



UANL

UNIVERSIDAD AUTÓNOMA DE NUEVO LEÓN



University  
of Glasgow

# Lesiones de Isquiotibiales

Dra. Dulce Morales

Especialista en Medicina de Rehabilitación

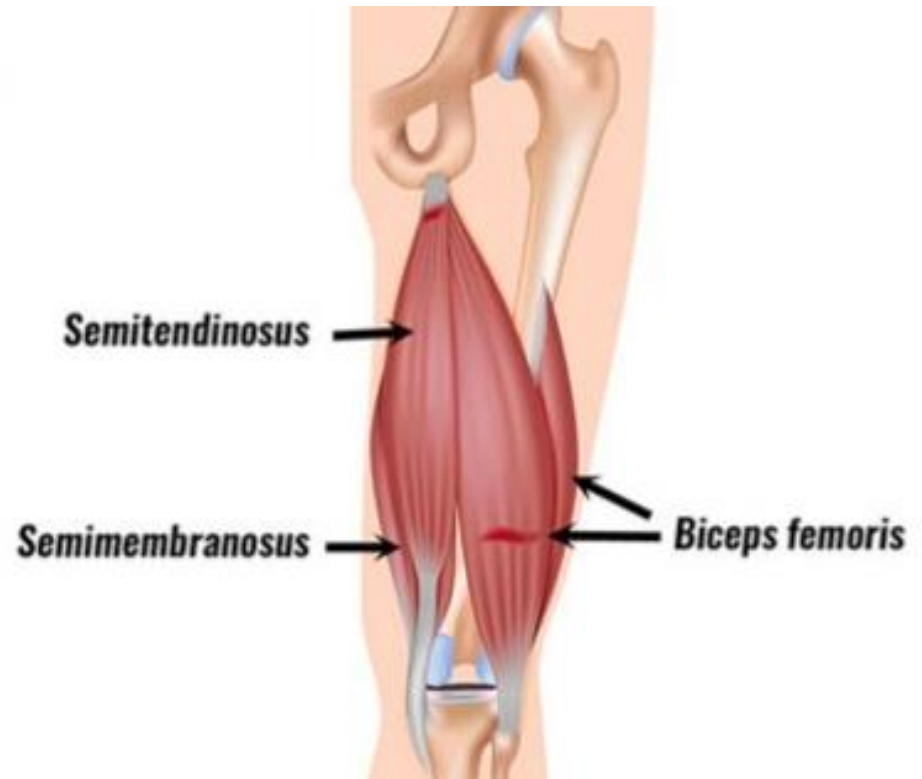
MSc. Ciencias del Ejercicio y Medicina Deportiva



Encargada del área de composición corporal del Laboratorio de Rendimiento Humano de la Facultad de Organización Deportiva de la UANL

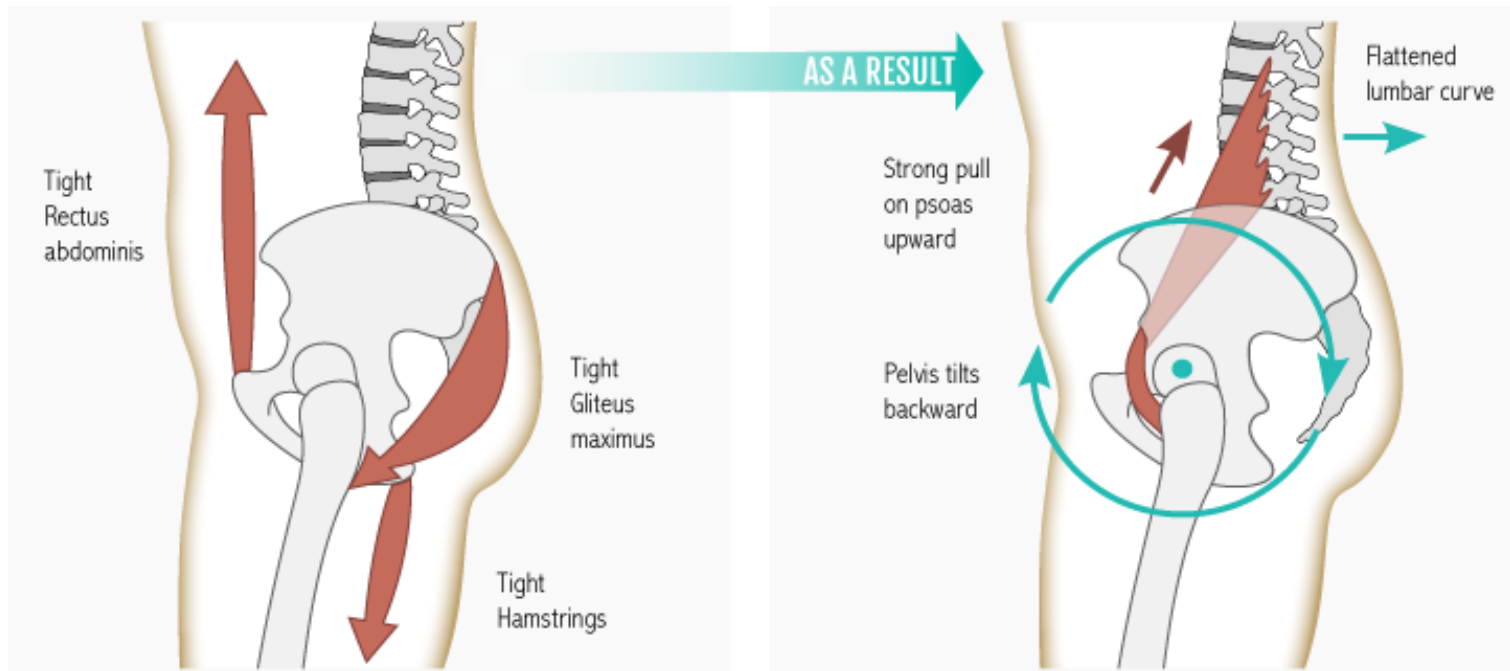
# Anatomía y Biomecánica

- Es un grupo de tres músculos con un origen común que tienen como función flexionar la rodilla, extender la cadera (bi-articulares) y rotar internamente la rodilla cuando esta se encuentra en flexión (semimembranoso y semitendinoso)

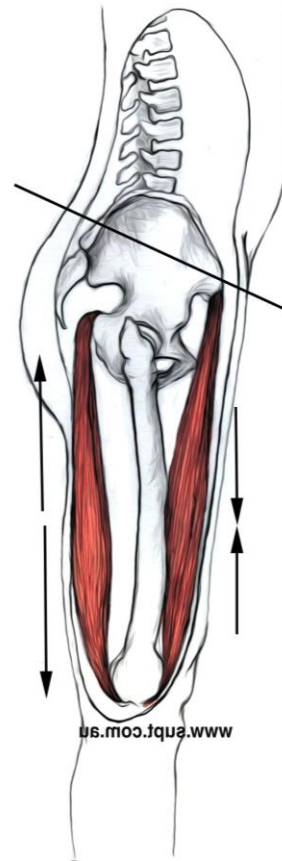
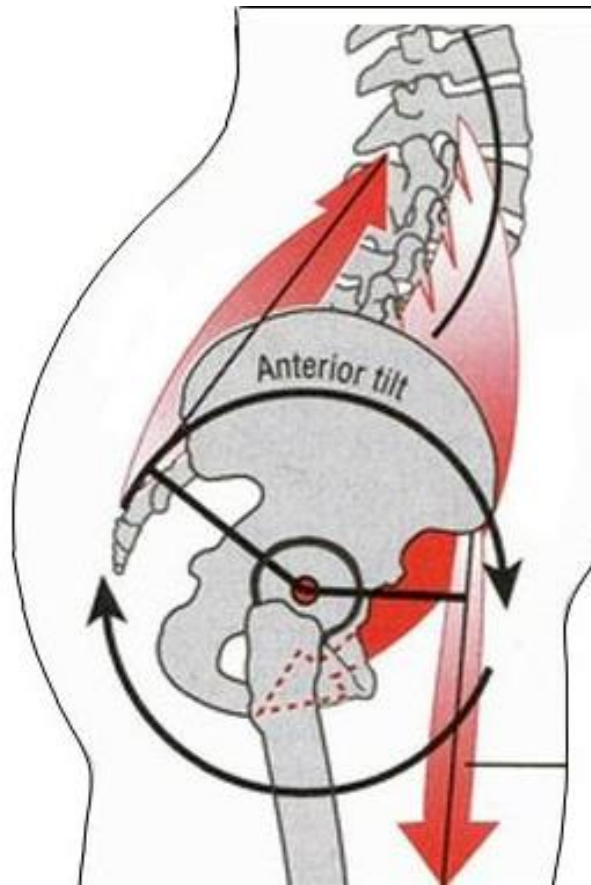


# Anatomía y Biomecánica

- El involucro de los músculos abdominales tiene un impacto significativo en la mecánica de los isquiotibiales

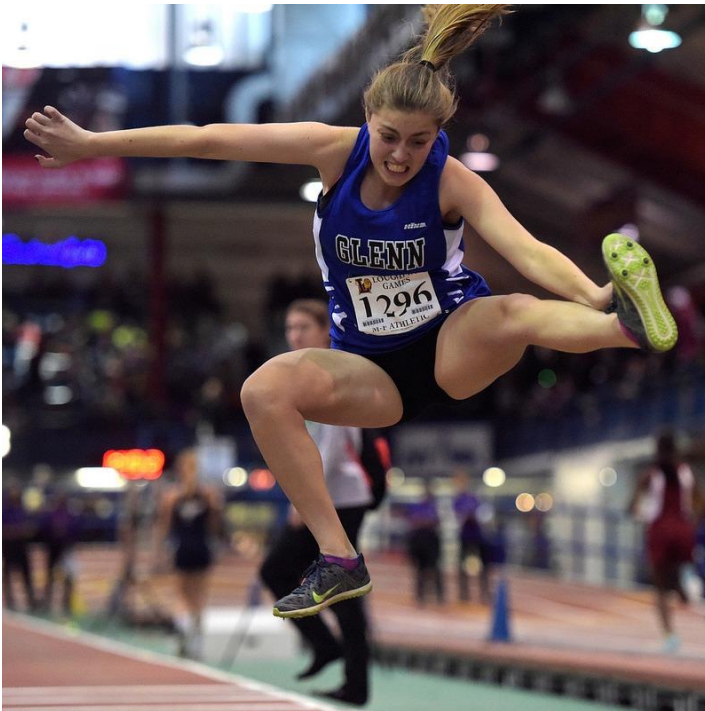


# Anatomía y Biomecánica



# Epidemiología

- Lesiones frecuentes en deportistas que requieren de realizar arranques a alta velocidad, saltadores, pateadores o deportes que impliquen mayor elongación muscular muscular



Erickson, et al Journal of Sport and Health Science (2017).

# Impacto

- Estas lesiones pueden generar que un atleta pierda entre 3 hasta 6 semanas de actividad
- Reincidencia entre 10-30%

# Tipos

- Existen varios tipos de lesiones de isquiotibiales así como localización de las mismas lo cual hace complejo la prescripción de la rehabilitación
  - Desgarros o elongaciones
  - Contusiones
  - Dolor referido de región lumbar
  - Dolor referido de articulación sacroiliaca
  - Tendinopatía
  - Bursitis

# Desgarro o elongación

- Lesión mas frecuente
- Común en velocistas, carreras de obstáculos, saltadores o disciplinas que realizan contracciones sostenidas como judo o danza.
- Mas frecuente en deportes de campo.
- Pretemporada mas común que temporada
- Tercer causa as frecuente de lesión después de rodilla y tobillo en deportistas
- El sitio mas común de lesión es la unión neuromuscular habitualmente la proximal.



# Factores predisponentes

## Extrínsecos

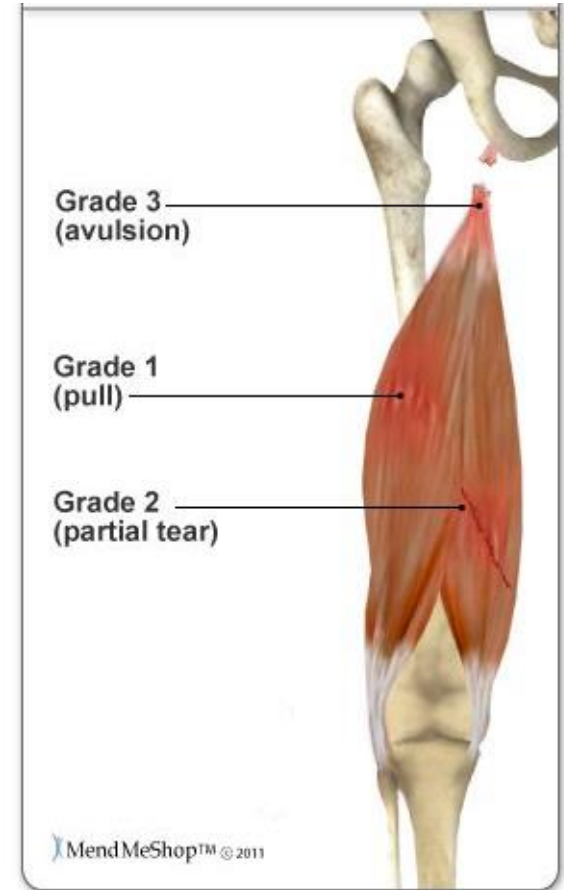
- Pobre calentamiento
- Sobre entrenamiento (fatiga)

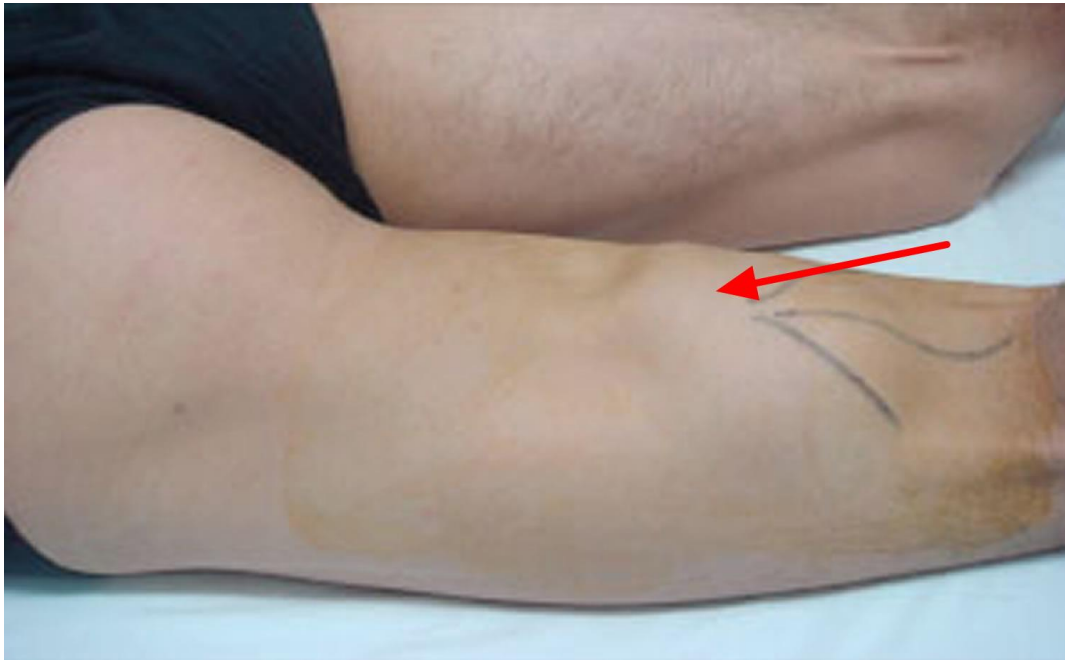
## Intrínsecos

- Edad
- Desbalances de fuerza entre flexoextensores
- Desbalances de fuerza contralaterales ( derecha a izquierda)
- Falta de flexibilidad
- Dolor lumbar
- Disfunción de sacroiliaca

# Tipos de desgarros

- Grado 1 sensación de “calambre” poco dolor al estirar, cesa al término de la actividad.
- Grado 2 Dolor súbito moderado, se incrementa con el estiramiento equimosis ligera 2-3 días posteriores.
- Grado 3 Dolor lancinante/quemante, masa palpable muy dolorosa, equimosis severa 2-3 días posteriores.





# Tratamiento

- El objetivo principal la reintegración a las actividades diarias o deportivas con el menor de recurrencia.
- Mejorar los factores modificables como:
  - Debilidad Muscular
  - Fatiga
  - Desbalances entre contracción excéntrica del isquiotibial y la concéntrica del cuádriceps
  - Falta de flexibilidad de cuádriceps y cadera
  - Deficiencias entre la coordinación muscular pélvica y del tronco

# Protocolos de tratamiento

## A Comparison of 2 Rehabilitation Programs in the Treatment of Acute Hamstring Strains

*Marc A. Sherry, PT, LAT, CSCS<sup>1</sup>*

*Thomas M. Best, MD, PhD<sup>2</sup>*

Comparó dos grupos de evaluando el tiempo que les tomaba reiniciar su disciplina deportiva y la frecuencia de reincidencia

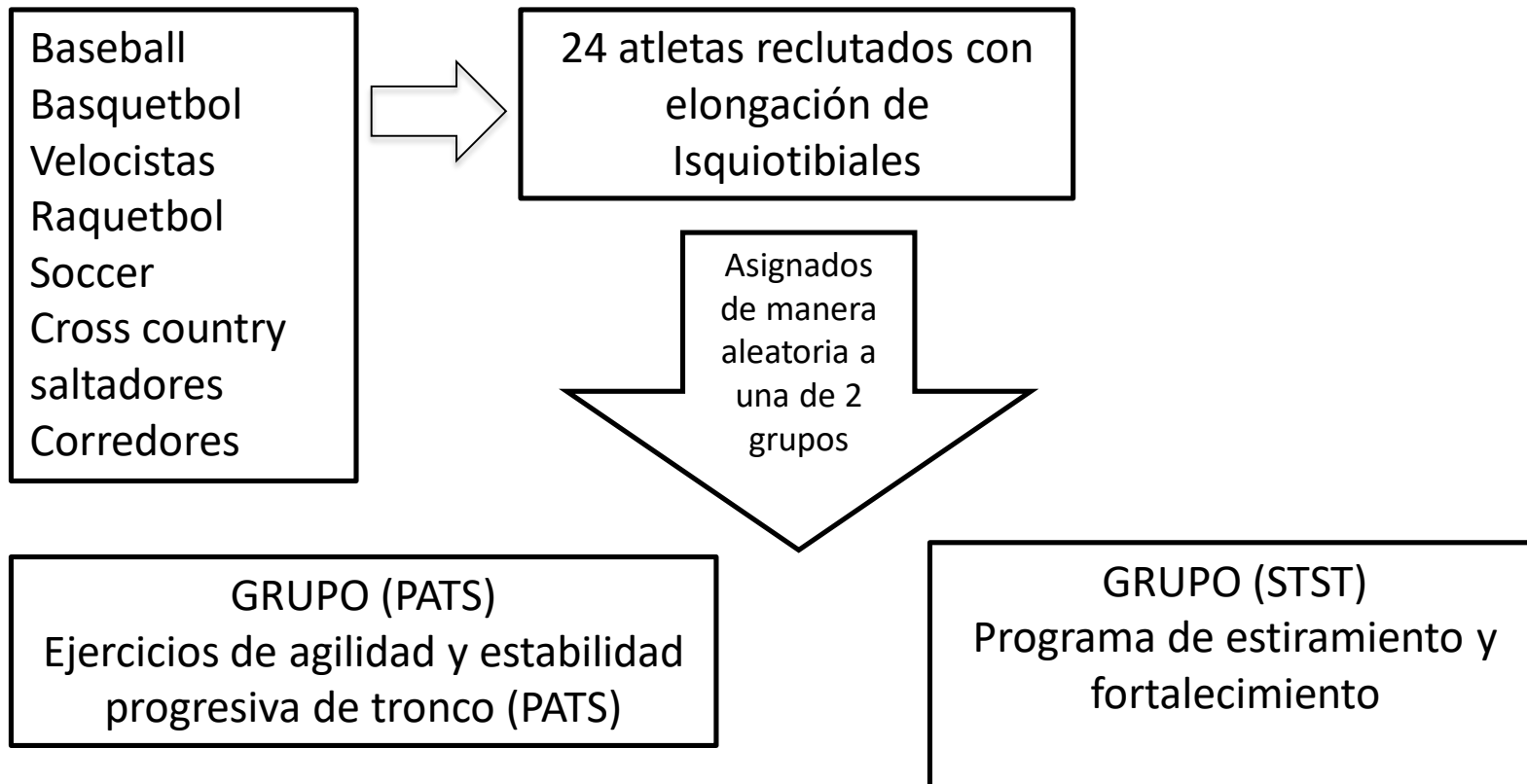


TABLE 2. Subject demographics for the individuals in the stretching and strengthening (STST) group and the progressive agility and trunk stabilization (PATS) group.

	STST	PATS
Mean age $\pm$ SD (y)	24.3 $\pm$ 12.4	23.2 $\pm$ 11.1
Age range (y)	14-49	15-49
Males (n)	9	9
Females (n)	2	4
Males, age 14-30 y (n)	8	8
Females, age 14-30 y (n)	1	2
Males, age 31-50 y (n)	1	1
Females, age 31-50 y (n)	1	2

# Programa de rehabilitación del grupo de PATS

TABLE 5. Rehabilitation program for individuals in the progressive agility and trunk stabilization (PATS) group.

Phase 1
<ul style="list-style-type: none"><li>• Low- to moderate-intensity sidestepping, 3 × 1 min</li><li>• Low- to moderate-intensity grapevine stepping (lateral stepping with the trail leg going over the lead leg and then under the lead leg), both directions, 3 × 1 min</li><li>• Low- to moderate-intensity steps forward and backward over a tape line while moving sideways, 2 × 1 min</li><li>• Single-leg stand progressing from eyes open to eyes closed, 4 × 20 sec</li><li>• Prone abdominal body bridge (performed by using abdominal and hip muscles to hold the body in a face-down straight-plank position with the elbows and feet as the only point of contact), 4 × 20 sec</li><li>• Supine extension bridge (performed by using abdominal and hip muscles to hold the body in a supine hook lying position with the head, upper back, arms, and feet as the points of contact), 4 × 20 sec</li><li>• Side bridge, 4 × 20 sec on each side (Figure 3)</li><li>• Ice in long sitting for 20 min</li></ul>
Phase 2*
<ul style="list-style-type: none"><li>• Moderate- to high-intensity sidestepping, 3 × 1 min</li><li>• Moderate- to high-intensity grapevine stepping, 3 × 1 min</li><li>• Moderate- to high-intensity steps forward and backward while moving sideways, 2 × 1 min</li><li>• Single-leg stand windmill touches, 4 × 20 sec of repetitive alternate hand touches (Figure 4)</li><li>• Push-up stabilization with trunk rotation (performed by starting at the top of a full push-up, then maintain this position with 1 hand while rotating the chest toward the side of the hand that is being lifted to point toward the ceiling, pause and return to the starting position), 2 × 15 reps on each side</li><li>• Fast feet in place (performed by jogging in place with increasing velocity, picking the foot only a few inches off the ground), 4 × 20 sec</li><li>• Proprioceptive neuromuscular facilitation trunk pull-downs with Thera-Band, 2 × 15 to the right and left</li><li>• Symptom-free practice without high-speed maneuvers</li><li>• Ice for 20 min if any symptoms of local fatigue or discomfort are present</li></ul>

Key: Low intensity, a velocity of movement that is less than or near that of normal walking; moderate intensity, a velocity of movement greater than normal walking but not as great as sport; high intensity, a velocity of movement similar to sport activity.

\*Progression criteria: subjects progressed from exercises in phase 1 to exercises in phase 2 when they could walk with a normal gait pattern and do a high knee march in place without pain.



# Programa de rehabilitación del grupo de STST

TABLE 4. Rehabilitation program for the individuals in the stretching and strengthening (STST) group.

Phase 1	
<ul style="list-style-type: none"><li>• 10 min of low-intensity stationary biking with no resistance, primarily focusing on continuous movement with minimal force required</li><li>• Supine hip flexion with knee extension stretch 4 × 20 sec (Figure 1)</li><li>• Standing hip flexion with knee extension stretch with slow side-to-side rotation during the stretch, 4 × 20 sec</li><li>• Contract-relax hamstring stretch in standing with foot on stool, 4 sets of 10-sec contraction and 20-sec stretch</li><li>• Submaximal isometric hamstring sets, 10 reps for 10 sec held at 20° knee flexion and 60° knee flexion while lying supine</li><li>• Ice in long-sitting position for 20 min</li></ul>	
Phase 2*	
<ul style="list-style-type: none"><li>• 15 min of moderate-intensity stationary biking, moderate level of resistance and moderate work level; should feel some perceived exertion</li><li>• 5 min of moderate-velocity walk</li><li>• Supine hip flexion with knee extension stretch 4 × 20 sec</li><li>• Standing hip flexion with knee extension stretch with slow side to side rotation, 4 × 20 sec</li><li>• Prone leg curls, 3 × 10 reps with ankle weights for resistance</li><li>• Hip extension in standing with knee straight using Thera-Band resistance, 3 × 10 reps</li><li>• Non-weight-bearing “foot catches,” 3 × 30 sec (Figure 2)</li><li>• Symptom-free practice without high-speed maneuvers</li><li>• Ice for 20 min if any symptoms of local fatigue or discomfort are present</li></ul>	

\*Progression criteria: Subjects progressed from exercises in phase 1 to exercises in phase 2 when they could walk with a normal gait pattern and do a high knee march in place without pain.



# Re-lesión y reincorporación al deporte

TABLE 6. Mechanism of injury responsible for causing hamstring strains in the athletes participating in this research study.

Mechanism of Injury	n
Sprinting	13
Acceleration (transitioning to a full sprint from a relatively stationary position)	5
Lunging for tennis ball or first base	2
Plant and kick in soccer	2
Slip and fall	1
Stretching	1

TABLE 7. Incidence of reinjury for the individuals in the stretching and strengthening (STST) group and progressive agility and trunk stabilization (PATS) group.

Group	Reinjury Rate	
	2 wk	1 y
STST (n = 11)	6 (54.5%)	7 (70.0%)
PATS (n = 13)	0 (0%)	1 (7.7%)

TABLE 8. Time required for return to sports for the individuals in the stretching and strengthening (STST) group and the progressive agility and trunk stabilization (PATS) group.

Group	Injury to Return to Sports	Start of Rehabilitation to Return to Sports
STST	37.4 d (SD, 27.6; SE, 8.3; range, 10-95 d)	33.3 d (SD, 25.9; SE, 7.8; range, 8-88 d)
PATS	22.2 d (SD, 8.3; SE, 2.3; range, 10-35 d)	18.8 d (SD, 9.4; SE, 2.6; range, 5-33 d)



FIGURE 4. Single-leg stand windmill touches: performed by standing on 1 leg, then rotating the trunk and flexing the hips to bring the hand down in front of the lower leg.



FIGURE 3. Side bridge: performed by using abdominal and hip muscles to hold the body in a side-lying plank position with the lower elbow and feet being the only points of contact.

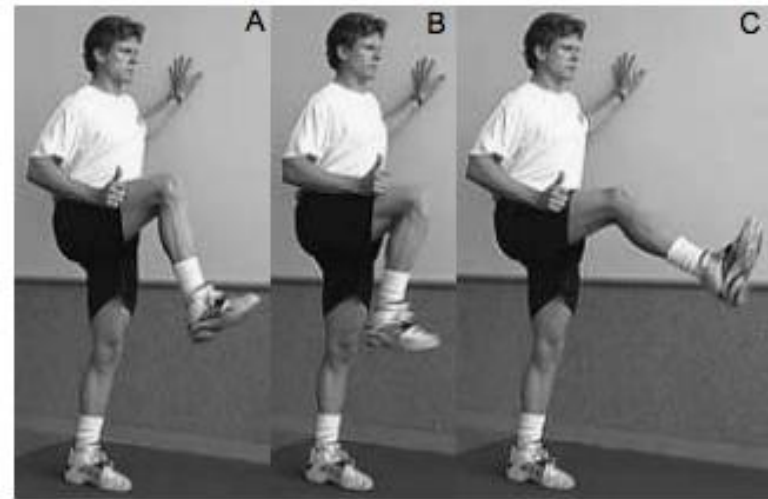


FIGURE 2. Foot catch exercise. This exercise was described and pictured in a review article by Worrell<sup>26</sup>; "The athlete stands parallel to a wall, using the upper extremity on the wall side as needed for stability, and simulates the swing phase of walking or running. During the swing phase, the athlete performs a quick quadriceps contraction and then attempts to catch or stop the lower leg before reaching full knee extension by a hamstring contraction."

# Discusión

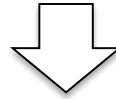
- Un programa de rehabilitación que consiste en agilidad progresiva y estabilización de tronco, es efectivo en promover el reincorporarse al deporte así como prevenir la recurrencia de lesiones en atletas con elongaciones y desgarros de isquiotibiales

# Acute Hamstring Injuries in Swedish Elite Sprinters and Jumpers: A Prospective Randomised Controlled Clinical Trial Comparing Two Rehabilitation Protocols

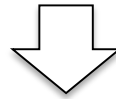
Carl M Askling, Magnus Tengvar, Olga Tarassova and Alf Thorstensson

Objetivo: Comparar la efectividad de dos programas de rehabilitación de elongación/desgarro de isquiotibiales en velocistas y en saltadores. Los cuales variaban por la diferencia de alargamiento de los tendones.

56 atletas Suecos entre  
15 y 19 años  
46 velocistas 10  
saltadores ( salto  
horizontal)



Lesión aguda no mas de 5 días confirmada por resonancia  
magnética y valoración de pruebas clínicas



**Grupo C**  
Se enfocaba en el  
fortalecimiento en  
la fase de  
acortamiento

Ambos grupos realizaban 1.ejercicios de  
flexibilidad  
2. Ejercicios de estabilización de la zona  
lumbo-pélvica  
3. El ejercicio específico

**Grupo L**  
se enfocaba en ejercicios  
que produjeran  
fortalecimiento en la fase  
de estiramiento del  
músculo principalmente  
ejercicios concéntricos

# Ejercicios del grupo L

**Figure 1** L-1 'The Extender': the player should hold and stabilise the thigh of the injured leg with the hip flexed approximately 90° and then perform slow knee extensions to a point just before pain is felt. Twice every day, 3 sets with 12 repetitions (see online supplementary video 1).



**Figure 2** L-2 'The Diver': the exercise should be performed as a simulated dive, that is, as a hip flexion (from an upright trunk position) of the injured, standing leg and simultaneous stretching of the arms forward and attempting maximal hip extension of the lifted leg while keeping the pelvis horizontal; angles at the knee should be maintained at 10–20° in the standing leg and at 90° in the lifted leg. Owing to its complexity, this exercise should be performed very slowly in the beginning. Once every other day, three sets with six repetitions (see online supplementary video 2).

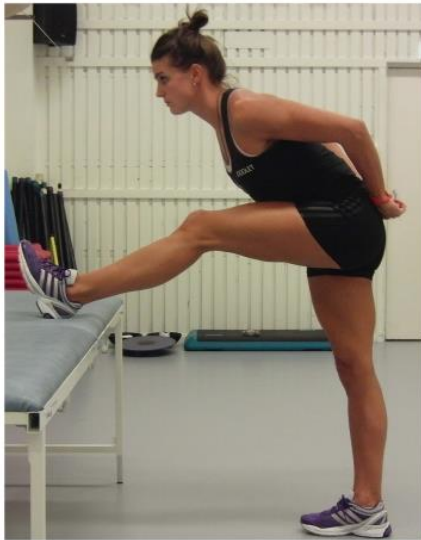


**Figure 3** L-3 'The Glider': the exercise is started from a position with upright trunk, one hand holding on to a support and legs slightly split. All the body weight should be on the heel of the injured (here left) leg with approximately 10–20° flexion in the knee. The motion is started by gliding backwards on the other leg (note the low friction sock) and stopped before pain is reached. The movement back to the starting position should be performed by the help of both arms, not using the injured leg. Progression is achieved by increasing the gliding distance and performing the exercise faster. Once every third day, three sets with four repetitions (see online supplementary video 3).

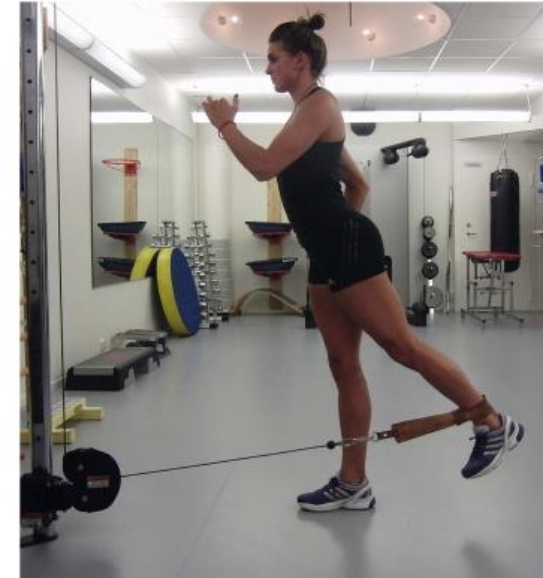




# Ejercicios del grupo C



**Figure 4** C-1 *Stretching—contract/relax.* The heel of the injured leg is placed on a stable support surface in a high position (close to maximum) with the knee in approximately 10° flexion. The heel is pressed down for 10 s and then, after relaxation for 10 s, a new position is assumed by flexing the upper body slowly forwards for 20 s. Twice a day, three sets with four repetitions (see online supplementary video 4).



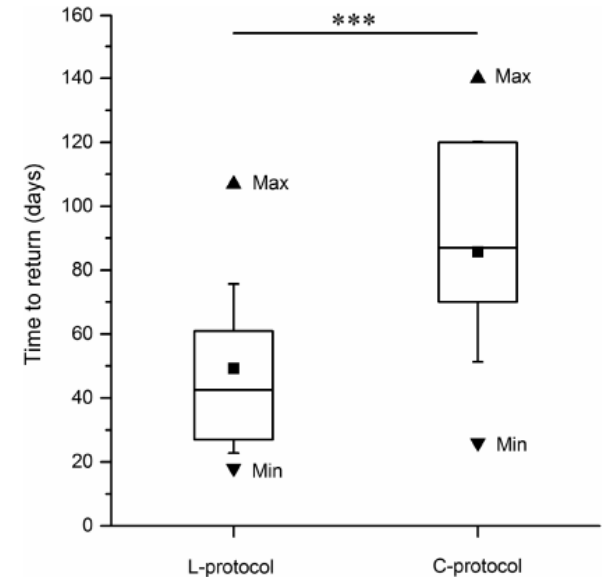
**Figure 5** C-2 *Cable-pendulum:* A stationary cable-machine or expander is used. With the uninjured leg as the standing leg, forward-backward hip motions are performed with the injured leg with the knee in approximately 20–30° flexion. This exercise involves the whole body and should be performed slowly in the beginning of the rehabilitation period. Once every other day, three sets with six repetitions (see online supplementary video 5).

**Figure 6** C-3 *Pelvic lift:* This exercise is started in a supine position with the body weight on both heels, and then the pelvis is lifted up and down slowly. Start with the knee in 90° of flexion. The load is increased by putting more of the body weight on the injured leg and by having a greater extension in the knee. Ultimately, only the slightly bent injured leg is carrying the load. Every third day, three sets with eight repetitions (see online supplementary video 6).



# Discusión

- El protocolo de rehabilitación que consistía en mayor estiramiento se mostró mas efectivo que el protocolo convencional promoviendo una reincorporación deportiva mas temprana en los velocistas y saltadores suecos



**Figure 7** Time to return, in days, in the L-protocol (n=28) and C-protocol (n=28). The boxes represent IQRs in the boxes, the horizontal lines represent median values and black squares represent mean values; whiskers=mean±1 SD. \*\*\* Denotes significant difference (p<0.001, Mann-Whitney U test).

**Table 2** Correlations between time to return and MRI and palpation parameters in players in the L-protocol and the C-protocol, respectively

	L-protocol Spearman's r	p Value	C-protocol Spearman's r	p Value
Distance to ischial tuberosity (mm)	-0.895	<0.001	-0.896	<0.001
Length (mm)	0.851	<0.001	0.662	<0.001
Palpation (cm)	-0.885	<0.001	-0.775	<0.001

Significant (p≤0.05) correlations are in italics.



## Review

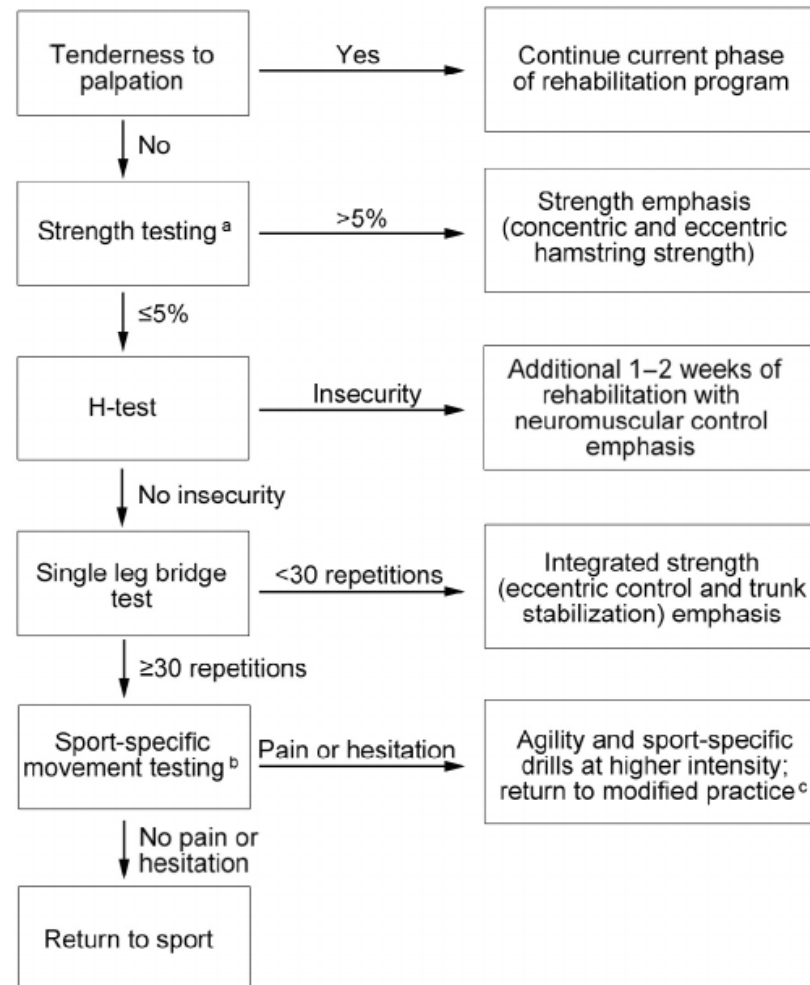
## Rehabilitation and return to sport after hamstring strain injury

Lauren N. Erickson, Marc A. Sherry \*

*Sports Rehabilitation, University of Wisconsin Hospital and Clinics, Madison, WI 53718, USA*

Received 16 November 2016; revised 25 January 2017; accepted 24 February 2017

Available online 10 April 2017



Gracias por su atención