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THE JOURNAL

of the National Athletic Trainers Association

AUTUMN 1966

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KNEES...

WATER...

CORTISONE...

1967 NATIONAL CONVENTION—COLUMBUS, OHIO, JUNE 12, 13, 14

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THE JOURNAL
of the National Athletic Trainers Association
AUTUMN 1966

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The *NATA Journal* editors welcome the submission of articles which may be of interest to persons engaged in or concerned with the progress of the athletic training profession. The following suggestions are offered to those submitting articles for consideration:

1. All manuscripts should be typewritten, double-spaced, on ordinary typing paper.

2. When references are made to other published works, include superscript numerals and appropriate footnotes giving author, title of book or article, periodical or volume number, pages, and date of publication.

3. Photographs must be black-and-white prints, preferably on glossy paper. Graphs, charts, or figures should be clearly drawn on white paper, in a form which will be readable when reduced for publication.

4. It is the understanding of the *Journal* editors that any manuscripts submitted will not have been published previously.

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Rotary Instability of the Knee and Its Surgical Correction

Ligament transplant technique, described by Oregon physicians at 1966 NATA Convention, provides a solution somewhat different from the usual surgery for "knees."

By

DONALD B. SLOCUM, M.D.
ROBERT L. LARSON, M.D.
Eugene, Oregon

THIS PAPER deals with a surgical procedure designed to control rotary instability of the knee caused by abnormal external rotation of the tibia on the femur. This condition is primarily the result of rupture of the medial capsular ligaments. The degree of instability increases with rupture of the tibial collateral and anterior cruciate ligaments.

Anatomically, the ligamentous structures on the inner side of the knee consist of the deep capsular ligament and the superficial tibiocollateral ligament. The deep capsular ligament forms a half sleeve extending from the popliteal space behind to the patellar tendon in front. The anterior portion is represented by the anterior capsule of the knee joint and its reinforcement from the vastus medialis retinaculum. This portion passively tightens when the knee is flexed. Actively, its tension varies with the state of contraction of the vastus medialis. The fact that it is taut with the knee flexed makes it an area of possible tear when an abduction force is rendered to the knee. If the anterior portion is torn and allowed to heal so that its length is longer than normal, ligamentous laxity will be present and the action of the vastus medialis as a knee stabilizer will be weakened. The middle one-third of the capsular ligament is somewhat thickened and is often called the deep layer of the medial ligament. The posterior one-third of the medial ligamentous sleeve is the posterior capsule. It lies slack when the knee is flexed. With the knee extended, it embraces the rounded posterior medial femoral condyle.

Overlying the deep capsular ligament in its midportion is the tibiocollateral ligament, often called the superficial portion of the medial ligament. This ligament tightens when the knee is extended as it moves forward. As the knee is flexed, it drifts backward and becomes more relaxed. The cruciate ligaments within the knee stabilize the knee in the anterior-posterior direction, preventing excessive motion of the tibia on the femur. The anterior cruciate prevents excessive anterior motion, and the posterior cruciate prevents excessive posterior motion.

A condition in which the foot is fixed either by cleats, an opposing player, or a ski in the snow with a resulting twist away from the fixed foot sets the stage for a ligamentous injury to the inner side of the knee. If to this relative external rotation of the tibia is added a forceful abduction strain to the flexed knee, rupture of ligamentous tissue in varying degrees of severity may occur.

Clinically, the syndrome manifests itself as instability of the knee during attempts to turn to one side, either walking or running, with the body weight supported on the involved limb, such as in cutting. Current methods of ligamentous reconstruction are primarily designed to correct valgus displacement of the knee in the weight-bearing limb and anteroposterior instability. Pes anserinus transplant was designed to control abnormal external rotation of the tibia while the knee is flexed during walking and running, and to provide a supporting sling beneath the medial flare of the tibia to counteract the downward, forward, and inward thrust on the knee that is present when the athlete runs and cuts. This support is provided by converting the primary function of the conjoined tendon of the gracilis, sartorius, and semitendinosus from flexion to internal rotation of the tibia (Figure 1), and by creating at the same

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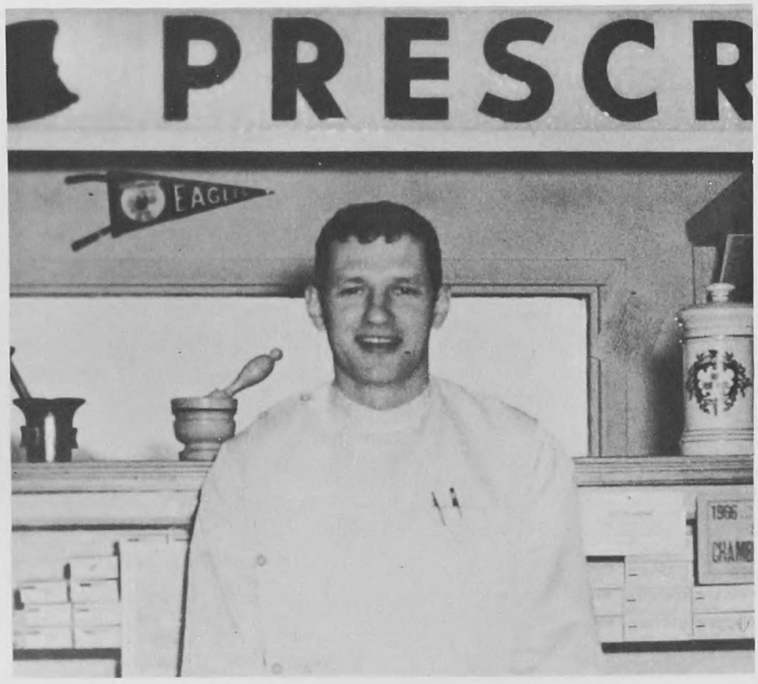

CURT MUELLER
Registered Pharmacist
President of Mueller Chemical Co.

Hello . . . let me introduce myself. I am a college graduate of the University of Wisconsin School of Pharmacy, Madison, Wisconsin in the year 1957. After an army hitch I became a registered pharmacist in Illinois, working for Walgreens Drug Stores. Shortly after leaving Walgreens and the state of Illinois I became registered in the state of Wisconsin. I have been a partner with my father in the Mueller Pharmacy here in Prairie du Sac, Wisconsin since 1961. I have been doing some experimenting with rubs and liniments since that year. I think you will like what I have come up with. You see as a druggist I fill prescriptions all day long on orders from doctors and as a result think that I can fulfill your training room needs. For example, I manufacture an Athletes Foot ointment that has the same active ingredients as the prescribed ointment by doctors. (Undecylenic Acid USP and Zinc Undecylenate USP.) My new foot spray is closely related. You might say that any product bearing my name will be of the quality of items you see on the shelves of prescription departments. I feel that if your medical advice indicates the use of certain products, I can fulfill your needs just like the druggist does when filling your personal prescription.

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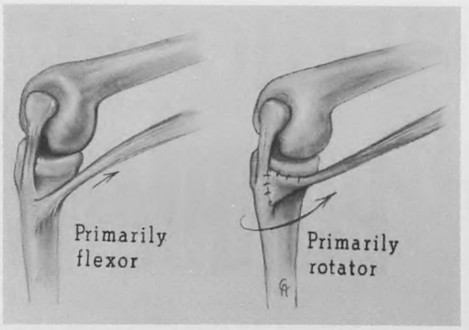

FIGURE 1

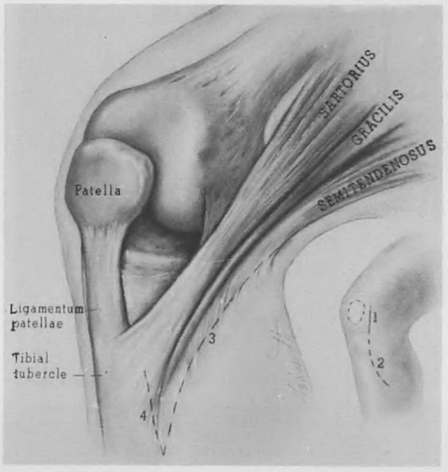

FIGURE 2A

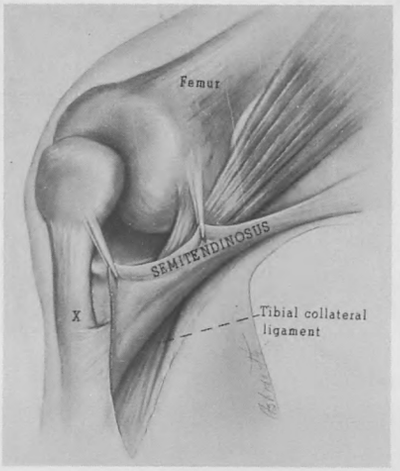

FIGURE 2B

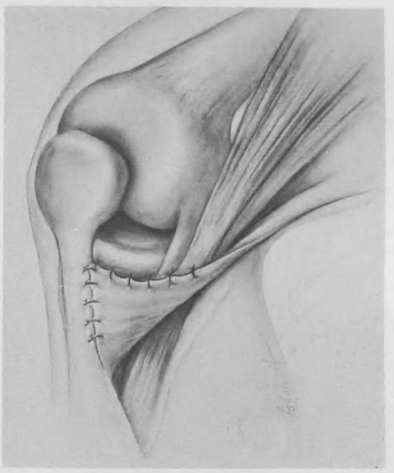

FIGURE 3

time a heavy band of tendon as a sling beneath the medial flare of the tibia. The surgical technique consists in detaching the lower 60 percent of the pes anserinus and folding it upward (Figure 2A, 2B). The free distal end is attached from below upward to the tibial tubercle and lower part of the patellar tendon (Figure 3). Fixation in a plaster cast or splint is maintained for five to six weeks postoperatively to insure firm healing of the transplanted tendons.

Following removal of the cast, patients are routinely placed on an exercise program. In the absence of acute ligamentous injury, these are of the progressive resistive types; in the presence of acute ligamentous injury and where arthritis is present, isometric or elastic resistance exercises are used to strengthen both the quadriceps and the hamstring muscle group. Although the transplanted muscles usually will function automatically once walking has been resumed, specific exercises toward attaining strong internal rotation of the tibia are started and will accelerate rehabilitation. This is the recommended exercise: The patient sits with his knees at right angles and his feet flat on the floor. He places his hands over the transplanted muscles so that he can feel them contract. Internal rotation of the tibia against resistance is now carried out by forcing the inner side of the balls of the feet together. A single six-second isometric contraction is carried out three times per day. Time of contraction is gradually increased to 12 seconds as discomfort subsides and strength increases. When this level is reached, strength is usually adequate and the exercises may be discontinued. When general strength is adequate, patients are encouraged to first jog, then run half-speed, next run figure-eights in ever-tightening patterns, then run cross country, and finally run and cut.

Preliminary evaluation suggests promising results in a group of cases which would otherwise have been relegated to the relatively sedentary life afforded through muscular rehabilitation of the unstable knee.

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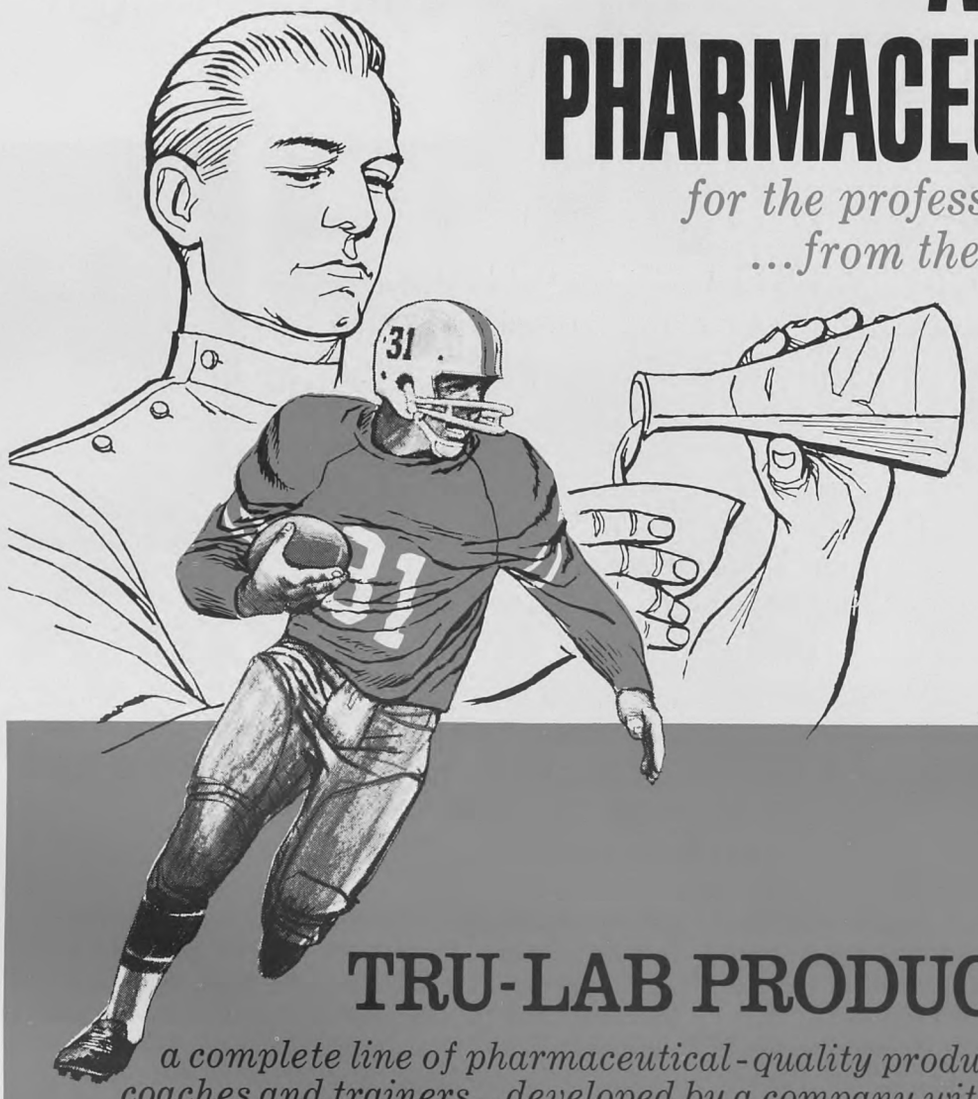

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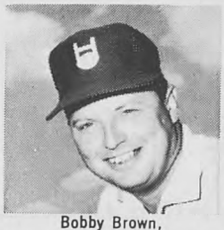

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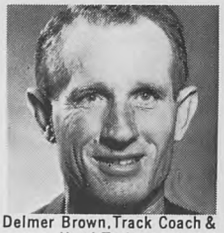

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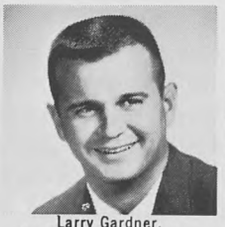

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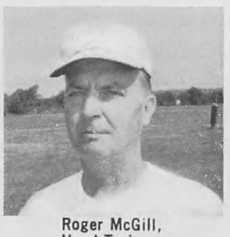

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HYDROCORTISONE INJECTIONS

The old notion about there being no way to speed the healing of a sprain seems no longer true. Research indicates corticoid injections can help sprains as well as a number of other athletic injuries.

By Donald L. Cooper, M.D.
Director, Student Health Service
and Team Physician
Oklahoma State University, Stillwater

(Editor's note: The following article is drawn from the address given by Dr. Cooper at the seventeenth annual convention of the National Athletic Trainers Association in Kansas City, Missouri, on June 14, 1966.)

After extensive research, it has been established that the use of hydrocortisone injections and allied medications are extremely effective in speeding recovery and obtaining better results in the treatment of both trauma and inflammation.

An article has appeared in the British journal *Lancet* describing a study of ankle sprains, and three forms of treatment were outlined. They include injection with 50 mgm hydrocortisone and elastic wrap and early ambulation, strapping or taping and the use of crutches for three to four days, and casting in plaster of Paris with no walking advised for 48 hours.

The authors of the *Lancet* article, Caro and Shaw, explained: "We have defined sprains of the lateral ligaments of the angle joint as those inversion injuries remaining after bone injury has been excluded by simple X ray and "tears" of the ligament excluded by means of stress radiography.

"The treatment with hydrocortisone proved superior to the other two methods. There were no complications of this treatment and, provided that specific aseptic precautions are taken, it is an easy and safe treatment for these injuries and is apparently the treatment of choice.

"We are unable to explain the efficacy of the hydrocortisone injection, and so far as we can ascertain from published reports, no satisfactory explanation has been offered. Cyriax suggested that the antiinflammatory action was beneficial and that the inflammatory reaction induced by injury was the same as that induced by infection, but that, although it was beneficial in the presence of infection, it was *deleterious* in the presence of injury and that by reducing this reaction hydrocortisone hastened healing."

Actually, Cyriax's theory was close to hitting the nail on the head. Dr. Thomas Dougherty at the University of Utah and others have gone to the cellular level for time-lapse cinemacrography studies with the electron microscope and can show that it is a chain of events taking place at the cell level that perpetrates the destructive process of inflammation whether it is coming from infection, trauma, or chemical irritation of the tissues.

The tissue injury sets in motion the inflammatory chain reaction that changes normal cell environment so drastically a wave of cell death and destruction


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erupts. Mast cells take up water, rupture, and release histamine, serotin, and heparin. Histamine produces a series of events beginning with capillary dilatation and increased permeability with exudation into tissues of neutrophils, lymphocytes, plasma, and fibrogen. Fibers become edematous and fibrous tissue framework may be destroyed. In addition to capillary effects, the histamine-like substances are cytotoxic to neighboring cells. It has now been shown that the cytotoxic material is coming from the lysosomes contained in the cell cytoplasm that normally have a lysosome membrane around them protecting the cell from the toxic effects of the lysosome enzymes. It is these lysosome enzymes that play such an important role in inflammation. Assaulted by tissue injury and the cytotoxic effect of histamines, fibroblasts, the most numerous cells of the connective tissue, begin erratic self-destructive movements. In the fibroblast cytoplasm, lysosome membranes rupture, permitting the cytotoxic lysosome enzymes to enter and destroy the cytoplasm of the cell they were living in, and as these fibroblasts die and disintegrate these potent cytotoxins are released and go on to irritate and invade the healthy cells in surrounding tissue. A self-perpetuating wave of cell injury and death results locally and further tissue injury occurs.

The lysosome has been found to be involved in numerous inflammatory processes. Its destructive qualities can lead to death of normal cell areas and to fibrosis, the scar tissue that loses the basic function of the original normal tissue. Once the process has gone its entire route the scarring is permanent and irreversible, but prevention of scarring through control of inflammation is possible before scarring takes place. This is where corticoids or hydrocortisone do the job, at the cellular level; the corticoids stabilize the lysosome membranes. The release of cytotoxic lysosome material into the cells' cytoplasm is halted. Cell death is avoided; the lysosome enzymes are prevented from entering intercellular fluids. Corticoids have a direct effect on the cell walls. Under corticoid influence cells in inflammed tissues assume a stable morphological form. Fibroblasts nest in groups, cease erratic self-destructive motions, pull in protoplasmic processes, become rounded and very resistant to cytotoxins. The fibroblast disintegration is halted and the release of cytotoxins avoided. Corticoids also stabilize the mast cell and prevent the explosive release of histamine. Histamine effects are halted, permitting normalization of capillary dilatation and permeability. Exudation ceases, resorption of exudate by normal mechanism is favored. Damage to the fibrous tissue network ceases. Swelling, heat, redness, and pain are relieved. Corticoids inhibit granulation by preventing fibroblastic and capillary proliferation. Corticoids help preserve tissue function and normal tissue repair takes place without the continued destruction leading to scarring and slower, more poor healing.

I have heard many knowledgeable people state that there is no way to speed healing of a sprained ligament, but I feel there is a way to help nature do this and I feel the explanation we have been given by the researchers can justify this approach.

As to whose brand of hydrocortisone to be used, I feel this is each doctor's choice.

This is a list of those inflammatory processes which in the opinion of many should always be treated with corticoid injections:

1. *Tenosynovitis*—Pain on movement of tendon, a feeling of sandpaper grittiness when the tendon moves.

2. *Bursitis*—Pain on motion over bursae, tenderness, perhaps swelling.

3. *Traumatic hemarthosis*—Swollen knee. (After X ray and certainty that there is no fracture or severe ligament tear, aspirate, then 1–2 cc of hydrocortisone.)

4. *Epicondylitis*—Tenderness over epicondyle, and chronic muscle insertion complaint.

5. *Ganglia*—(Grandma's prescription is not bad: with a book, strike ganglion with wrist over the edge of a desk.)

6. *Chronic rhomboid strain*—Tenderness over rhomboid muscle between scapula and spine (passers and pitchers). Injection is indicated.

7. *Rotator cuff strains*—Chronic.

8. *Calcific deposits in supra spinstus and triceps muscle and tendon*—insertion.

9. *Trigger areas*—After manipulation, areas spot in with ultrasound and persist. Can inject with carbocaine, cyclaine, or procaine—plus hydrocortisone.

10. *Exostosis*—On heel or small tender spots at insertions of tendons.

11. *Heloma (corns)*—Occur occasionally and can be treated with anesthetic first and then with hydrocortisone injection. Good symptomatic relief.

12. *Acne*—Inject large cortedones. No antibiotic necessary, corticoids alone.

13. *Neurodermatitis*—Local.

14. *Alopecia areata*—Inject locally.

15. *Ulcerative colitis, rectal.*

16. *Arthritis, all types.*

Most controversies over injection treatment are related to the acute traumatic types of cases—those that could be managed conservatively with the probability of fairly good results with some scarring, but which would delay the boy's participation and possibly have bad psychological effects on both individual and team. Needless to say, the delay in the use of muscles leads to atrophy and weakness, especially localized.

These are some of the more controversial areas for injection treatment:

1. Ankle sprains. These are classed as mild to moderate, moderate to moderately severe, and severe tears of ligaments. We inject only the first group, and refer the second and third to an orthopedic consultant.

Always, of course, get the X ray to make certain there is no fracture. I have been fooled many times in trying to diagnose ankle injuries without X ray. I think X ray is a *sine qua non* in any joint injury.

The most common ankle injury is the sprain of the anterior talofibular ligament. I use a mixture-type injection before games and practices. The most important next step is for our trainer to put on an excellent strapping with heel lock and extra strong tape job.

In most instances we rarely lose a man for ankle sprain unless it falls into the second or third group of severity.

2. Contusions or hematomas of deltoid area, calf, or anterior thigh. I have injected about 150 of these in the past eight years and feel a high percentage have been relieved of their pain and returned to activity with no sequelae. In this particular condition I always use a solution of alidase or wydase mixed with the cyclaine, and I use from 20 to 30 cc of the solution with 1 or 2 cc of hydrocortisone mixed in. I use a spinal needle, 22 gauge, and make multiple injections into the sore muscle and hematoma areas.

We must again be careful to estimate the damage. This treatment cannot be used where a vessel has been torn and there is fairly massive hematoma. It goes without saying that all these should be treated for at least 24 hours with cold, rest and compression, and enzymes.

3. Distal attachments of ligaments, knee and ankle. On occasions there will be mild sprains or strains of ligaments. In the area of the knee there are very few indications for this injection therapy other than already discussed for effusions.

Occasionally there will be a mild sprain of the knee in which there is point tenderness at distal attachment of the medial or lateral collateral ligament. These can be injected very successfully and then the knee strapped for competition. I know many M.D.'s who would scream their heads off, but I feel it can help those few isolated cases that fit the category.

4. Costochondial bruise, bruised ribs and myositis. Here is a very difficult area. Each case must be judged individually. The injury of separation or fracture probably should not be injected for competition unless there is only very mild separation, but one can inject for therapy. Radicular injection relieves pain and makes the patient comfortable.

5. Transverse process fracture. Injection at the base of tenderness in this situation helps the patient to move. In four to five weeks, if there is still local tenderness, we feel we can inject for competition.

6. Acromial bruises and very mild A.C. joint separations. Although in this area we seem to have only about 60 percent good results, some boys can be helped a great deal.

7. Hip pointers. I have had excellent results in this area. One can infiltrate hip pointers and return the players to competition with protective pads. Again, one should never inject an injured joint or traumatized area without first checking by X ray.

Any sub-acute area injury with bacterial or viral infection in or around it probably should never be injected. Dislocations and fractures obviously never should be injected for competition. We usually don't inject areas in close proximity to large nerves or vessels.

Injection is not a treatment that is used indiscriminately, and *never* for the purpose of winning at the risk of further injury to the boy. There is a middle road on this problem; some doctors are too puritanical, some are too prone to use shots. We must always try to use common sense, based upon sound medical principles.

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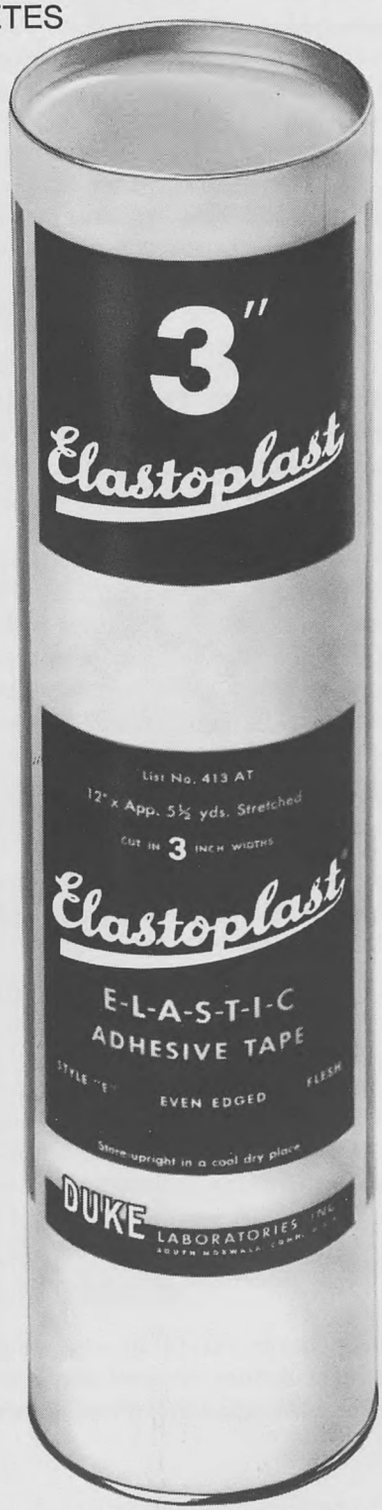

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FREE USE OF WATER FOR ATHLETES?

Sure, says this Indiana coach, who since 1948 has been giving his athletes unlimited water during practices. What's more, his players top off each session by downing a cold soft drink.

By WALTER W. GRAY

Dr. Walter W. Gray, the author of this article, has been associated with football as a participant and for the past 18 years as a coach. He is the athletic director and football coach at University High School, Bloomington, Indiana.

FREE USE OF WATER BY ATHLETES during practice long was frowned upon by coaches, trainers, and team physicians—but certainly not by steaming players.

For those who have sweated through innumerable Spartan dry sessions, it will come as welcome news that the experience of trainers and physicians verifies what players have said all the time: unlimited use of water not only improves play but also is essential to the well-being of the athlete.

Free use of water during practice for any player has been our policy since 1948. We have augmented this policy to include ice, ice water, and lemonade, and we always finish practice with a cold soft drink.

We based our decision on studies made by a former Olympic runner, Dr. Sid Robinson, professor of physiology at Indiana University, and Dwayne "Spike" Dixon, Indiana trainer for the past 18 years. They both hold that internal body cooling is as important as external cooling.

In recent years we have extended our program by issuing salt tablets to all players and encouraging them to use more salt on their food. Salt creates a thirst and replaces the amount of body salts lost through perspiration. This maintenance of a balance of body salts prevents heat stroke or heat exhaustion.

Following is a checklist for coaches and young players to follow when practicing during periods of high temperature and high humidity:

1. The danger zone during practice is 85 degrees and high humidity.

2. Players should have unrestricted use of water.

3. When the temperature rises above 85 degrees, a bag of ice should be available on the field.

4. Limit strenuous individual drills to 10 minutes when temperatures are above 85 degrees.

5. Two salt tablets should be furnished for players who are overweight; one for all others.

6. Remember that the body requires 7 to 14 ounces of water every 30 minutes during strenuous practice.

7. Salt solution can be used with two 10-grain salt tablets per one quart of water.

8. Limit practice sessions to a maximum of 90 minutes.

9. Thirteen quarts of water are required daily for a "working" person in temperatures above 85 degrees over an eight-hour period.

(*Continued on page 15*)

The Treatment of Acute Ankle Injuries

"Treatment" includes proper use of a well-fitted cane for faster recovery, less chance of compensation injury, and fewer post-recovery bad habits of gait.

By Joe H. Gieck, R.P.T.
Head Trainer, Department of Athletics
University of Virginia

The program of treatment for acute ankle injuries suffered by athletes at the University of Virginia is designed to return them to competition as quickly as possible and to avoid the development of chronic conditions. It can also be helpful in shortening recovery time for students not participating in the intercollegiate program. With proper treatment, normal gait is not affected, unnecessary pressure is not applied on the ankle joint, and injury caused by compensation is avoided.

All suspected fractures should be X-rayed promptly. If there is some doubt whether a fracture has occurred, a compression dressing in the form of an elastic wrap is applied. This should be used in conjunction with ice and elevation to reduce hemorrhage while the athlete awaits X ray. If the X ray is negative this treatment should be continued for 45 to 60 minutes.

Provided the injury has been diagnosed as mild or moderate and there is no fracture, we have found the proper use of a cane to prevent limping to be a valuable aid to quicker recovery. The patient is instructed in proper walking mechanics, and to use the cane with just enough pressure to eliminate the limp. The cane should be used in the hand opposite the injured ankle; this prevents lurching and lateral leaning, utilizes optimal muscle balance in the gait, simulates a normal gait as the leg and contralateral arm swing together, and is less fatiguing. If a slight limp is still evident, the patient should carry his books or some other weight on the ipsilateral side to compensate for it. If the limp is too decided, crutches should be used at the outset.

The length of the cane is important. With the person standing, and wearing his shoes, the cane should reach his great trochanter. This places the elbow in approximately 35 degrees of flexion.

When an athlete returns to competition he may limp unconsciously, even though he no longer feels pain. Usually he has acquired this unnatural gait during the acute phase of his injury, and its correction is difficult because he is not aware that he limps. The use of the cane to normalize the gait from the outset thus tends to minimize bad habits.

Characteristics of the limp of a person with an injured ankle are lack of toe push-off, lack of knee flexion during swing-through phase, lack of knee extension at heel strike, and external rotation of the foot or upper leg. The injured ankle is also painful during the swing-through phase of the uninjured leg. When he limps, the athlete's muscles used in normal gait suffer atrophy because of disusue, and the muscles used in substitution are susceptible to strain because they are functioning abnormally. The cane, when used during the acute phase of the injury, is a simple aid to recovery which also reduces the danger of compensation injury.

If the athlete leans too heavily on the cane, an open basket weave taping of the ankle with one-inch tape will also help during the acute phase. This taping is changed with each physical therapy treatment, and the skin is checked for any signs of irritation.

The taping is basically a Gibney support of alternating vertical and horizontal strips, with heel locks adding extra support. One of the heel locks pulls the ankle toward eversion, the other toward inversion. The open basket weave will not interfere with circulation as sometimes occurs when an ankle is completely encased in tape. Taping should be discontinued when the athlete requires less pressure on the cane when walking. In conjunction with this taping, an elastic bandage is applied. If the ankle is edematous, a sponge pad compression dressing is used under the elastic wrap. The physician may also prescribe an edema reduction drug to hasten the elimination of hematoma.

Physical therapy modalities are primarily whirlpool, contrast baths, hydrocollator packs, and analgesic packs between treatments.

Four isometric exercises have been employed successfully in reducing hematoma and maintaining normal strength of the lower leg. In the first exercise the patient dorsiflexes his ankle and holds this position while another person attempts to plantarflex the ankle. In the second, the reverse pressures are employed. In the third and fourth, the ankle is everted and inverted against resistance. Each exercise is maintained for six to eight seconds.

Careful physical therapy and rehabilitation techniques will prevent many potentially chronic "ankles."

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The Well-Watered Athlete Is Healthier, Plays Better

(*Continued from page 13*)

10. Players can become acclimated to humid weather and high temperatures by having a morning and an afternoon practice session of 45 minutes each on the first day and increasing the respective practices by 15 minutes each day until a maximum time of 90 minutes is reached on the fourth day.

11. Salt particularly is important during this acclimating period.

Following practice, players should be given all the ice water and/or cracked ice they wish in order to reduce the internal temperature quickly to restore the normal physiological function of the body organs.

AMA Reference Book Clarifies Athletic Injury Terminology

Strain or sprain, charley horse, and concussion are familiar terms used in athletic circles, but confusion exists regarding their precise meanings and the definitions of many other sports hurts.

A new reference book, written for athletic coaches, trainers, team physicians, and others involved in high school and college sports, is designed to clarify and define injuries and conditions that commonly occur in organized athletics.

It is an effort to present a common language and vocabulary that will contribute to proper health supervision. Published by the American Medical Association and called *Standard Nomenclature of Athletic Injuries*, it is designed to facilitate maintenance of a universally understood medical record.

The book, nearly two years in development by the AMA subcommittee on classification of sports injuries, attempts to make a definitive evaluation of injuries and to aid persons involved in sports supervision. The 155-page handbook lists the 550 most commonly occurring injuries and conditions and labels their preferred terms. It includes other medical or colloquial names under which the conditions may be known and lists their causes, symptoms, complications, and typical X-ray findings, laboratory reports, and pathology.

The degrees of severity in many cases are cited to provide for better management and recording of specific injuries.

A glossary of 113 general and related terms and a cross-index of terms are included for further clarification and identification.

In the preparation of the book a survey was made of members of the National Athletic Trainers Association and the American College Health Association Section on Sports Medicine. Their responses indicated clearly the need for a common book of terminology.

The publication is being distributed by the AMA for $2.00 when mailed to addresses in the United States, its possessions, and Canada or Mexico; $1.00 for 25 copies or more mailed to addresses in those areas; and $1.50 to medical students, interns, and hospital residents in those areas. The cost to residents of all other countries is $2.50. Orders should be placed with the AMA's Order Unit, 535 North Dearborn St., Chicago, Ill. 60610.

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