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## A Research Paper on the Definition, Treatment, and Rehabilitation of Knee Injuries Incurred in Football

Larry W. Maguire  
*Central Washington University*

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A RESEARCH PAPER ON THE DEFINITION, TREATMENT, AND  
REHABILITATION OF KNEE INJURIES INCURRED  
IN FOOTBALL

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A Thesis  
Presented to  
the Graduate Faculty  
Central Washington State College

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In Partial Fulfillment  
of the Requirements for the Degree  
Master of Education

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by  
Larry W. Maguire  
August, 1969

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Everett A. Irish, COMMITTEE CHAIRMAN

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Stanley A. Sorenson

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Dohn Miller

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## Chapter 1

### THE PROBLEM AND DEFINITION OF TERMS

Knee injuries are probably the most common of all athletic injuries. They are almost as common in football as ankle injuries and are far more disabling. Coaches and teachers in the field of physical education and particularly athletics are indirectly responsible for the safety of their student participants in the program they are conducting. Therefore, it is imperative that educators be aware of the implications surrounding such injuries.

Today, man enjoys football and other athletic events both as recreation and as competitive sports. Since the year 1933, when the first pamphlet on the prevention and care of athletic injuries was written, there has been a great many medical discoveries and advances which have increased the knowledge as to how to diagnose, treat, and rehabilitate an injury to the knee. Unfortunately, however, those educators working directly in the area of athletics, are not always aware of the implications and events leading to the possibility of injuries which occur to the athlete. In any case, the effects of the injuries are not always recognized as being factors to take into consideration when planning and implementing the athletic program. While the knee injury to the star athlete is widely



reported by the news media, and the "football knee" is so widely recognized, no coach or instructor can be expected to be an expert in the surgical treatment of such injuries. There is, however, a need for the coach and instructor to be familiar with the problems surrounding the injury in order that precaution can be taken, and activities eliminated which provide for the safety of the student participant.

## THE PROBLEM

### Statement of the Problem

Coaches entering the area of football need to be aware of the factors involved in knee injuries. Both experienced and inexperienced coaches can benefit from research which will enable him to adequately care for any injuries which may arise. Often coaches in athletics do not have available to them, ready information covering this problem. Therefore, the purpose of this investigation was to provide relevant data pertaining to all facets of the knee injury as it occurs in football; the diagnosis of the injury; prescribed treatment; and the actual rehabilitation of the knee. Attention will be given to these areas in hopes that the problems accompanying such an injury may be thoroughly examined and reached a better understanding.

### Importance of the Study

The value of competitive sports, especially the contact sports, is inevitably a part of our culture and is exhibited in everyday life. Injuries occur; therefore, the more knowledge that can be obtained, the better the care that can be given. In the contents that follow, this information will be presented and evaluated in an effort to attain a more thorough understanding of one small phase within the scope of athletic injuries. An overall examination of the knee injury as it occurs in football and the treatment involved will be of significance to those coaches who realize the importance and the personal responsibility for being cognizant of these problems with their players.

The writer developed this comprehensive overview of the knee injury problem with the intent of providing a framework of knowledge for himself as well as to other coaches and administrators who may benefit from such material for personal use. Such available data gleaned from the research of medical and educational authorities will be of value to the coach or administrator who does not have the time or facilities to pursue such an investigation.

### Limitations of the Study

There was no attempt to compare or evaluate training or other coaching methodologies relating to the incidents of knee injuries. This research investigation was undertaken only to provide a comprehensive

compilation of data which could serve as a resource guide. It was not the purpose of this study to formulate conclusions based on statistical analysis of the significance or lasting effects of the knee injury. It was determined that a knowledge base regarding the care and prevention was a more worthwhile approach to the problem, rather than a mere review of cases of knee injuries taking place during the athletic sport of football.

A further limitation to the study was the lack of literature providing a comprehensive overview of all facets of the knee injury problem. Literature on the subject was emersed in various fields of discipline as is shown in the Bibliography of this paper.

### Overview of the Paper

Chapter 2 presents the opinions of authorities in the fields of medicine and education regarding the significance of the knee injury problem and how such injuries affect the physical and mental well-being of the injured person.

The review of literature pertaining to athletic injuries was attempted in an effort to gain insight into this area of concern and also to provide rationale for the compilation of a comprehensive guide on football knee injuries for use by the coach and athletic administrator.

Chapter 3 is the presentation of the resource material which delineates various factors concerned in the specific knee injuries pertinent to the football player. This research data provides a basic guide for use by the coach and administrator.

Chapter 4 summarizes the research investigation and offers recommendations for further research.

## DEFINITION OF TERMS

### Cause of Injury

Definite origin of why damage was inflicted to a part of the body.

### Contusions

Type of bruising injury in which no tearing or breaking of the skin occurs.

### Rehabilitation

To restore to the original state.

### Drawer Sign

The presence of abnormal forward movement of the knee joint.

### Anterior Cruciate Integrity

Proper functioning of knee joint through normal movements.

### Retropatellar Fat-Pad

A pained area directly behind the knee cap due to hyperextension or a blow to this area.

### Knee Injury

Damage to the lower extremity of the leg caused by a blow, striking force, or other similar pressure.

### Prepatellar Bursitis

Technical term for "water on the knee," which is an excess amount of fluid accumulated around an injured area.

## Chapter 2

### REVIEW OF LITERATURE

A major concern of most coaches and parents of players is the possible incidence of injury to the participant in the athletic event. Authorities in the area of physical education point to the need for coaches and other teaching personnel to cooperate with the family and community in preventing the occurrence of injury on the playing field, and providing for optimum programs in sports and athletics:

. . . new and imposing demands will be made on teachers and administrators. More effective coordination with medical personnel, the home, and public, semipublic, and private agencies will have to be developed . . . (2:xi-xii).

Hirata (18:210) remarks upon the inability of the coach to assume the task of being an expert in the surgical treatment of knee injuries, or an expert in the reconstruction of permanently damaged knees. He also explains the necessity for educators to elicit the assistance of those in the medical profession and the need for schools to provide competent doctors "primarily responsible for the health of athletes in a controlled program."

According to Daniels and Davies, teachers and coaches:

. . . need to know a great deal about the structure and function of the human organism. They must understand not only normal structure and function, but also the effects of disease and injury,

and the kinds of experiences . . . to remove the condition, or at least minimize its effect on total living (2:81).

While the employment of a medical specialist is often beyond the financial realm of many school districts, it is conceivable to expect those educators involved in the athletic program to avail themselves of any resource person or research data which will guide them in the direction of prevention and safety.

Dr. Donald B. Slocum points to the need for the coach to become aware of the manner in which injury may be incurred and the injuries most likely to occur in a given situation. He said that football presents "certain inescapable injury hazards, due to the very nature of this vigorous body-contact sport" and that a knowledge of the mechanics of these injuries is vital if adequate medical history and effective diagnosis is to be made. He further states:

Classifying the injuries incurred by football players has given valuable clues for prevention, diagnosis, and treatment . . . . Here probably the most lethal weapon in football is the oncoming knee, which exerts forces that must either be absorbed by the head or transmitted to the vertebral column (13:1640).

Another member of the medical profession, Dr. Paul Trickett, Director of Athletic Medicine at Tulane University, remarks upon the psychological effects of the football injury. He states that while physically the injured player may recover, the trauma factor is always present and indeed increasing with the "intensity of participation" in the athletic event" (15:iii). Therefore, it would seem that the coach and athletic trainer must

recognize the possible traumatic psychological effects of injuries as well as the physical implications. Trickett lists "The Bill of Rights for the College Athlete" and a review of his statements leads the reader to the realization that such a "Bill of Rights" is applicable to any coach or player from the elementary school level and higher:

Participation in college athletics is a privilege involving both responsibilities and rights. The athlete has the responsibility to play fair, to give his best, to keep in training, to conduct himself with credit to his sport and his school. In turn he has the right to optimal protection against injury as this may be assured through good technical instruction, proper regulation and conditions of play, and adequate health supervision.

**GOOD COACHING:** The importance of good coaching in protecting the health and safety of athletes cannot be minimized. Technical instruction leading to skillful performance is a significant factor in lowering the incidence and decreasing the severity of injuries. Also, good coaching includes the discouragement of tactics, outside either the rules or the spirit of the rules, which may increase the hazard and thus the incidence of injuries.

**GOOD EQUIPMENT AND FACILITIES:** There can be no question about the protection afforded by proper equipment and right facilities. Good equipment is now available and is being improved continually; the problem lies in the false economy of using cheap, worn-out, outmoded, or ill-fitting gear. Provision of proper areas for play and their careful maintenance are equally important.

**GOOD MEDICAL CARE . . . Including:**  
**FIRST . . .** a thorough preseason history and physical examination. Many of the sports tragedies which occur each year are due to unrecognized health problems. Medical contraindications to participation in contact sports must be respected.  
**SECOND . . .** a physician present at all contests and readily available during practice sessions. It is unfair to leave to a trainer or coach decisions as to whether an athlete should return to play or be removed from the game following injury. In serious injuries the availability of a physician may make the difference in preventing disability or even death . . . (15:16).



As it has been pointed out, football because of the very nature of the game, accounts for a major proportion of athletic injuries. In a study made by the Carnegie Foundation for the Advancement of Teaching, twenty-two universities and colleges in different parts of the United States were investigated for incidents of athletic injuries. Among 44,000 students, 1,320 serious accidents and injuries had occurred in one year. These included sprains, dislocations, concussions, fractures, collapses, and internal injuries. More than half of the 1,320 accidents were due to football (15:iii).

Slocum and Larson reported a study of seventy-six patients personally examined and operated on whose injuries were located in the knee. An analysis of the results of the investigation showed that of the seventy-six patients, sixty-five were athletic injuries. Forty of these occurred in football: twenty-five injuries resulted from lateral or posterolateral blows to the weight-bearing leg while running (clipping), nine occurred when the patient twisted a leg when suddenly changing direction while running, five injuries resulted from gang tackles, and one occurred when the patient received a lateral blow to the leg while standing (14:211-225). It appears significant to note the large number of football injuries with the variety of incidents resulting in injury.

Larson and McMahan reported a study taking place with the school population of the area which includes the University of Oregon at Eugene. A study of 1,338 athletic injuries as viewed by a group of four orthopedists,

revealed 20 percent of such injuries to occur in the age group fourteen years old and younger and 40 percent in the group fifteen to eighteen years old. Sixty per cent of the students were in elementary and junior high schools, 15 percent in high schools, and 25 percent at the university. The high school students with 40 percent of the athletic injuries in the smallest numerical group appeared to be the most vulnerable to athletic injury. The authors concluded that the high incidence of joint injuries resulting from the high school students' participation in athletics was accounted for by many factors, including the nature of the athletic sport as well as the physical maturation of the player. The authors reflect upon the need for the coach to recognize these factors such as involving pre-teenagers in a football game without limiting playing time, etc. They further pointed out that coaches consider the effects of possible injuries along with the benefits derived by youth participating in athletics (11:607-612).

The above studies point out the relevance of the game of football to the occurrence of athletic injuries, and the fact that principles for prevention and treatment of injuries should be acknowledged as a part of the educational philosophy of the coach and trainer. Trickett directs responsibility to the coach and asks him "What sort of man do you want [your child] to have as his coach?" He goes on to say:

First of all, you want a man who knows his sport and can teach the skills required in that sport to those who come under his charge . . . . Certainly, you want a man who knows something

about the physiological and psychological make-up of the age group he is dealing with. What are their capabilities? What are their limitations? You want a man who can be inside the boy's head and see what makes him tick . . . (15:20).

The author discusses the attitude of the coach and states that all too often youngsters are pushed too far too fast by coaches whose only philosophy seems to be to win at all cost, with apparent total disregard for the physical and emotional well-being of the youngsters:

Although a great deal of the coach's responsibility for insuring the health and safety of the athlete is shared with his trainer and with the team physician, generally speaking it is the coach who must enforce the rules of conditioning, the rules of health, and the rules for safety that coach, trainer, and physician have set up (15:20-21).

It is pertinent to reflect, at this point, upon the fact that while authorities are pointing out the need for coaches to assume knowledge and responsibility for the prevention of athletic injuries, there are many coaches whose attitudes about such occurrences of injuries are of a selfish nature. Trickett observes that there is no excuse for a coach not reporting an injury simply so the player can suit up and continue to be a member of the team. He says that time and again "I've heard of coaches saying, 'I'd rather have my star out there limping around than anybody I've got on my bench.'" (15:23).

Hirata is concerned with the lack of information available to the coach or injured player whenever such injuries happen to be reported. He stated the lack of professional knowledge by those in the medical field was also apparent when it came to the vast implications surrounding a

football knee injury, and similar athletic injuries:

. . . For despite the many books and the voluminous literature by experts in the field, he will find, as I did, that the real problems, the difficulties that plague all doctors working directly in athletics, are either not to be found in the printed word, or are hidden in the middle of paragraphs dealing with more "major" clinical problems (8:3).

Hirata further elaborated upon the lack of available medical data when he stated that "a frenzied scrutiny of the literature at the nearest medical library, or a quick look at one of the accepted classics will avail the doctor nothing" (8:3).

This accusation by Dr. Hirata leads one to question why this is so. Why is there such a lack of accurate medical information on this level? Hirata gives an explanation:

The answer to these questions is simple. An overwhelming percentage of athletic disabilities are so minor as to warrant little or no attention from the devoted clinician, who deals only with "serious" conditions. A sore hamstring, asymptomatic except when a boy really "pours it on," is hardly worthy of notice; there is no real disability, the boy can continue to go to school, he is not in pain, so why worry about it? The soreness will surely disappear if the part is adequately rested, will it not? Given sufficient time and rest, the complain cannot fail to disappear! (8:4)

The long lasting results of knee injuries by some individuals attest to the fact that such lack of medical awareness and treatment is disturbing. As Hirata emphasized, athletes and coaches fully and rightfully so, expect serious accidents and disabilities to be treated with efficiency, dispatch, and skill. But they also expect that any disability--no matter how minor--will be treated with the same efficiency, dispatch, and skill.

All disabilities are important and must be dealt with seriously and individually (8:4-5).

A comprehensive study of knee injury in sports has been recently reported by Klein and Allman. Their research is directed to the athletic team physician, athletic trainer, coach, and other physical education personnel. These authorities have clinics and treatment laboratories with which to develop methods to rapidly and completely restore the strength of muscles weakened by injury and disuse. Apparently, the importance of studying the knee injury problem is coming to the attention of professional educators (10).

This was evidenced during the Second Annual Sports Medicine Seminar held in March at Seattle, Washington, when a major concern of medical and educational leaders present involved the problem of knee injuries. According to Bob Peterson, Head Trainer at the University of Washington, more coaches need to be aware of the definite causes of knee injuries. He said that many times the severity and longevity of the injury is brought about by the negligence or lack of knowledge by the person in charge--the coach. It was suggested that perhaps through a projected and mandatory program of interest, some of these problems could be eliminated by informing the coach as to how to diagnose and treat these injuries (12).

In retrospect of the review of literature, it can be concluded that authorities in the fields of education and medicine acknowledge a lack of information on the part of both professions. While it was agreed that the

dangers and lasting implications of athletic injuries are apparent and of prime importance to the physical and mental well-being of the player, medicine and education need to join ranks and develop specific knowledge bases regarding the prevention and treatment of the problem.

## Chapter 3

### DEFINITION, TREATMENT, AND REHABILITATION

#### DEFINITION

The knee injury is probably the most serious injury that occurs in football. Nowhere in athletic medicine are early examination and treatment more important. Certain results can be expected, but there is no miracle pertaining to knee injuries and their treatment.

Let us examine some of the reasons or situations as to why an injury to the knee occurs. The knee is a very vulnerable joint and is not designed to accept undue stress or shear forces that might be placed upon it. The two biggest causes of injury are receiving a blow from the side such as delivered in a "side block" or being tackled and the undue stress that is present when cleats are firmly fixed in the turf. When these situations are presented and all factors involved, injury usually occurs. Something has to give and many times it is ligaments or cartilages found in the knee joint, especially those of high school boys whose joints and ligamentous structures are not entirely mature or fixed.

The next phase to consider is how to evaluate the true extent of the knee injury. Complete and painstaking examinations must be undertaken

at the time of the injury and thereafter. Every advantage must be taken of X-ray and other diagnostic measures.

Complete examination includes: First, an exacting history of the precise mechanism of injury, something that must be obtained immediately after the injury and before the athlete forgets exactly how it happened. Second, a thorough inspection of the entire knee joint for swelling or deformity must be made. Third, a sequential series of tests that must include a complete range of motion from hyperextension to full flexion, abduction and adduction in full extension as well as 15 degrees flexion, the "drawer" sign and rotation of the lower leg on the femur with the knee flexed to 20 degrees. No knee can be examined without each of these maneuvers nor can any injury be correctly evaluated by any single one without the others (8:214). Each maneuver has a specific meaning and the presence or absence of findings in each one of them is of lasting significance. Fourth, all areas must be thoroughly palpated, checking for tenderness along the medial and lateral joint lines, the medial and lateral collateral ligaments, the medial femoral condyle, and finally, testing for true joint effusion as contrasted to prepatellar effusion while routinely pressuring the fat pad area for suggestive thickening or tenderness. Only after this complete examination can a working diagnosis be formulated and a program of future rehabilitation be established.



## Contusions

The next step shall be to consider the types of knee injuries encountered, the first of which will be contusions. There are many types of contusions which are the result of a specific incident of impact. These are almost always possible to determine within the first minutes of evaluation. If the blow was neither sufficiently forceful nor remarkable to cause any counter-joint motion, the player will be able to state this with a positive knowledge that can be depended upon. The site must then be carefully located and inspected, keeping in mind possible confusion with contusions on the femoral condyle and associated neighborhood symptoms that might falsely suggest collateral ligament strain. Also, the "low charlie" with its penchant for suprapatellar bursal bleeding must be kept in mind. Also, bruises of the bony surfaces of the condyles or of the patella itself can occur with local characteristics typical of the bone bruise.

## Minor Ligament Strains

The second type of injury to be discussed will be the minor ligament strains. Minor ligament strains are evidenced first by a history of counter-joint force; and second, by distinctly localizeable tenderness along the length of the medial or lateral collateral ligaments. Occasionally this tenderness is limited to a narrow area, but this is diagnostic even in the absences of demonstrable instability either in full extension or at 15 degrees flexion. The most common type of ligament strain is characterized by some

degree of demonstrable laxity in the involved ligament with a distinct elasticity on abduction or adduction at 15 degrees flexion; and in a few days is as tight and stable as ever. Two other types are the medial collateral strain and the lateral collateral strain which are not serious injuries as long as there is full range of motion and full hyperextension in the standing position.

### Ligament Tear

The next injury type that will be discussed is the complete or near complete collateral ligament tear. All the symptoms present in ligament strains are present, but to a greater degree. Abduction or adduction is greatly evidenced without any sense of elasticity at all and full quadriceps stabilization in extension does not alter the degree of lateral instability. In cases of complete collateral tear, the only remaining stability is provided by the medial joint capsule itself. If this is partially torn, there may be so little support that the true limits of lateral angulation of tibia or femur can be downright frightening.

If there is joint-line tenderness and limitation of extension or hyperextension by more than five degrees, a cartilage injury must be suspected which is the next injury type to be discussed. Every opportunity should be afforded the knee to spontaneously resolve under these circumstances since past experiences has shown that a large proportion of these subside spontaneously, full range of motion returns, joint-line tenderness

disappears, and the football player can return to full participation. Close observations should be maintained on the knee because re-injury or lack of proper attention and care will undoubtedly result in surgery to remove the damaged cartilage.

### Anterior Cruciate Integrity

Now we come to the "drawer sign" and its true meaning, the presence or absence of anterior cruciate integrity.(8:214). This is directly dependent upon an immediate on-the-spot examination which may be the most revealing before any reflex spasms of the hamstrings can develop to completely obscure any possible positive sign.

Of additional importance in all knee injuries, but particularly in cases of ligament strain, is the rapidity of quadriceps atrophy. This atrophy is sometimes evident within three or four days and is apparent in the lower-most portion of the vastus medialis, just above the patella. This atrophy is all the more evident because of the usually extraordinary development of this muscle group in the football player or any other competitive athlete. Ironically, this is usually the last segment of the quadriceps to develop even after the most strenuous competition over many years and is the first to go after injury. It must be restored as soon as possible to stabilize the injured knee.

### The Retropatellar Fat-Pad

Another injury that occurs to the knee is the retropatellar fat-pad to use medical terminology, but is commonly called the "pinched fat-pad" in athletic terms. This injury is characterized by the complain of pain in the kneecap or patella area on hyperextension. A thorough examination may fail to reveal any ligamentous instability, joint-line tenderness, or evidence of internal damage; yet the football player will still complain of pain and increasing discomfort directly behind the patella. Examination of this area reveals an ill-defined soft tissue thickening on both sides of the patella, which is exceedingly tender and is most often termed as a bruise. Under normal circumstances this injury might not be too noticeable and would present only minor discomfort. However, under the stress of competitive athletics such as in football, the incessant demand on repetitive knee action is certain to pinch the pad sooner or later. Once this pinching occurs, hemorrhaging results and the pinched or damaged tissues swell more and present a larger protruding mass that is painful and tender. During this time the symptoms and the discomfort increase unless activity is prohibited until this "fat-pad" and the surrounding tissue have had the opportunity to return to normal or ordinary condition.

### Prepatellar Bursitis

Prepatellar bursitis is another knee injury that is of concern to football players. Commonly labeled as "water on the knee," it is

characterized by excessive fluid present on the knee, usually caused by a blow or impact to the bursa. This condition is usually eliminated by aspiration, ice, and compression or use of steroids. Also of great importance is the use of a greater amount of padding or a more absorbent type knee pad to insure adequate protection and prevent further aggravation or damage to the irritated bursae.

There are other injuries or problems to the knees such as Osgood-Schlatter's Disease and Menisectomy, but since these are not usually an injury caused directly by football, they will not be discussed at this time. Many times they may create difficulties for the football players which are then labeled as injuries caused by football.

Also there are the rare but easily recognized dislocation of the patella. This injury is usually lateral and is very painful and disabling. The deformity of a knee whose patella has been displaced laterally out of the condyle notch and is locked into a lateral position is impossible to miss. Immediate replacement by a qualified person such as a physician or team trainer should take place on the spot of the injury before spasms and swelling occur. Any delay in replacement of the patella causes increased pain and difficulty. Immediate attention should follow in the form of X-rays for possible bone chips or fractures and to determine if surgery is necessary for complete treatment and correction of the injury.

## TREATMENT

The next phase to be considered is the treatment and rehabilitation of the knee. First of all, when a knee injury occurs, any good coach, trainer, or doctor should practice a sound "on-the-field" routine. This means that the injured player should be supported or carried from the field either by his teammates or on a stretcher. This is no time for heroic efforts or "tough it out" attempts which will bring the oh's and ah's from the fans and possible increased injury to the player. The fans will clap and the cheerleaders will give him fifteen raahs regardless of how he leaves the field, so think of the injured knee and carry him off the field. The injured knee should be packed in ice immediately and elevated. Hopefully, a team physician or trainer will examine the knee before a great amount of swelling occurs. A compression pad of cotton batting or composition roll is placed over the knee and wrapped with an elastic bandage. Nowhere in athletic medicine are early examination and early treatment more important. It is difficult to examine an injured knee adequately three or four hours after the time of injury. Swelling and muscle spasms occur and make functional tests for stability and flexion unreliable and difficult to perform. Early diagnosis and treatment usually enhance the speed of recovery and most of the time insure more positive results. Knowing how the injury occurred is extremely important in evaluation of the nature and extent of the injury. One of the most important factors is that all knee injuries require immobilization until

the exact nature of the injury is determined. If the football player is allowed to walk on an injured knee, changes or increased damage might occur which might mean that the joint cannot be repaired properly even through surgery.

In the case of minor knee injury such as partial or minor ligament tears and strains, the boy should be required to use crutches probably for a minimum of three or four days or longer depending on a doctor's prescribed treatment. This is to keep all weight off the knee to prevent aggravating the injury and to allow the swelling to decrease. Many times a cast is required to insure immobilization of the knee joint.

The majority of the knee injuries will involve the medial meniscus which is the medical term for the cartilaginous surface of the joint (3:114). Injuries of this type require surgical repair, usually the sooner, the better the outcome of the injured knee. Although a boy may continue to play with cartilage damage, his knee will begin to lock, causing increasing pain, greater damage, and decreasing palying efficiency, which is why surgery is so necessary.

In the cases of complete ligament tear, surgery is required to insure proper results in re-establishing the knee. Frequently both the collateral and cruciate ligaments are torn. It is possible for a person in normal life to function with torn cruciates, but not a football player who is subjecting his knee to abnormal stresses.

One of the biggest problems that complicate the diagnosis of the knee injury is the almost uselessness of the X-ray. Any broken bone, bone chips, dislocated patella, or similar injury will show up on the X-ray, but not a damaged cartilage or ligament. Therefore, it is imperative that a physician or trainer examine and diagnose the injury or refer the injured player to an orthopedic specialist. Also of equal importance is to be aware of any previous injury that might have been sustained by the knee.

The biggest therapeutic improvement in the treating of soft tissue injuries is the use of medications known as enzymes, such as Papase Ananase or similar proteolytic type. These enzymes will reduce the injury and discoloration period by apparently speeding the re-absorption of blood and fluid in the injured area (11:87). Also, they have a tremendous psychological effect on the injured player because they are fairly new and not too well known by the average person.

Another phase in the treatment of the knee is to start whirlpool therapy approximately 48 hours after cessation of treatment with ice. This should be done gradually and is definitely not to be used for a minimum time period of 48 to 72 hours after the time the injury was sustained. Heat therapy through the use of the whirlpool bath should begin at fairly low or moderate temperatures and gradually increased to a higher degree. However, it is necessary to consult with the physician who is treating the injury since only those of a minor nature will respond while those of a more serious nature will probably require surgery.



## REHABILITATION

Most of the time football players are great patients physiologically and psychologically. They are fine physical specimens and usually have been ingrained to accept and live with injury and pain. However, too many times these same players are subjected to unrealistic rehabilitation, probably because of their playing ability, with too little regard for their physical being and the nature of their injury. Hopefully, these situations may be avoided by leaving the boy under the care of the attending physician and thus making him responsible for instituting and supervising the rehabilitation processes.

Before a boy is returned to the football field, his knee should be at least as strong as it was before the injury. The main problem that a boy is faced with is atrophy of the muscles supporting the knee, particularly the quadriceps group. Because the strength and stability of the knee is dependent upon the quadriceps, it is important that this muscle group is at least at its original strength to provide these qualifications.

Basically, there is not much reason why extensive atrophy should occur; but it often does, usually because of negligence and unawareness. Even on the day of the injury, work can begin with the quadriceps muscles. When the leg is fully extended, the boy can contract the muscles and hold it for approximately five seconds. No joint movement is involved and a boy should be able to do two or three sets of ten repetitions of this post-

operative exercise. This is nothing more than a simple isometric exercise and will aid in good muscle tone which is easier to maintain than to rebuild after the muscles have been allowed to atrophy.

As soon as the boy's condition permits, he should begin raising the leg in a fully extended position to strengthen the quadriceps. If his leg is in a cast, he can use isometric type exercises by having someone hold the cast while he exerts force upward. The hamstring muscles group can be strengthened in the same manner by simply having the boy roll over on his stomach and force up on the leg against the cast or stay on his back or in a sitting position and exert downward pressure.

As soon as possible, attempts to restore full flexion to the knee should be made. The type of injury will determine what treatment and what type of motion should be used. Probably the best exercise to begin with is to have the boy sit on the edge of a table with the lower portion of his leg hanging down over the side and flex the knee. The weight of the leg itself will be enough at the beginning. He should raise the leg until it is straight and then slowly lower it to the original starting position. A boy should start out with five to eight repetitions and gradually increase according to the individual's tolerance and endurance.

As soon as the boy has achieved a reasonable range of motion, he should begin to walk. Here is where the team trainer or physician should be consulted. Emphasize the point of not limping or favoring the knee. This will be difficult in the beginning, but it is important when striving to

rebuild strength and endurance. After a reasonable length of time, he should begin running to establish stability to the knee. As progress is made, the boy should do a few simple agility drills such as quick starts and stops, cuts, figure eights, and other similar maneuvers. This should be a gradual process determined by the type and nature of the injury and designed to restore the knee to full use.

Many types and variations of exercises are used to rehabilitate the knee. Some of them are running and bicycle riding, preferably on a stationary or exercise type mode so that the injured player can be properly supervised. Another exercise to be utilized after flexion is to use weights such as the boot, sandbags, or the quadriceps bench, such as is designed in the Universal Gym Set or the Marcy Gym Set. There are many home-made apparatus such as inner tubes, springs, etc., that can be manufactured to fit the individual budget and facilities and provide adequate exercise.

Over-exercising can be as dangerous as under-exercising, but is not so common. Therefore, supervision and guidance are essential so that any attempted exercise is not extended beyond tolerance and results in retarding rehabilitation. The boy must be encouraged to do enough exercise to insure his opportunity to return to the football field. Again, it should be emphasized that a knee strong enough to allow a boy to bowl, dance, and lead a normal everyday life may not be strong enough to withstand the stresses and strains that it will be subjected to in football.

Once the player returns to football practice, the injured knee is still of primary concern. How do you support the knee? Externally, the most elaborate devices of steel, plastic, rubber, canvas, and elastic have failed to provide adequate support under the daily demands of football. Granted there are some such as the Palmer knee brace that seem to do a better job than others, but none are really satisfactory. Taping the knee every day seems to provide the best results, but this proves to be costly to some athletic budgets and is not always 100 percent effective. The main concern should be for the stability of the knee in order to allow the player to participate without excess danger of re-injury. Any boy whose knee is so unstable that it cannot withstand the demands of football which occur when flexed should be prevented from participation regardless of his own desire, parental pressure, or his "importance" to the team. No boy should be subjected to possible permanent injury to win a game or championship. These cases are usually the exceptions rather than the usual cases, but this should be kept in mind.

The next ~~item~~ to look at is the role of football cleats in knee injuries. In the past few years, there has been a great deal of concern, study, and experimenting in the correlation of the knee injury and the football cleats. Hirata reports that originating with Hanley at Bowdoin, who demonstrated a convincing relationship between cleats which were firmly fixed in the ground and subsequent knee injury, there has been many modifications and changes (8:229). The cleats have been shortened,

rounded, made into circular discs and flat bars, redesigned like soccer cleats, made from rubber, metal, and plastic, but still knee injuries occur. In some cases, the heel cleats have been replaced by an ordinary shoe heel in an attempt to prevent injury. Knee injuries can and do occur if the heel becomes firmly locked in the ground, thereby creating torsional forces to the knee (8:235). This is compounded when impact is added, such as a block or tackle, especially from the side. This leaves a great deal of speculation and second guessing to all concerned parties and provides a great selling point to the manufacturers of football shoes.

## Chapter 4

### SUMMARY AND RECOMMENDATIONS

Throughout the paper, the writer has endeavored to objectively and thoroughly examine some of the various types of knee injuries that occur in football. A review of related literature showed that while medical and educational authorities were aware of the problem, a definite lack of literature in both areas often leads to haphazard treatment and attitudes by doctors and coaches alike.

The main points that were emphasized in the paper were those factors relating to methods of treatment and rehabilitation of the knee. It appears that the most successful cases of knee injuries and their recovery are determined by intelligent and early diagnosis and treatment. It is the tendency of too many of us in coaching to be more concerned with the "toughness" of the player and his immediate return to action on the playing field.

With football players, it is especially important to diagnose the injury immediately, treat it, and personally supervise the post-operative care and muscle development. It is not always possible for the average coach to be an outstanding authority on every injury, but it is possible to apply common sense, concern for the injured player, and some basic knowledge of how to care for athletic injuries.

Our main concern must be a return to 100 per cent normal functioning of the player's knee. How this goal is achieved depends upon the coach, his concern and interest, the cooperation and rapport established with a qualified physician, and how each individual case is handled. Bearing in mind the statement from Coach Duffy Daugherty of Michigan State University, "Dancing is a contact sport, football is a collision sport," each one of us is responsible to be aware of the symptoms of a knee injury and the steps to follow to achieve the best possible results.

It is recommended that educators, and especially the athletic coach, take a sincere look at his school's policies and procedures regarding the prevention and treatment of injuries occurring on the football field. A baseline knowledge for guidance in the area of injury prevention is a necessary prerequisite to any educational endeavor when one is responsible for the safety of young people. This responsibility is of direct concern to the athletic coach whose influence on the mental and physical well-being of the athlete is powerful. Administrators should allow time for coaches to participate in professional training courses directed toward the safety and health of the student participants. Finally, it is recommended further investigations be made relating to the prevention and treatment of all injuries which might occur during school athletics. The provision of proper and immediate medical attention to the athlete which enables him to continue to participate in a sport he loves and which

will prevent him from being forced to live for the rest of his life with a disability that could have been prevented, should be the desire of every athletic coach.



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**APPENDIX**

DRS. MCCONVILLE, CALLAHAN & ELLINGER

701 SIXTEENTH AVENUE  
SEATTLE, WASHINGTON 98122  
May 19, 1969

Mr. Larry Maguire  
Football Coach  
South Kitsap High School  
Port Orchard, Washington, 98366

Dear Mr. Maguire:

My most sincere apology for the delay in answering your letter.

In going over your letter I would suggest that you get hold of a copy of "Treatment of Injuries to Athletes" by Dr. Don O'Donoghue.

This book was first published in 1962 by the W. B. Saunders & Company of Philadelphia and actually is "The Bible" for doctors who treat injured athletes. I am sure that any doctor friend of yours in the community would have this or make it available to you through a county medical library.

At the Athletic Injury Conference in Oklahoma City this year one of the better days was spent on a break down on the knee in its relationship to athletic injuries. This included the extensor mechanism, the knee ligaments which was subdivided into the medial compartment, lateral compartment, and posterior compartment, as well as the cruciate ligaments. A separate day was likewise spent on cartilage injuries. I would think that if you could break down your thesis along these lines you might have a very workable plan.

Another and somewhat newer book "The Doctor and the Athlete" by Issao Hirata, Jr. has recently been published by the J. B. Lippincott Company. This takes up injuries more or less in an anatomical division rather than by sports. There is a great deal of good information in this book and it is readily available to anyone through any reliable book store.

If I can be of any further help to you, kindly call.

With kind personal regards,

Please note:  
Signature has been removed due to security concerns

John J. Callahan, M.D.

JJC:lt