be hired much as hospitals will consider only "registered" nurses. At present there is no basis on which such a demand can be logically founded. The growth of athletic training curriculums on the collegiate level would be stimulated since they would be the most logical way to prepare for such an exam. To put it mildly both the immediate and future potential of an "athletic training board examination" offers exciting possible benefits to our profession.

CONCLUSIONS

The idea of a professional examination for trainers is not new. Most athletic and medical authorities would agree as to its eventual inevitability. Most arguments and discussion on this subject presently concern priorities. Is such an exam needed now or ten years from now?

Even with immediate concentrated efforts toward establishing an early national examination, many months would be required before it could become a reality. At a time when the membership is divided and uncertain regarding which direction our future should be, few members would object to the immediate consideration of such an examination.

Such an examination would give our Association a unity of purpose and direction at a time it is sorely needed. Let us proceed now!

REFERENCES


Recent Athletic Training Literature

This list is generally restricted to those areas of specific interest to the athletic trainer. Topics belonging to the broad areas of athletics, physical education and physical therapy will usually be omitted.


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Bits and Pieces

Clyde Stretch

Something that is usually a headache for the trainer at the start of each new season is the difficulty many athletes have with the new stresses placed upon some areas of the skin. The reaction of the skin generally takes two forms: those due to minor irritations in the form of a rash and those involving a rather severe irritation, blisters.

“That blisters constitute a problem in athletics is shown by the number of different methods now in use for their prevention. These methods include the wearing of properly fitted shoes and socks, the wearing of two pairs of socks, the wearing of thin silk socks under wool socks, the wearing of cushioned socks, the application of skin lubricants, petroleum jelly, skin toughener, powder, tape or mole skin to friction areas, and the soaking of feet in methylated spirits or salt solutions.”

It must be assumed that blisters are a protective mechanism of the body for the preservation of its dermis. “Despite their frequent occurrence, little scientific study has been devoted to these lesions. Moreover, a diversity of opinions on their treatment continues to exist, probably because the medical literature still lacks a precise clinical and histological description of the natural course of friction blister healing.”

This discussion will deal with two methods of prevention and two ideas about treatment which have appeared in recent literature.


“Forces acting on the sole of the foot during locomotion are represented by four major components: vertical forces (resisting movement straight down), fore and aft shear (resisting movement of the foot towards the front or towards the rear), lateral shear (resisting movement of the foot towards either side), and torque (resisting rotation of the foot on the floor).” ABSTRACT: “Blisters, calluses and trophic ulcers on the soles of the feet represent potentially serious medical problems. A primary etiology is thought to be shearing forces acting on the skin. A closed-cellular neoprene insole has been developed which will absorb 1 centimeter of fore, aft and lateral shear, and 30 degrees of rotary shear. This material is effective in preventing blisters and calluses and appears to be helpful in prevention of trophic ulcers on the soles of the feet.”

2. On Prevention—the use of instant ice on the hand and cold water on the feet: Two studies were done at the University of Kentucky to determine the effect of immediate cold applications to “hot spots” reported during activity.

A group of eight students, “four each in an experimental group” and a “control group” performed repeated kip ups with the experimental group receiving instant ice treatments to their hands when “hot spots” were reported. Twenty-four senior high school basketball all stars were the subjects, of a second study, with twelve players in each of the control and experimental groups. The experimental group was treated with 30 second foot soaks in a tub of iced tap water after the “hot spots” were reported.

The prevention of blisters by these methods was found to be statistically significant in both experiments. However, it was noted that the small groups used for the experiments indicated a need for further replication before the results could be considered conclusive.

3. On Treatment from Thomas, A. C., Jr.: “Treatment of Friction Blisters; An Experimental Study,” Archives of Dermatology 97:717-21; June, 1968. ABSTRACT: “The healing of experimental friction blisters on palms or heels of 83 volunteers was followed for three weeks with and without fluid drainage, and with and without blister top removal.”

“Both natural fluid resorption and aspiration resulted in the adherence of some of the blister tops to their bases. A single drainage not earlier than 24 hours and not later than 72 hours or drainage three times during the first 24 hours after blistering trauma produced the highest incidence of blister top adherence. Under the conditions of these experiments, the blister sites protected by the adhering tops became functional earlier and caused less discomfort than denuded blisters. Blister drainage did not influence epidermal regeneration of the base, which was histologically evident in the production of a new granular cell layer by 48 hours after blistering trauma.”

Method of blister production: “Friction blisters were produced by using the eraser of an ordinary lead pencil which was pressed downward against the skin surface and briskly rotated in a clockwise-counterclockwise direction. Two to three blisters were produced on the hypothenar eminences of both palms in all but four of the soldiers. In these four soldiers, one friction blister was produced on the lateral aspect of each heel.”

4. On Treatment A. G. Edwards suggests a new and unusual method for treating blisters, the application of adhesive tape. The method can save considerable time for the trainer’s standpoint and yet appears to be successful.

The blister is first drained and the
Except for oxygen therapy, Diapulse (pulsed, high peak power electromagnetic energy) was the only therapeutic medical equipment supplied by the Mexican Olympic organizing committee in the competition and training clinics throughout the Olympic area, for the accelerated healing of athletic injuries.
raised skin removed. Antiseptic is then applied, followed by a strip of adhesive. The tape is left on the area of the blister for approximately three days. Upon removal of the tape, the blister will most often be healed or partially healed. Partially healed blisters may be re-treated.

Further information on the techniques or results may be found in:


**CALENDAR:**


2) The Fourth Annual Spring Conference on Prevention and Management of Sports Injuries will be presented March 26 and 27 at the Wisconsin Center, University of Wisconsin, Madison, Wisconsin. Further information may be obtained from Thomas C. Meyer, M.D., Chairman Postgraduate Medicine, 307 N. Charter St., Madison, Wisconsin, 53706.

3) The American College of Surgeons will host its Annual Athletic Injuries Course on March 28, 29 and 30 at the Murphy Auditorium, Chicago, Illinois. There is a $35 fee covering two luncheon meetings and a banquet. Details may be obtained from Sara Barr Cohen, Publicity Director, Communications Division, American College of Surgeons, 55 East Erie St., Chicago, Illinois, 60611.

4) A Postgraduate Course on Conditions of the Knee in Sports Medicine will be presented April 7, 8 and 9 by the American Academy of Orthopedic Surgeons in Oklahoma City, Oklahoma. Details about the course may be obtained by contacting Don H. O'Donoghue, M.D., 1111 N. Lee St., Oklahoma City, Okla. 73103.

5) The Sixteenth Annual meeting of the American College of Sports Medicine will take place May 1, 2 and 3 at the Hyatt House, Atlanta, Georgia. Information comes from Mr. Donald E. Hermann, 1440 Monroe St., Madison, Wisconsin, 53706.

6) The annual meeting of the Michigan State Medical Society's Medical Aspects of Sports will take place on May 8 at Kellogg Center, Michigan State University, East Lansing, Michigan. Further information may be obtained by contacting James S. Feurig, M.D., Olin Health Center, East Lansing, Michigan, 48823.

7) The Great Lakes Athletic Trainers Association (District #4—N.A. T.A.) will hold its Second Annual Meeting and Clinic. The Clinic is under the direction of Roland "Duke" LaRue. The dates for this Clinic are March 14-15, 1969. For further information write to Mr. LaRue at Western Hall, Western Illinois University, Macomb, Illinois, 61455.

STATEMENT OF OWNERSHIP

Management and Circulation

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Apologies are in order as this column comes to you, at least for members of the NATA who were in Philadelphia on January 19, 20, and 21st, 1969. The apologies are offered because some of the subject matter in this issue was presented at that meeting and at several other informal sessions your Executive Secretary has been involved in around the country.

Before you receive this issue, you will have received a National Newsletter pertaining to the dues increase. I hope and believe that this letter is self-explanatory. The need for the dues increase has been explained quite thoroughly before and I hope needs no further explanation. One thing that I would like to mention at this point is that the need for a full time Executive Director is becoming much more apparent each day. This is not to be construed as an overture for the position but, whoever accepts the position when it becomes available has a work load to look forward to that is really quite staggering. As an example, the need for a Central Placement Bureau is of extreme importance; but this is only one of many things that the NATA National Office should and must do. In the area of representation it is of the greatest importance that we have a good representation at all functions involving allied organizations. Recently, while in Los Angeles at the NCAA meetings, a group of the trainers present got together for a series of informal talks pertaining to the needs of the organization. The lack of understanding and need for better communications became extremely apparent at these sessions. The wants, desires, and problems of the organization must be made known, and then and only then can action be initiated.

One of several points of discussion that arose in Los Angeles was the need for workshops at the NATA Annual Meeting designed to make all athletic trainers more cognizant of and be able to better work with some of the sports that they don’t ordinarily come in much contact with. As an example: Boxing, Wrestling, Crew, Skiing, Hockey, Gymnastics, Fencing, etc.

Another matter that disturbs me is the situation wherein an athletic trainer is placed in such a position in his institution or organization that he comes directly under the supervision and jurisdiction of the Head Coach rather than the Medical people responsible for the care of the athletes. I sincerely believe it is an affront to the individual athletic trainers’ integrity to be placed in such a position. We all, I hope, try at all times to cooperate with, work with, and understand the problems of the coaching staff. By the same token, I’m sure that all of us work as closely with our doctors as possible. And, of course, we must and do have the wel-
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Again, I will close by asking you to please contact the NATA office at any time with problems, needs, or ideas.

fare of the athlete foremost in our mind and actions at all times. The point I am attempting to make here is that each of us as an individual athletic trainer must, in addition to doing the best work we are capable of performing, continue to obtain and work for the respect of our administrators and develop job situations to a point where we are looked upon as the key person in the Athletic-Medical Team. To reach professional status as an organization and as individuals, we must strive to achieve this respect and understanding.

One other item that I feel quite strongly about is the subject of accepting at face value and using various types of treatment programs, modalities, or products without adequate research, testing and understanding of the program, modality, or product. Samples are great, but they must be treated as samples and handled accordingly. In the same sense, overenthusiastic plunges into new treatment programs, while at the same time excluding the tried and true, seem just as absurd and ridiculous as issuing a new product that has been given to you only minutes before by a salesman. None of us, I’m sure, would ever do anything to harm or injure an athlete in our care, but isn’t it just as important to use common sense and use the procedures and products that have been adequately tested and researched. In this way, we can never have our moral, ethical, or intellectual values questioned. I’m sure that most of you realize that one treatment procedure that I’m writing about is the use of Ice Therapy, in which all other forms of procedures and modalities have been excluded. We have all used ice in various forms over the years, and it is an excellent adjunct to the total treatment picture, but let us be certain that the physiological reasoning and the research done is adequate to withstand the test of time and good judgment.
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