Research Assessment #2

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Subject: Case Study of Dislocated Hip in Football Player

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Assessment:

Looking deeper into a case study within sports physical therapy I learned about each step taken and what a physical therapist has to do in order to treat the patient the correct way and get him back to playing. Through the journal article, “Traumatic Dislocation of the Hip in a High School Football Player” by Yates, Bandy, and Blasier who are all professors, the journal encompassed of processes the physical therapist went through with the football player within five months.

Before doing anything with a patient there must be some sort of screening such as an MRI and patients complaints, as well as instructions from doctor. At first, I did not know that the doctor gave exercise instructions, I thought the physical therapist made those up depending on the areas injured in the patient. I am still wondering how physical therapists come up with treatment exercises for each month to focus on different areas that hurt? Also, if home exercies ever change depending on area(s) focused on from the initial visit when they were given to the patient or if new ones get added to the old ones as the patient can do more? Now learning about treatment

techniques I now have an understanding of why the class anatomy and physiology is a prerequisite for physical therapy school. This is because the knowledge of the body and certain areas that correspond with the located injury is needed in order to give the best treatment to patients. Also, I knew of electrical stimulation treatment and had it done to me in physical therapy when I inflammed my hip, but did not know before that it was a popular treatment for any injury.

From the image of the table I was able to gain a better understanding of how they kept record of each visit. Also the point system when at the end of the five months, the player could go back to playing once he hit 80/80. The record keeping is really interesting to me because of the point system of one point per level of difficulty as the patient can do more. I did not realize before that hopping was a final motion to do based on a hip injury. I wonder if physical therapists have the same activities on the table for every patient? Are they basic activities that everyone should be able to do before injured? Having more knowledge of the point system I now understand how they know when to discharge a patient to get back to playing and stop physical therapy, since it seems like an easy way to keep record of the patient's progress.

Now having a better understanding of the step by step processes a physical therapist goes through with a patient I realize it is a long process. I have more questions to ask a mentor or now with informational interviews coming up about specialized treatment, how to know how much time the patient should be in physical therapy, and what occurs each time a patient gets treated such as during the same month with focusing on certain areas.

Case Report

Traumatic Dislocation of the Hip in a High School Football Player

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[Yates C, Bandy WD, Blasier RD. Traumatic dislocation of the hip in a high school football player. *Phys Ther*. 2008;88:780–788.]

Background. Although traumatic dislocation of the hip often occurs as a result of automobile accidents, dislocations have been reported to occur during sports activities.

Objective. Using the experience in treating a 17-year-old high school football player with a posterior dislocation, complicated by involvement of the sciatic nerve, this case report provides background information on hip dislocations and provides a description of the immediate treatment by the physician, followed by 6 weeks of immobilization, and a detailed account of the 5-month intervention.

Case Description. The patient was injured while making a tackle during a high school football game when another player fell on him from behind. The case report describes his plan of care after immediate hip reduction surgery and 6 weeks on crutches. Generally, the program utilized a progression of non–weight-bearing resistance training and stretching in the initial stages of intervention and progressed to weight-bearing activities (on land and in the pool) as the patient was able to tolerate more stress. In addition, the treatment of the sciatic nerve using electrical stimulation during treadmill walking is described.

Outcomes. The patient was seen in an outpatient physical therapy clinic an average of 2 times per week for 5 months. At the end of 5 months, results of the Lower Extremity Functional Scale (LEFS) indicated that recreational and sporting activities were within normal limits, and the patient was able to return to playing on his high school football team the next year.

explanation of injury

Traumatic dislocation of the hip is an orthopedic emergency requiring early recognition and prompt reduction for successful management.[1,2] In a posterior dislocation, the head of the femur lies posterior to the acetabulum and the injured lower extremity has a clinical presentation of shortening, medial (internal) rotation, flexion, and adduction. In an anterior dislocation, the femoral head lies anterior to the acetabulum and the injured lower extremity has a clinical presentation of abduction and lateral (external) rotation of the hip.[3] According to a retrospective review of 62 patients (mean age=34.5 years, range=14–72) with traumatic dislocation of the hip, Sahin et al[2] reported that 57 (92%) were posterior dislocations and 5 (8%) were anterior dislocations. Posterior dislocation as the most frequent direction of dislocation is well supported in the literature.[1,3–6]

The vast majority of dislocations occur as a result of automobile accidents.[5] In their review of hip dislocations in 62 patients, Sahin et al[2] reported 52 (83.9%) of the patients sustained their hip dislocation due to traffic accidents. The most common mechanism of injury for a hip dislocation during an automobile accident is when the person's knee (with hip flexed) strikes the dashboard, forcing the head of the femur posteriorly over the rim of the acetabulum.[4] However, if the thigh is abducted, impact on the knee would cause further abduction and lateral rotation of the hip, leading to an anterior dislocation, which occurs less frequently than a posterior dislocation.[4]

rare injury to occur in sports

Traumatic dislocation of the hip rarely occurs in sports activities. Sahin et al[2] reported that 2 (3.2%) of the hip dislocations in their study were the result of athletics. Lamke[7] investigated 110 traumatic dislocations of the hip and reported that 5.5% occurred during sports activities. More recently, Chudik et al[8] estimated that only 2% to 5% of all hip dislocations occurred during participation in sports. The injury tends to occur secondary to a collision in sports such as skiing or football.[5,9,10] A frequent mechanism of injury for a posterior hip dislocation is the knee striking the ground with the hip in a flexed position, thereby forcing the femoral head posteriorly over the rim of the acetabulum.[5,9,11]

A review of the literature related to the treatment of patients with traumatic dislocation of the hip reveals frequent discussions of immediate intervention (open versus closed reduction) and the need for frequent follow-up examinations to rule out postinjury complications.[3–5,9,12] Information and details concerning the appropriate plan of care following immediate intervention are lacking. Regardless of whether the hip dislocation is the result of an automobile accident or participation in athletics, no descriptions of the specific intervention and plan of care exist. Paletta and Andrish, for example, suggested that "return to activity is permitted only when strength, motion, and agility have been achieved."[3(p610)] Anderson et al suggested that "a return to sport is allowed if the MRI [magnetic resonance image] is negative and there is pain-free range of motion."[5(p526)] The authors of these articles provided no description of the appropriate plan of care after the immediate reduction of the dislocated hip.

Although previous literature exists as to the immediate emergency treatment for an individual with a traumatic dislocation of the hip, the specific plan of care for the rehabilitation of this type of injury is not described. Therefore, the purpose of this case report is to describe the physical therapy plan of care for a 17-year-old high school football player with a posterior hip dislocation complicated by involvement of the sciatic nerve.

Patient History

The patient was a 17-year-old male football player who was injured during a high school football game while making a tackle. The patient later reported that he felt a "pop" and immediate pain in his right hip when making the tackle and turning when another player fell on the back of his thigh. The patient was evaluated on the field and transported to the emergency department via ambulance.

Emergency Department Examination/Intervention

The patient arrived at the emergency department with his right lower extremity propped on pillows in flexion, adduction, and medial rotation—consistent with a posterior dislocation of the hip. In addition, prior to radiographic evaluation and reduction, the patient had decreased light touch sensation in his foot and was unable to flex or extend his toes or ankle, consistent with a sciatic nerve injury. Radiologic evaluation confirmed that he had a right posterior hip dislocation (Fig. 1).

before a PT can release player-player must be tested

The hip was reduced with the patient in the supine position. After conscious sedation allowed the patient and his musculature to relax, the reduction was performed. The physician applied traction to the flexed knee in line with the axis of the thigh with the hip flexed 45 degrees while an assistant stabilized the body and trunk to allow countertraction. After a few moments of traction, a gentle external rotation force was applied, and the hip was felt to reduce. The hip was put through gentle range of motion (ROM) to assess for crepitus, which could suggest the presence of a retained intra-articular fragment of bone, cartilage,

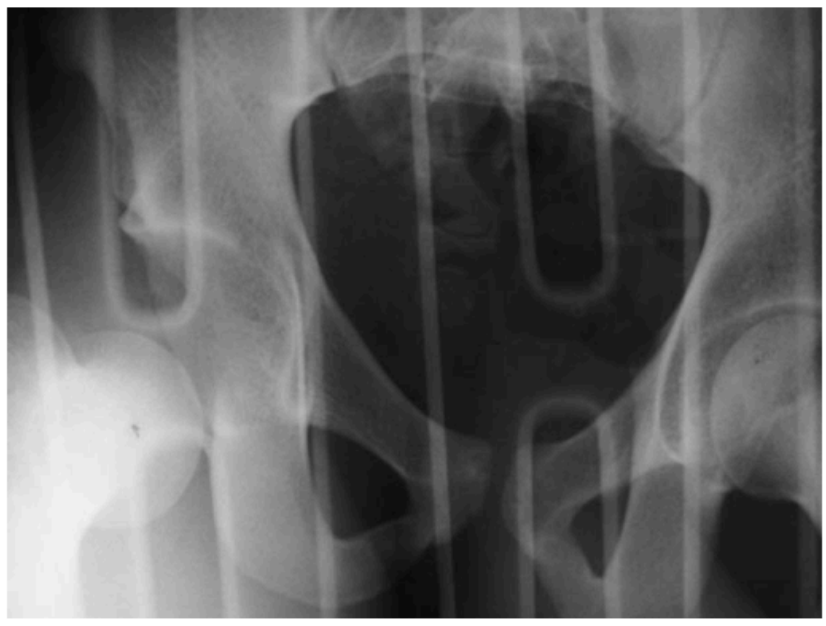

Figure 1.
Radiograph of pelvis taken in emergency department prior to hip reduction.

Figure 2.
Radiograph of pelvis taken in emergency department after hip reduction.

or soft tissue. No crepitus was present. Post-reduction radiographs were taken to ensure that the hip was successfully reduced and that nothing, such as interposed joint capsule or cartilage, was blocking a full reduction. Post-reduction radiographs revealed a good reduction, with no evidence of fracture or avascular necrosis (Fig. 2).

At this time, the patient was referred for physical therapy for instruction on touch-down weight bearing on the right lower extremity. Due to difficulty ambulating with crutches and the amount of pain in the hip, he was admitted to the hospital after reduction of his hip dislocation for intravenous pain control and physical therapy for instructions on crutches. A computed tomography scan of the right hip was ordered and was completed on the morning of the admission. The results showed a normal scan of a good reduction, with no evidence of bony fragments or fracture about the joint. The day after reduction and admission, the patient was walking independently with crutches, and the pain was better controlled. However, he continued to be limited in active dorsiflexion of the ankle, and a resting ankle-foot orthosis was ordered to maintain the ankle in neutral dorsiflexion when he was in bed. The patient was discharged from the hospital with instructions for touch-down weight bearing, with periodic follow-up with the orthopedic fracture clinic.

Initial Physical Therapist Examination

Presenting Complaint

At the time of the initial examination, 6 weeks after injury, the patient arrived for physical therapy ambulating independently with a Trendelenburg gait when weight bearing on the right lower extremity. His chief complaints were an inability to walk and run without hip pain, weakness in the hip, and difficulty in moving his right foot due to "intense pain" in the calf, as well as intermittent pain in the right posterior thigh.

Step 1:before doing anything must have initial examination with patient

Functional Status

Prior to the examination, the patient completed the Lower Extremity Functional Scale (LEFS).[13] Binkley et al[13] have reported the LEFS to be reliable, valid, and sensitive to change. In addition, the LEFS has been used to successfully document functional abilities in patients with osteoarthritis of the hip and knee[14] and community-dwelling patients with difficulties in mobility referred for physical therapy.[15] The LEFS is used to qualitatively assess an individual's functional status during 20 specific functional tasks on a scale

Table.
Patient's Lower Extremity Functional Scale (LEFS) Scores at Initial Physical Therapy Visit (Pre) and at Discharge (Post)[a]

Activities	Extreme Difficulty or Unable to Perform		Quite a Bit of Difficulty		Moderate Difficulty		A Little Bit of Difficulty		No Difficulty	
	0 Points		1 Point		2 Points		3 Points		4 Points	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Usual work, household or school activities							▲			★
Usual hobbies, recreational and sporting activities	▲									★
Getting into or out of bath									▲	★
Walking between rooms									▲	★
Putting on shoes or socks									▲	★
Squatting									▲	★
Lifting objects from the floor			▲							★
Light activities around the house							▲			★
Heavy activities around the house			▲							★
Getting in or out of the car							▲			★
Walking 2 blocks			▲							★
Walking a mile	▲									★
Ascending/descending a flight of stairs	▲									★
Standing for an hour					▲					★
Sitting for an hour							▲			★
Running on even ground	▲									★
Running on uneven ground	▲									★
Making sharp turns while running fast	▲									★
Hopping	▲									★

[a] ▲=score at initial physical therapy visit; ★=score at physical therapy discharge.

keep record of activities for patient with initial and discharge

from 0 (unable to perform actively) to 4 (no difficulty). The patient's preintervention score on the LEFS was 33/80 (Table).

Systems Review

The patient appeared to be a healthy 17-year-old athletic male. He was 175.26 cm (5 ft 9 in) tall, weighed 77.1 kg (170 lb). Heart rate, blood pressure, and respiration were well within normal limits. Other than an antalgic gait when weight bearing on his right lower extremity, the patient demonstrated normal, coordinated movement and motor function. Gross assessment indicated no scars, edema, or any abnormalities with the skin. Screening for any musculoskeletal abnormalities of the upper extremities and lumbar spine showed full ROM, substantial strength (force-generating capacity), and no pain with any movements. In addition, gross assessment of sensation with light touch indicated decreased sensation ("tingling") in toes 2 through 5 and on the dorsum and plantar aspect of the right foot.

ROM

Examination indicated full passive ROM bilaterally in the patient's hips, knees, and ankles. The patient complained of pain with gentle overpressure into medial and lateral rotation of the right hip. He was apprehensive when performing a posterior glide of the hip joint. In addition, the patient complained of pain with gentle overpressure to dorsiflexion of the right ankle. He had difficulty moving toes 2 through 5 of the right foot, consistent with a sciatic nerve injury. Figure 3 illustrates the relationship of the acetabulum, the head of the femur, and the posterior location of the sciatic nerve and how a posterior dislocation of the femur can cause pressure on the sciatic nerve. Given the mechanism of injury, it is probable that this athlete had a tension type of injury rather than a compression type of injury of the sciatic nerve.

Pain

A 10-point visual analog scale was used to evaluate the patient's pain with the most pain-provoking activi-

of right lower extremity during the pre-swing phase, and single-leg stance on the right with the left foot elevated on a secondary surface).

step at the beginning of each month

Month 2

Examination. Observation at the beginning of the second month revealed that the patient demonstrated an abnormality at mid-stance and terminal stance due to continued weakness in his plantar flexors, contributing to a decreased step length on the left. He demonstrated an obvious lack of force production during terminal stance, with a decreased heel raise on the right lower extremity compared with the left lower extremity. The patient demonstrated decreased force production of the triceps surae muscle with attempted single-leg heel raises.

Strength improvements from the initial evaluation were: grade 4/5 (from 3/5) for hip medial and lateral rotation and grade 4/5 (from 3/5) for hip abduction. Manual muscle testing revealed muscle strength of grade 3/5 for hip adduction. Circumferential measurements around the gastrocnemius muscle revealed the left calf to be 1½ cm larger than the right calf. The patient demonstrated poor proprioception in the right lower extremity with single-leg stance activities and was only able to maintain his balance for 3 seconds with his eyes closed. The patient's LEFS score at 2 months was 45/80.

Intervention. The patient was seen 7 times during the second month. Physical therapy treatment continued 2 times per week and focused on strengthening of the right lower extremity, functional strengthening activities, gait refinement, proprioception, and cardiovascular endurance. The patient continued his daily home exercise program as previously described. Pool therapy was added one time a week, but success was limited initially due to his limited water skills prior to injury. Pool therapy focused on prone kickboard activities and deep-water running and jumping. In addition, treatment focused on proprioception work in the pool and progressed to dynamic proprioception work on land. This included single-leg stance on the right lower extremity in chest-deep water with overhead dynamic upper-extremity tasks for 5-minute intervals and progressed to single-leg stance on the right lower extremity with dynamic upper-extremity tasks on land. The patient continued with progressive strengthening activities, including progressive resisted exercise with Thera-Band and proprioceptive neuromuscular facilitation, for plantar flexion and progressed to weight-bearing strengthening[23,24] of the plantar flexors and hip extensors, with mini-squats and leg-press activities involving lowering from a step (15 repetitions × 3 sets for both activities). Single-leg heel raises with assistance of his arms to decrease compensatory patterns were initiated at this time (10 repetitions × 3 sets).

common treatment used for any injury

To further address the patient's plantar-flexor weakness, electrical stimulation was initiated in combination with treadmill walking at a variety of speeds and inclines.[25,26] Electrodes were placed on the heads of the gastrocnemius muscles, and a remote switch activated the gastrocnemius muscles at mid-stance and terminal stance, beginning with 5 minutes and progressing to 20 minutes of treadmill activities during each therapy session by the third month. The Empi Respond Select Unit[†] was used with the remote switch, and amplitude was determined by clear visualization of plantar-flexor contraction within limits of patient tolerance prior to initiation of weight bearing. The plantar flexors were stimulated using a biphasic asymmetrical balanced waveform with a pulse width of 300 microseconds, a pulse rate of 50 pulses per second, and a ramp time of 0.2 second.

treatments have to do with what areas focusing on per month

Month 3

Examination. At the beginning of the third month, the patient was not able to kick across the width of the pool lying prone on a float. Strength testing indicated that all hip muscles had improved to grade 5/5. Circumferential measurements indicated a 1-cm difference between the left and right calves. The patient was able to demonstrate a supine straight leg raise with a 2.27-kg (5-lb) weight for 20 repetitions. His LEFS score at this time improved to 60/80.

Intervention. The patient was seen 7 times during the third month. Given the improvement during the second month, the twice-weekly treatments were progressed to more functional activities, and the frequency of pool therapy was decreased to twice a month. A functional progression program, defined as a series of sport-specific basic movement patterns that are gradually progressed according to the difficulty of the skill and the client's tolerance,[27] was initiated. The patient started working on basic plyometric drills consisting of jumping off a 5.08-cm (2-in) mat and stepping back up and progressed to jumping up and down from a 5.08-cm mat for 30 seconds.[28]

The literature indicates that the "calcaneus everts about 5 degrees and the subtalar joint moves into pronation at loading response."[29(p14)] As the patient progressed to jogging and running activities on land, we noted that his ankle remained in subtalar neutral to minimal supination, potentially placing him at risk for an inversion ankle sprain. Therefore,

add more as patient can do more

[†] Empi Inc, 599 Cardigan Rd, St Paul, MN 55126-4099.

the electrodes were placed on the lateral leg to activate the peroneal muscles and address the timing of the activation of the peroneal muscles in mid-stance and terminal stance. The patient used the remote switch as he progressively worked on the treadmill at increasing speeds. Two months of focused work corrected the problem.

The final functional activity implemented into the treatment plan was rope jumping (30 repetitions × 2 sets). The patient continued to address his cardiovascular conditioning on his own through stationary bike training (20–30 minutes, 3 times per week).

Month 4

Examination. At the beginning of the fourth month, the patient had full hip ROM and mild discomfort with maximal overpressures performed at the end range of hip medial rotation and at the end range of hip lateral rotation. His score on the LEFS was 72/80.

focus on what parts hurt the most on that visit after examination every month

The patient also performed functional tests consisting of a vertical jump test and a 3-hop, one-legged cross-over test.[27] Functional tests are the performance of one maximal effort of a functional activity, or series of activities, in an attempt to indirectly assess muscle strength and power and to quantify function. The one-legged vertical jump test measured the height that the patient jumped while touching the wall at the height of the jump and landing on the same leg. During the 3-hop, one-legged cross-over test, the patient hopped forward 3 consecutive times while crossing back and forth over a center strip that was 15 cm in width. No differences were found between the right and left limbs for either test, and the patient reported no pain.

add as patient can do after a couple of months

Intervention. The goal at this time was to increase the difficulty of the functional activities in preparation for the patient returning to football practice. The patient was instructed in a home exercise program consisting of running 0.4 to 0.8 km (0.25–0.5 mile), jumping rope, running up and down bleachers, 36.6-m (40-yd) sprints (forward, backward, and side-to-side [carioca]), and agility drills in which he performed start-and-stop and cutting activities. He was instructed not to participate in spring football drills or in tackling drills. At this point, the patient was seen weekly to monitor his progress. He was seen 4 times during the fourth month.

Month 5

The patient was seen as part of the pre-participation screening for his football team 2 months prior to the first football practice in the fall. Examination at that time indicated that he was having no difficulty or pain with his exercise program. He still complained of pain with aggressive overpressure at end ranges of medial and lateral rotation in the right hip that was not present in the left hip. His LEFS score was 80/80. At this time, the patient was discharged from the physical therapy service and given permission to fully participate in football in the fall. final step

Follow-up

At follow-up 1 year 3 months after the injury, the patient did not complain of hip pain with any activities. He had participated in all 14 football games of the season, leading to winning a state championship, with no problems and no reinjury. He had no pain with active ROM. He did describe "achy pain" in cold weather. His sciatic nerve function had fully returned. Radiologic examination showed no signs of degenerative changes or avascular necrosis.

Discussion

Traumatic hip dislocation most commonly occurs as a result of an automobile accident in which a person's knee strikes the dashboard, forcing the head of the femur posteriorly.[9] The most common mechanism of injury in the rare cases of hip dislocation in the athlete is a forward fall on the knee with a flexed hip, forcing the head of the femur posteriorly over the rim of the acetabulum.[4] Giza et al[12] suggested a second mechanism of injury for an athlete receiving a hip dislocation during sports activities—a blow from behind when the athlete is on all 4 limbs. This type of injury appears to be what occurred to the patient in this case report. The athlete was making a tackle and received a blow to the thigh from behind.

To date, no other publication has provided a detailed plan of care for an athlete following a posterior dislocation of the hip. Following immediate reduction and 6 weeks on crutches, the program described in this case report utilized non–weight-bearing resistance training and stretching in the initial stages of intervention and progressed to weight-bearing activities as the patient was able to tolerate more stress. The use of pool therapy allowed earlier weight-bearing activities due to the buoyancy of the water. Throughout the intervention, the pain in the hip was closely monitored and, if present, the patient was not progressed to a higher level of work.

This positive outcome does not discount the possibility that our patient continues to be at risk for complications related to his injury, with the most significant concern being the development of degenerative arthritis and avascular necrosis of the femoral head. Degenerative arthritis is thought to be caused or accelerated by scuffing of the smooth joint cartilage during the dislocation reduction

event, and it cannot be completely eliminated or reversed. The most significant concern following a dislocated hip is avascular necrosis of the femoral head. This condition can occur because the important blood vessels that supply the femoral head become torn or stretched during dislocation. The femoral head loses its blood supply, which leads to degeneration, and eventually the joint becomes severely arthritic. No reliable cure exists for this unfortunate condition. Avascular necrosis occurs in 10% to 20% of patients.[2,3,5]

Time to reduction of the hip also is an important factor to consider in the motor nerve damage associated with nerve injury.[30] Our patient was fortunate in the quality of his on-the-field management, the regional children's hospital being within a 10-minute drive of his high school, and the ability of the orthopedic surgeon to reduce the hip in the emergency department. This athlete was at a lower risk for additional complications of labrum damage because bony fragments were not detected on the computed tomography scan at the 1-day follow-up and he denied any pain with hip active ROM.[2,3,5]

The incidence of nerve injury following a posterior hip dislocation varies. In a review of the literature on traumatic dislocation of the hip, Cornwell and Radomisli reported that the incidence among adults ranged from 0% to 20%, "with the majority reporting incidences in the range of 10%-15%."[31(p86)] However, a review of the literature by Giannoudi et al[32] indicated that only one case of sciatic nerve complication has been documented following an injury due to sports. In that study, Tennent et al[33] described a 22-year-old basketball player who slipped when landing from a jump shot, doing the splits, and sustaining a posterior dislocation of the hip, resulting in sciatic nerve palsy. Therefore, the present case report is unique in that the patient sustained a complication to the sciatic nerve.

The mechanism for the injury to the sciatic nerve may the dislocated femoral head compressing the nerve.[31] Epstein[4] suggested that the circumduction motion during the closed reduction of the posteriorly displaced femoral head may produce a traction injury of the sciatic nerve. Cornwell and Radomisli[31] described the symptoms of a neurologic injury after a posterior hip dislocation to include pain, paresthesia, and weakness in the distribution of the affected nerve. These symptoms are consistent with the clinical presentation of the patient described in the present case report.

Clancy et al[34] suggested that the majority of the force for plantar flexion of the ankle is generated by the gastrocnemius-soleus muscle complex and that inappropriate timing of the plantar-flexion contraction during terminal stance may cause inefficient walking. In addition, Marqueste et al[35] indicated that treadmill walking or running performed when a muscle is reinnervating causes positive effects on histochemical muscle fiber alterations, contractile properties, enzyme activities, and muscle weight. Furthermore, Marqueste et al[35] suggested that chronic electrical stimulation of denervated muscle is known to accelerate the recovery of normal function in reinnervated muscle fibers.

add more activities gradually

As the patient's condition allowed, a series of graduated activities were introduced in order to progressively place more and more demand on the patient's hip. The progressive increase in activity involved an increase in loading on the tissues in an activity-specific fashion. An intimate knowledge of the sport and the specific duties required of the athlete for playing football were important for a successful functional progression program.

Finally, no elaborate strength measurements were taken. The clinician relied on manual muscle testing (ensuring that all muscles achieved a grade of 5/5) and functional tests. Given that previous research[36,37] demonstrated that greater sensitivity occurs when 2 one-legged tasks are performed, our patient was required to perform 2 maximal hop tests on the involved (right) leg to the same degree as the uninvolved (left) limb prior to returning to competitive sports.

Conclusion

This case report highlights the plan of care provided to a 17-year-old high school football player following a traumatic dislocation of the hip, complicated by sciatic nerve involvement. Following immediate reduction of the hip by the physician, 6 weeks on crutches, and 5 months of physical therapy intervention, the athlete was able to return to his previous high level of activity and complete a full season as a participant on his high school football team.

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