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Field Management and Rehabilitation of an Acute Posterior Hip Dislocation in a Professional Football Player

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David Chao, MD

Collins is the head athletic trainer and Trulock is the assistant athletic trainer for the San Diego Chargers. Chao is one of the team's orthopedic surgeons.

Acute dislocations of the hip are rare in sports. When it does occur, several important decisions must quickly be made for the best outcome to be achieved. The length of time from dislocation to reduction, skeletal and soft tissue trauma and complications during the rehabilitation process are factors that need to be considered. Therefore, the purpose of this case study is to discuss the evaluation, management and rehabilitation considerations for a professional football player who sustained an acute posterior hip dislocation.

Background

A 5'8", 170-pound, 26-year-old professional football player with no history of hip pathology was returning a punt during a pre-season game. Two opponents tackled the player from behind, and as he fell to the ground, his left hip was flexed, adducted and internally rotated. Both his hip and left knee were flexed to approximately 90 degrees when his knee hit the ground, and the force of the collision was translated directly to his hip.

Immediate Care

The certified athletic trainers arrived seconds after the injury and found the player on his right side in a fetal position complaining of excruciating pain in his left hip. The player stated that he felt a "pop" in his left hip as he struck the ground. The head athletic trainer attempted to



San Diego Chargers Assistant Athletic Trainer Scott Trulock (left), Head Athletic Trainer James Collins (middle) and Team Physician David Chao (right) tend to an injured player.

calm the player and was able to palpate a bony protrusion on the posterior aspect of the left buttock as well as severe spasm of the hip musculature. Observation of the injured athlete in the fetal position also revealed that the point of the left flexed knee was about 4 to 6 inches shorter than the right. Palpation revealed a normal pulse on the dorsum of the left foot.

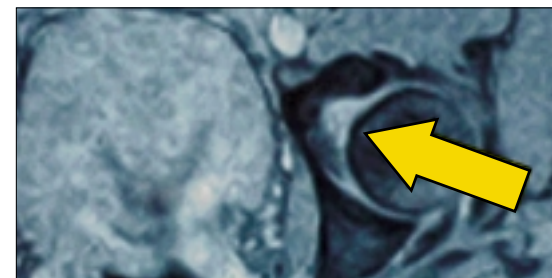
The team's orthopedic physician arrived soon after to examine the player and determined that his left hip was dislocated posteriorly. The physician decided to roll the athlete from his side-lying fetal position to a supine position. As the athletic trainers rolled the player onto his back, the physician held the athlete's lower leg in order to maintain the hip in its flexed position.

Once in the supine position, the player was instructed to relax in an attempt to alleviate the muscle spasm.

As the physician maintained the hip at about 90 degrees of flexion, he began to internally rotate and adduct it while applying traction to the hip via the posterior aspect of the proximal lower leg. As he applied traction with the hip in the flexed, adducted and internally rotated position, a reduction occurred. He then externally rotated and extended the hip to secure the reduction. The player experienced immediate relief of pain and spasm as the reduction occurred. Upon subsequent

review of game film, it was determined the time from injury to reduction was approximately three minutes.

Following the hip reduction, a secondary
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An intra-articular acetabulum lip fracture is identified by MRI.

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News and Notes

PFATS Education Seminar at the NATA National Convention

PFATS is once again sponsoring an educational session at the NATA Annual Meeting & Clinical Symposia, held this year in Los Angeles from June 19 to 23. The three-hour session, which is titled "Medical Case Studies in the NFL," is scheduled from 8:30-11:30 a.m. Saturday, June 23 and will feature eight presentations given by both PFATS members and NFL team physicians.

Award Winners

Charlie Harrison, MD, a longtime physician with the Atlanta Falcons and former New Orleans Saints Head Athletic Trainer **Dean Kleinschmidt, ATC**, were both honored at the 2001 NFL Combine for their work in the field of sports medicine. Harrison received the Jerry Rhea "Hawk" Award, which is sponsored by PFATS and is presented to the NFL team doctor who has made the greatest contributions to both the NFL and to the profession of athletic training. Kleinschmidt, who worked as the Saints Head Athletic Trainer from 1971-2000, was named the recipient of the Cain Fain Memorial Award which is sponsored by the NFL Team Physicians Society.

Athletic Training Staff of the Year

The Tennessee Titans athletic training staff, Head Athletic Trainer **Brad Brown** and Assistant Athletic Trainers **Don Moseley** and **Geoffery Kaplan**, were named the NFL Athletic Training Staff of the Year.

Hall of Fame Inductee

Ron O'Neil, long time head athletic trainer for



Tennessee Titans Assistant Athletic Trainers Don Moseley (left) and Geoffery Kaplan (middle), with Head Athletic Trainer Brad Brown, were named the NFL Athletic Training Staff of the Year.

the New England Patriots, was recently inducted into Ball State University's Cardinal Ring of Honor. The hall of fame honors alumni who graduated from the university's athletic training and sports medicine program.

New Faces

Eric Buckman becomes the newest member of the Cleveland Browns' Athletic Training Staff. Buckman, who was an athletic trainer for Stanford University's football and men's basketball teams, received his Master's degree from the University of Kentucky after completing his undergraduate work at Purdue University. He also spent the 1993-94 season as an athletic training intern with the Dallas Cowboys.

Greg Gaither becomes the third member of the Dallas Cowboys' athletic training staff. The Dallas native served two, one-year internships with the Cowboys during the 1997

and 1998 seasons and most recently worked as an assistant athletic trainer at Kansas State University. He received his Bachelor's degree from Southern Methodist University and earned his Master's degree from Kansas State.

Eric Steward joins the athletic training staff of the Washington Redskins. Eric completed a one-year internship in 2000 with the Pittsburgh Steelers and was also a student athletic trainer for the Buffalo Bills during the 1996-97 season. He earned his Master's Degree from Syracuse University and completed his undergraduate education at Canisius College in Buffalo, NY.

Ben Westby was named the newest member of the Miami Dolphins Athletic Training Staff. Westby, who also is a certified physical therapist, earned his undergraduate degree at Moorehead State in Minnesota and served as an intern with the Baltimore Ravens during the 1997-98 and 1999-2000 seasons.

Long time PFATS Members **Ryan Vermillion** and **Mike Hooper** have taken new positions for the 2001-02 seasons. Vermillion moved from the Miami Dolphins to the Washington Redskins, while Hooper went from the Detroit Lions to the Carolina Panthers.



PFATS President Ronnie Barnes (center) with Charlie Harrison, M.D. (right) and Dean Kleinschmidt.

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Hip Dislocation

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evaluation revealed a positive femoral and pedal pulse on the left leg and foot, negative neurological signs and negative knee and ankle orthopedic signs. With the assistance of the game-day paramedics, the injured player was transported to the locker room via a spine board and gurney. The hip was secured in the anatomical position prior to any movement.

Once off the field, the player was taken to the x-ray room and the films verified the reduction of the hip and showed no sign of a fracture. The player was then removed from the spine board and was placed on crutches. Ice was applied to the hip region for 30 minutes and he was wrapped with an elastic bandage in a hip spica technique. He was given minimal oral narcotics and NSAIDs for pain and inflammation and was instructed to remain non-weight bearing on his left leg. The player traveled home with the team on the chartered flight that night and was scheduled for MRI the next morning.

MRI Results

The MRI revealed several injuries within the ilio-femoral joint complex. The radiologist identified an intra-articular acetabulum lip fracture with a fragment 10 x 12 x 16 mm in size displaced two mm posteriorly. Soft tissue trauma included a sprain of the pubofemoral ligament and partial tears of the piriformis and gluteus medius attachments on the trochanter. A bone contusion was apparent on the femoral head, but the femoral neck did not show any signals of trauma.

Treatment Options

The medical staff had to decide if surgical intervention was required to repair the bone fragment broken off the acetabulum before a treatment protocol could be defined. Following consultation with other orthopedic physicians, it was agreed that the fragment was too small and the displacement was not significant enough to require surgical intervention.

Rehabilitation Program (Week 1)

The first week of the rehabilitation program focused on managing pain, improving range of motion (ROM) and maintaining the strength of the surrounding musculature. Exercises implemented at this time included light passive ROM exercises, heel slides, quad sets, dual leg ground standing and balance board routines. By the end of the first week, the athlete was able to comfortably achieve passive ROM to 90 degrees of flexion, 10 degrees of extension, 20 degrees of abduction and 30 degrees of external rotation.

Increase Strength and ROM (Weeks 2 to 4)

In week two, the athlete started basic gait training and by week three, he was full weight bearing. In week four, he began more functional weight-bearing exercise along with an isotonic lifting program for the upper body.

Raise the Intensity (Weeks 5 to 8)

Exercises added in weeks five to eight included step-ups, walking exercises against a sport cord resistant, balance board, Stairmaster, slide board and the Swim Ex. Additional exercises included lunges, lateral shuffle, jogging and a plyometric program.

Back to the Field (Weeks 9 to 12)

Following week eight, the athlete began the final stages of his rehabilitation program with the incorporation of sport-specific functional exercises. By week eleven, he was able to fully participate in practice with no pain or discomfort and was cleared for game participation following week 12. He played the remainder of the season without further injury.

Clinical Application

A well-established emergency treatment and rehabilitation protocol has not yet been defined for this type of injury. In fact, a question might be raised regarding the physician's decision to reduce this dislocation prior to ruling out a fracture of the femoral neck. Although the injury is uncommon, the physician in this case had previously managed four on field hip dislocations with positive outcomes. Experience demonstrated to the team physician that the approximately 10 pounds of traction that was applied to the hip in the attempt to reduce the dislocation is equal to that which would be applied to a suspected fracture to maintain vascular integrity. It should also be noted that the reduction of the injury would not have been possible without the athlete's ability to relax the hip musculature.

The rehabilitation protocol may also raise points of discussion. As opposed to other programs that recommend a longer period of immobilization and non-weight bearing, the athlete in this case was progressed as his symptoms allowed. The positive outcome of this case is also largely attributed to the avoidance of any complications during the rehabilitation process and through a high level of compliance on the part of the athlete. Further analysis of similar cases is needed to draw any conclusions regarding the best management protocols for returning an athlete to competition following an acute hip dislocation.

Structural Foot Deformities

At the recent PFATS Educational Session at the NFL Combine in Indianapolis, IN, David Tiberio Ph.D., P.T., O.C.S., University of Connecticut, Department of Physical Therapy, discussed several structural foot deformities. Following is a list of the most common:

Rearfoot Varus

Diagnosis: When the calcaneus is inverted with the subtalar joint (STJ) in neutral.

Cause: Calcaneus has not derotated or the tibia is in varus alignment.

Symptoms: Can cause pain in the knee, hip or sacroiliac joint.

Treatment: Foot orthoses with a medial wedge under the rearfoot.

Forefoot Varus

Diagnosis: Calcaneus is in vertical alignment when the subtalar joint is in neutral.

Cause: The medial side of the foot will not touch the ground with the STJ in neutral.

Symptoms: May result in plantar fasciitis, stress fractures, a hallux abductovalgus deformity or a proximal knee or hip injury.

Treatment: A medial wedge orthotic in the forefoot.



Jacksonville Jaguars Head Athletic Trainer, Michael Ryan, evaluates a foot and ankle at the PFATS Education Session at this year's NFL Combine.

Forefoot Valgus

Diagnosis: The lateral side of the foot is off the ground when the subtalar joint is in neutral.

Cause: The forefoot is everted relative to the rear foot.

Symptoms: Knee or low back pain when medial rotation of the tibia and corresponding knee flexion is delayed or restricted.

Treatment: Foot orthoses using a lateral wedge under the forefoot.

Forefoot Equinus

Diagnosis: An abnormal amount of ankle dorsiflexion is required to allow the body to move forward over the weight-bearing foot.

Cause: The forefoot is in a plantar-flexed position when compared with the rear foot.

Symptoms: Clinical symptoms mimic those of a foot with forefoot varus.

Treatment: Bilateral heel lifts and a lower extremity stretching program.

An Athletic Trainer in the NFL: Balancing the Profession with the Needs of the Family

By Todd Sperber, MA, ATC with Miles Rush, MS, ATC, CSCS

Sperber spent 14 years working as a certified athletic trainer in the NFL. He is currently a Team Sports Marketing Manager for the Gatorade Company.

The certified athletic trainers who work in professional football would not be there without a love for the game and their profession. A tremendous amount of work is required to maintain the health of professional football players, however, and even in the off season, preparations are always being made for the next game.

During the season, football games are played on weekends and holidays and the athletic trainers must be there for their teams. In the off-season, there is the NFL Combine and draft, rookie and veteran mini-camps in May and June, training camp in July and August and on-going rehabilitation programs to supervise. An NFL athletic trainer works almost non-stop throughout the year and this schedule can effect not only himself, but also his family.

We spoke with three certified athletic trainers who together total almost 50 years of NFL experience to discuss how they balance the demands of their profession with the needs of their families.

Seattle Seahawks Head Athletic Trainer **Paul Frederici** and his wife **Teddie** never expe-

rienced life in the NFL until after several years of marriage. Prior to joining the Seahawks in 1999, the 37-year-old Frederici had worked six years as the head athletic trainer at Vanderbilt University in Nashville, TN. A job in the NFL brought a different lifestyle and before moving from college to the professional level, they researched life in professional football to be sure they were making the right decision. "I would not have even considered taking this position with the Seahawks if I thought it was going to compromise my marriage," states Paul.

After two seasons in the NFL, Teddie and Paul understand that they still have a lot to learn. "It is up to me to manage my workload stresses at the office, so I can maximize my time at home. I don't want to miss my child's early years because I am spending too much time in the training room," states Paul. "I've learned what changes to make to be sure my family gets the time they deserve.

I've cut back on hobbies because I know that quality family time is more important."

Family focus became much clearer after the birth of their two-year old son, Noah. "Since the birth of Noah, our time together as a family has become even more valuable," explains Teddie. "During the season, we try to cram in as much family time as we can but it is still hard. We do have friends within the Seahawks organization that have children Noah's age, but it is difficult

on him to be without his dad when Paul is on the road."

"Sometimes I think it's more frustrating for me," adds Paul. Little things, like not being able to take Noah to his first day of school or taking care of him when he gets sick make being on the road that much more difficult."



David and Jennifer Price with daughter Casey-Martin. David is the Head Athletic Trainer for New York Jets.

Teddie understands that the adjustments they have made are worth it. "The NFL is a great opportunity for Paul and I've learned to become very independent," she says. "The second year was easier than the first and we expect the third to be even better."

New York Jets Head Athletic Trainer **David Price** had been in the league 14 years before meeting and marrying his wife, Jennifer. When he first started in the NFL, he knew the job was demanding but he didn't worry about how it would affect his personal life.

"When you are young, single and a dedicated athletic trainer, you don't think about the lifestyle or how it may affect having a family," he says. "It took years of hard work to establish myself in the NFL and I didn't have a second thought about the hours and time I had to put in to follow my professional dreams."

After establishing himself in the NFL, David decided that he was in the right place both professional and psychologically to commit to a relationship and start thinking about



Seattle Seahawks Head Athletic Trainer Paul Frederici with wife Teddie and son Noah.

a family. When he met the right woman, he knew he was ready.

“I think you have to be comfortable with who you are as a person and where you are professionally before you are able to commit to a relationship. If you are not satisfied with yourself and your own achievements, the relationship will suffer. The challenge occurs after you decide you are in the right place. You then have to meet a strong woman who is comfortable with the lifestyle and the demands of the job. I was fortunate when I met Jennifer because she is that type of woman.”

With the seasonal nature of the job, athletic trainers and their families often have to plan events, beyond the family vacations, that someone with a more traditional job may take for granted. An example of this was when Jennifer gave birth to their daughter, Casey Martin.

“Having Jennifer come to term during the season was not good timing for us,” explains Price. There was no way I was going to miss the birth of our child, but obviously, having this happen during the season was not ideal. We induced labor on a Friday with the hope that the baby would be delivered by Saturday, so I could be with the team on Sunday. Come late Saturday, though, Casey had not yet been born.

Jennifer’s doctor suggested that we try to induce again on Monday, and with Jennifer’s permission, I went with the team for Sunday’s home game. It was very hard to be away from her but thankfully it all worked out. Casey was born that Monday so I was able to take care of both my professional responsibilities and witness the birth of our child. One is thing for sure, we will do our best to make sure our next child is born in the off season.”

Since the birth of their daughter, David feels he may actually have become a better athletic trainer. “You have to be more focused on what you are doing,” he says. “Since my time demands have increased, I am forced to become more productive. Before Jennifer and Casey, I could put unlimited hours into my work. Now, I would rather be with my family, so I spend less time in the training room, but I’m more productive and get more done.”

Johnny Omohundro, the Arizona Cardinals’ Head Athletic Trainer for the last 30 years, has been in the NFL for 34 years. He and his wife Martha will celebrate their 30th wedding anniversary during this year’s training camp. The two have three grown children and a wealth of knowledge of the ups and downs of being an athletic trainer in the NFL. Before they even got married, he knew that Martha was not in for the typical relationship. He remembers telling her to enjoy the off-seasons because he had a feeling they were going to get shorter and shorter. It turned out he was right.

“The off-season used to be the time to catch up on family outings and get away from the training room,” he recalls. “Back then, the organization would close everything up after the last game and we would not come back together until training camp. Now, if you wait more than a couple of weeks after the season to get things going for next year, you are already behind schedule.”

A photo of Johnny Omohundro and his wife Martha will be included.

A photo of Arizona Cardinals’ Johnny Omohundro and his wife Martha will be included, with a caption to be determined.

Johnny was already a four-year veteran in the NFL when he met Martha. She recalls that, not only was she unsure of what an athletic trainer did, but she had no idea of the NFL lifestyle she was getting herself into.

“I found out quickly that it was not the typical profession,” she remembers. “I was surprised that the job demanded his attention seven-days-a-week for so many months at a time. I learned to adjust as the years went by, although at times, especially once we started our family, it was hard.”

“Martha had to be the mother and father around the house because I was gone so much,” states Johnny. “She had to wear all of those hats and I know at times it was difficult for her.”

“It was just an overall struggle to make adequate time for the family,” remembers Johnny. “July 4th, Labor Day, Thanksgiving and Christmas are all working days for me and as much as I wanted to be home, I had to be with the team. Our children would ask me, ‘why do you have to work dad, nobody else is working?’ and it was very difficult to make them understand why I had to be away from them.”

Knowing that family time was going to be scarce, Johnny and Martha had to figure out how to maximize their quality time. Early on, Johnny volunteered at their children’s schools. Later in life, his sons helped out during training camp. Martha also recalls him spending hours on the phone with the children and, on Sundays, Martha and the kids would watch the Cardinals and dad on television.

“With the hours and days away from home, the time our family had together was always a bonding time,” says Johnny. “We had to make every moment count. I feel we as a family have worked hard to make that happen.”

Working as a certified athletic trainer in the NFL may seem like the ideal job, but the profession comes with high demands. When the game is over, many of the dedicated professionals responsible for the health and care of these high profile athletes need to make time for another group who deserve just as much attention, their families. Making time for the family while balancing the demands of the job may seem difficult and at times even challenging. According to these three athletic trainers, however, it seems that through communication, hard work and a shared vision, the joys and rewards of this unique profession can be shared, balanced and matched with the needs of the family.

Glucosamine-Nutritional Supplement Garnering Attention

By Miles Rush, MS, ATC, CSCS

Glucosamine is one of the most popular nutritional supplements on the market today. Touted as an osteoarthritis pain reliever and a healer of injured tendons and ligaments¹, glucosamine is available as either a pill or powder and is widely distributed in stores throughout the country. Believed to be as effective as a non-steroidal anti-inflammatory drugs (NSAIDs) but without the associated gastric distress and other side effects, glucosamine, packaged as glucosamine-sulfate, or glucosamine-chondroitin, may appear to be a cure all for sports related injuries. Although many professional football players incorporate the supplement into their daily nutritional routines, the scientific evidence to support the claims of its effectiveness are mixed. It is important for athletic trainers to learn about this popular supplement so they can properly educate their athletes on the benefits or risks associated with taking daily doses of glucosamine.

What does it do?

Glucosamine is an amino sugar synthesized naturally in the body which is thought to assist in the healing process by stimulating the growth and delaying the breakdown of cartilage. Glucosamine is necessary for the production of mucopolysaccharides which are found in tendons, ligaments, cartilage and synovial fluid and it is believed that additional glucosamine supplementation will stimulate the metabolism of chondrocytes in cartilage, thus delaying or possibly reversing degenerative joint disease. It is also believed that glucosamine provides a pain-relieving affect by blocking the activity of proteolytic enzymes that cause the breakdown of cartilage.²

Does it work?

Results from clinical studies show that glucosamine can be effective in the short-term reduction in osteoarthritis pain when compared to NSAIDs. One study was conducted on 200 hospital patients with clinically diagnosed knee osteoarthritis. One group received only

glucosamine supplements, while the other group received NSAIDs. Results from the three-month study showed that both groups reported equal levels of pain relief.³



An additional study to test the efficacy of glucosamine was conducted on 34 ex-Navy Seals with degenerative joint disease of the knee or back. The men were split into two groups for the eight-week experiment. One group received 1,500 mg of glucosamine per day while the other group received only a placebo. Results showed that the group receiving the glucosamine

supplementation had less need for NSAIDs when compared to the group receiving only a placebo.⁴

The National Institute for Health recently implemented the most comprehensive research study involving glucosamine to date. The 12-year clinical study, which is currently in its second year, was designed to evaluate the long-term safety and efficacy of the supplement. It is hoped that the data derived during the course of the study will provide a more accurate measurement of the effectiveness of glucosamine as a pain-relieving and anti-inflammatory and anti-degenerative agent.

Glucosamine Use in the NFL

Unsure of how widespread the use of Glucosamine is in the NFL and limited by the NFL's policy that prohibits athletic trainers from recommending supplements not prescribed by a team physician, most NFL team physicians and athletic trainers are taking a "wait and see" attitude when it comes to their approach on glucosamine.

According to Chicago Bears orthopedic surgeon Gordon Nuber, there simply is not enough scientific evidence to support the use of supplement. "At this point there really isn't

enough research for me to recommend it to a professional football player. There does not seem to be a downside to using the supplement and many people do find that it brings some type of pain relief, but it's just too early to tell if this is something we as NFL team physicians should be recommending to our players."

Many athletic trainers share the same point of view. "It's been getting a great deal of publicity and some of our players may use it," states Green Bay Packers Head Athletic Trainer Pepper Burruss, "but as a team we do not recommend it. If our team doctors say it is the right thing to give our athletes then we will be the first to do it. In the meantime, we'll wait and see what the literature and on going research studies discover."

Dave Price, head athletic trainer with the New York Jets agrees. "Some large drug companies have started manufacturing a glucosamine product which may give the supplement some credibility, but there is not enough hard evidence at this time for our team doctors to recommend it to our players."

Bottom Line

It is generally believed that glucosamine is safe, can be effective in the short-term and there is relatively little risk associated with its use other than mild gastrointestinal problems. It should be noted, however, that since glucosamine is a derivative of the blood sugar glucose and may cause blood sugar levels to rise, there might be some risk associated with its use in people with diabetes.²

Editorial assistance for this article was provided by Jackie Berning, Ph.D., R.D., sports nutrition consultant for the Denver Broncos.

¹ Sarubin, Allison. *The Health Professionals Guide to Popular Dietary Supplements*. Illinois: The American Dietetic Association, 2000

² Rosenbloom, Christine, A., Ed. *Sports Nutrition: A Guide for the Professional Working with Active People*. 3rd ed. Illinois: The American Dietetic Association, 2000.

³ Muller-Fabbender, H., Bach, G., Haase, W., et al. *Glucosamine sulfate compared to ibuprofen in osteoarthritis of the Knee. Osteoarthritis Cartilage*. 1994;2:61-69.

⁴ Lefler, Ct., Philippi, AF., Lefler, SG., et. Al. *Glucosamine, chondroitin and manganese ascorbate for degenerative joint disease of the knee or low back: a randomized, double-blind, placebo-controlled pilot study. Military Medicine*, 1999;164:85-91.

Hamstring Injuries in the National Football League: Correlation between MRI Findings and Return to Play

Arthur C. Rettig, MD, Methodist Sports Medicine Center, Team Physician for the Indianapolis Colts, Ed Marcheschi, MD, Methodist Sports Medicine Center, Indianapolis, IN, Timothy Berney, MD, Indiana University, Indianapolis, IN

The hamstring muscle group is one of the most commonly injured areas in football. While a proximal avulsion of the muscle requires a prolonged recovery time, a partial tear may also force an athlete to miss a substantial amount of practice or game time.

The severity of muscle injuries can be assessed using magnetic resonance imaging (MRI) and the purpose of this study was to determine the relationship between the severity of the injury as seen on MRI and the amount of playing or practice time missed due to an acute hamstring injury.

Methods

Nine players were identified on one NFL football team who suffered an acute hamstring injury and subsequently obtained a MRI between July 1998 and August 2000. A senior skeletal radiologist, blinded to the clinical outcome of each case, examined the MRIs and graded the injuries on a severity scale of one to four. The MRIs were evaluated to determine the exact location of the injury and injured muscles were identified. The size and extent of any existing intra-muscular edema was also noted. Clinical records from the team's athletic training staff and the senior orthopaedic surgeon on record were reviewed to determine how long it took players to return to practice.

Results

The nine athletes involved in the study competed in six different positions: running back, long snapper/tight end, defensive back, linebacker, defensive lineman and wide receiver.

Of the three hamstring muscles, the biceps femoris was involved in five cases, two players injured the semitendinosus and two injured multiple muscles. Four injuries occurred in the proximal hamstring area and five were to the mid-third and distal area. Players with Grade I and Grade II injuries returned to play in two weeks, while players with Grade III injuries required an average of five weeks. The criteria for each grade and the time to return to play are outlined in table 1.



on MRI and identified several factors that led to a recovery time of greater than six weeks. These factors included complete transection of the muscle, greater than 50 percent cross sectional muscle involvement, ganglion-like or hemorrhage-like signal intensity, distal myotendinous junction involvement and deep muscle tears. Hamstring injuries that were identified as having only edema in the muscle resulted in a much quicker recovery time, similar to grade I and grade II injuries in this study.

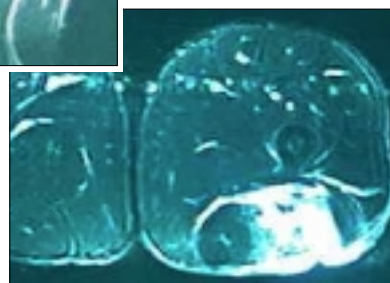
Conclusion

Preliminary evidence suggests that an MRI grading system for hamstring tears may have prognostic significance for predicting rehabilitation time in NFL players. Further study would allow us to more closely analyze variables, such as the location and size of the tear and the position played by the athlete suffering the injury. In turn we would be able to develop a more precise, uniform grading scheme based on MRI evaluation

A grade III strain to the right Hamstring muscles as shown on MRI.

Discussion

Partial tears in the hamstring tendons or muscle bellies are extremely common and are related to forceful eccentrically loaded contractions of the muscle group. Several studies have used cross sectional imaging techniques to evaluate injuries to the hamstring muscle group and MRI has proved to be particularly sensitive in detecting injury to soft tissues and the resulting edema and hematoma. To our knowledge only one previous study has attempted to correlate the appearance of hamstring muscle tears on MRI with time to return to sport. Pomeranz and Heidt¹ examined the morphologic characteristics of hamstring muscle tears



to allow NFL team physicians and athletic trainers the ability to more effectively treat players with acute hamstring tears.

¹ Pomeranz SJ, Heidt RS Jr. MR imaging in the prognostication of hamstring injury. *Work in progress. Radiology.* 189(3):897-900, 1993.

Table 1. Grading of Hamstring Injuries and Return to Play

Grade	Criteria	Return to Play		
		Mean (days)	Range (days)	N
I	Edema within muscle belly <8 cm	13.2	10-21	4
II	Edema >8 cm with vertical split in muscle and hemorrhage and fluid in fascial planes	14	10-18	2
III	Tendon separation at musculotendinous junction and increased edema	34.6	29-43	3
IV	Complete avulsion from ischium	NA	NA	0

Grade III Acromioclavicular Separations in NFL Quarterbacks—Surgery or Non-Surgical Treatment, What Is the Best Option?

Theodore F. Schlegel, MD, Team Physician for the Denver Broncos

An athlete who suffers a grade III injury to the acromioclavicular (AC) joint presents a unique treatment dilemma for physicians and athletic trainers alike. Non-surgical rehabilitation protocols are quite often successful for this type of injury but the situation may become more complex when this injury occurs to the dominant arm of a throwing athlete.

It is rare for an NFL quarterback to sustain this type of injury, but the severity of the injury and the fact that it occurs in the throwing shoulder could have possible career-altering consequences. The throwing motion requires an extreme range of motion and places high biomechanical loads on the shoulder and it is imperative that proper healing of the AC joint is achieved.

As there is considerable controversy surrounding the best treatment method for this type of injury, a retrospective study was conducted of treatment methods for NFL quarterbacks who suffered a grade III AC joint separation to their dominant shoulder in hopes of understanding the ramifications of this type of injury.

Methods

We reviewed the NFL injury database over the last 10 years to identify players who had sustained a Grade III AC joint separation. A questionnaire was developed and sent to the appropriate medical staffs to obtain information regarding hand dominance, the affected shoulder, mechanism of injury, treatment protocol and time missed due to the injury. Additional data was collected to evaluate pain, stiffness, strength, functional disability and overall satisfaction following this injury.

A shoulder anatomy photo
will be included

Results

There were a total of seven NFL quarterbacks who sustained a grade III AC joint separation over the 10 year time period, with five of the seven injuries occurring in the dominant arm. In each case, the injury resulted from a direct impact to the point of the shoulder while being tackled. Four of the five athletes with the injury to the dominant arm initially opted for non-surgical treatment and were placed in a sling for comfort. The average time for immobilization in a sling was seven to 10 days.

Following an extensive rehabilitation protocol, most of the athletes were able to participate at some level of practice and game activities approximately five weeks post injury. Five of the seven quarterbacks, however, did eventually have surgery to repair their injury. Early operative intervention was recommended for one of the five players suffering the injury to his dominant arm as he was early in his career and it was felt that surgical reconstruc-

tion of the AC joint would give him the best chance for long-term success. Three of the remaining four quarterbacks with dominant arm injuries required delayed surgery because of failed non-operative treatment.

Of the four players that underwent surgery on their throwing shoulder, all missed greater than eight weeks of the season. The player who had surgery on his non-dominant side was able to return to competition at six weeks and finish the season. Surgical outcomes were encouraging with all but one of the

quarterbacks returning to play without residual problems. The last individual still is early in his postoperative recovery.

Conclusion

It was the intent of this study to establish a treatment algorithm for quarterbacks with acute Grade III AC separations to their throwing or dominant arm. Our findings suggest that, although a small percentage of players may be treated non-operatively, the majority of quarterbacks suffering this injury will require surgical intervention to repair the injury. It is difficult to draw firm conclusions because of the small number of athletes in our study. However, our current treatment recommendations would favor initial non-operative treatment if the injury occurs to the dominant extremity early in the season and surgical reconstruction if the athlete is not able to throw effectively after the completion of an appropriate rehabilitation program.

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