



**JORNADA MONOGRÁFICA SOBRE LA LESIÓN MUSCULAR**

**LUNES 6 DE JUNIO DE 2011**

**Diagnóstico por ecografía: ventajas e inconvenientes**  
**Dr. Ramón Balius**  
*Consell Català de l'Esport. Generalitat de Catalunya*  
*Clínica Diagonal, Barcelona*



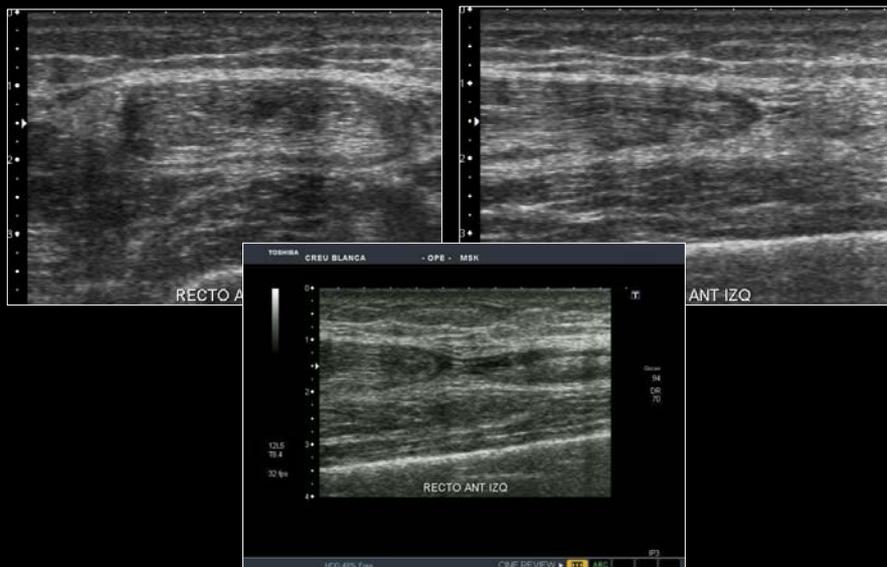
## La ecografía para la valoración muscular:



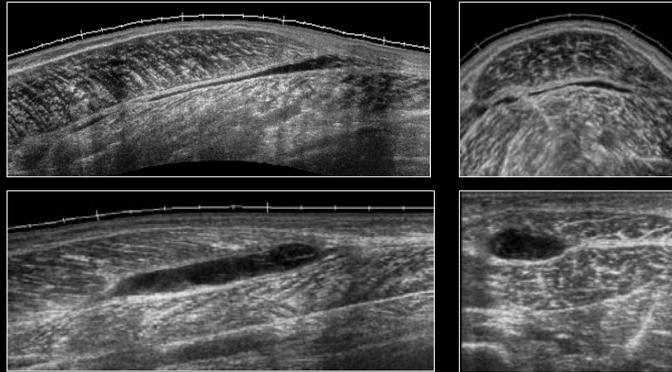
1. Es una prueba dinámica.
2. Permite la sonopalpación.
3. Permite ver detalles más finos.
4. No siempre es apta para realizar estudios y ensayos clínicos.
5. No objetiva de forma fiable la lesión las primeras 72 horas.
6. No objetiva todas las lesiones musculares. Es más útil la RM.
7. No ve la lesión de algunos músculos.
8. Permite monitorizar la lesión muscular y detectar complicaciones.
9. Permite intervencionismo.
10. Es accesible y barata, pero tiene una alta curva de aprendizaje.

# 1. La ecografía es una prueba dinámica

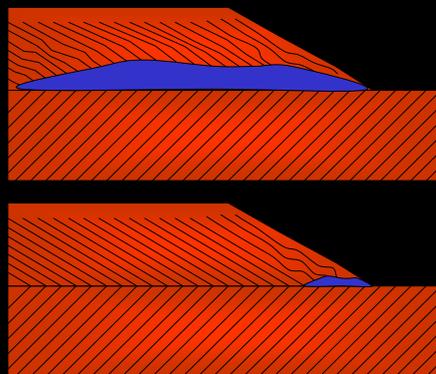
## LESIÓN MUSCULAR Más visible en contracción



**Ecografía lesión aguda: ¿PARCIAL O TOTAL?**  
Solución de continuidad fibrilar miofascial



**Ecografía lesión aguda: ¿PARCIAL O TOTAL?**  
Solución de continuidad fibrilar miofascial

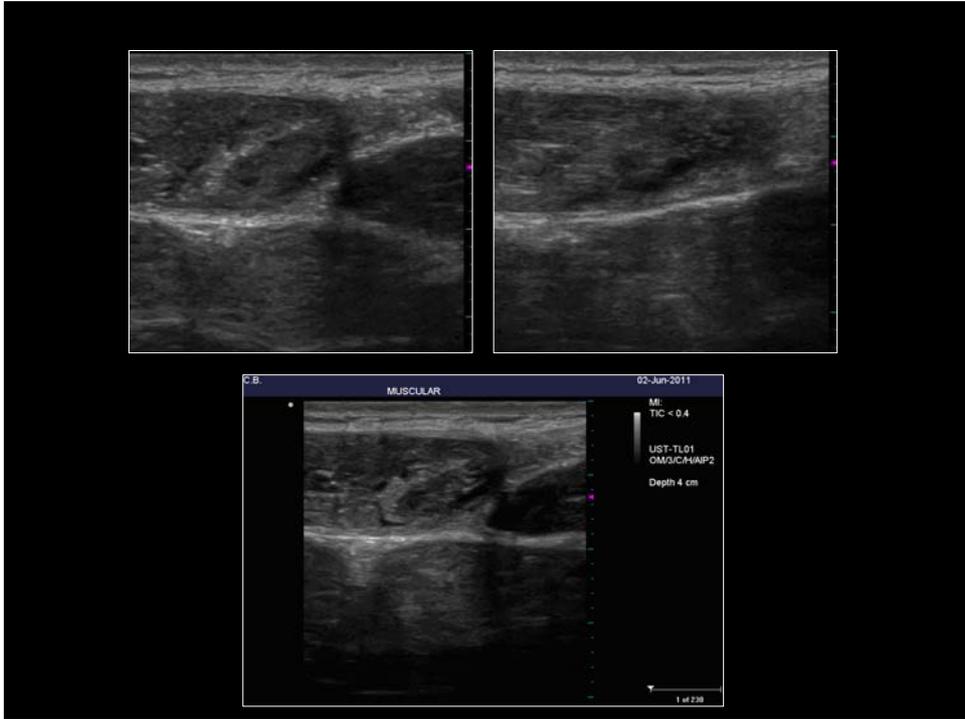


## **HERNIA MUSCULAR**

Lesión aponeurótica total o dehiscencia  
Visible en relajación o estiramiento  
Desaparece en contracción



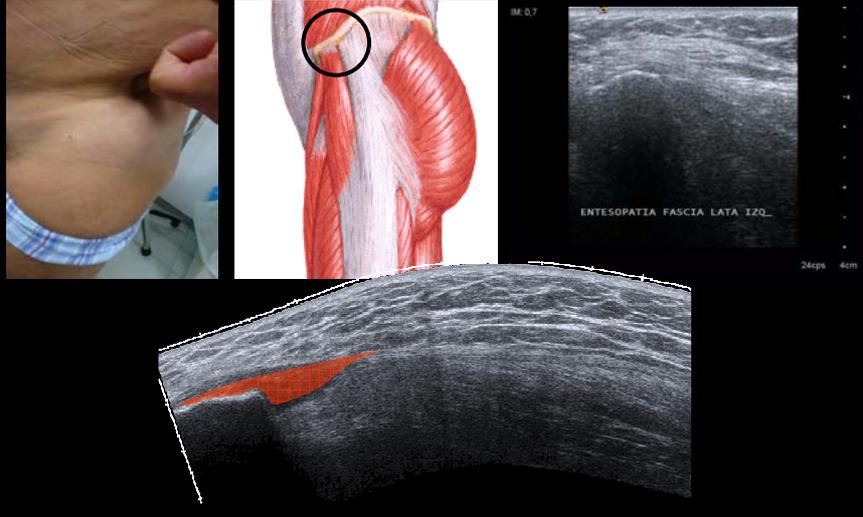
**2. La ecografía permite la sonopalpación**



3. La ecografía permite ver detalles más finos

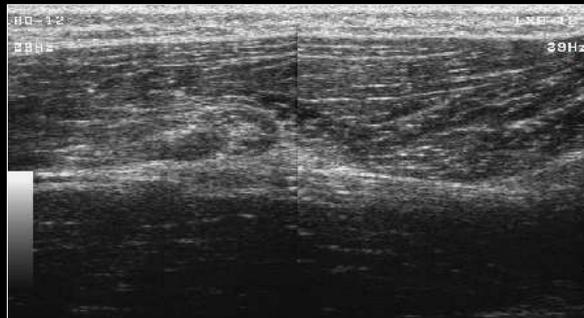
## Entesopatía Tensor Fascia Lata

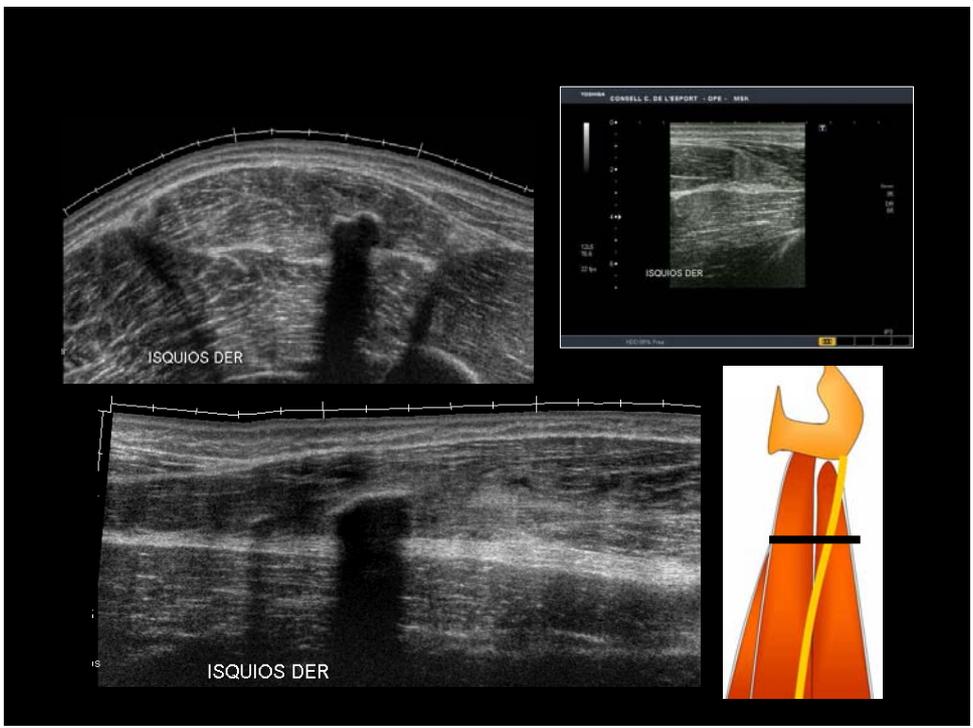
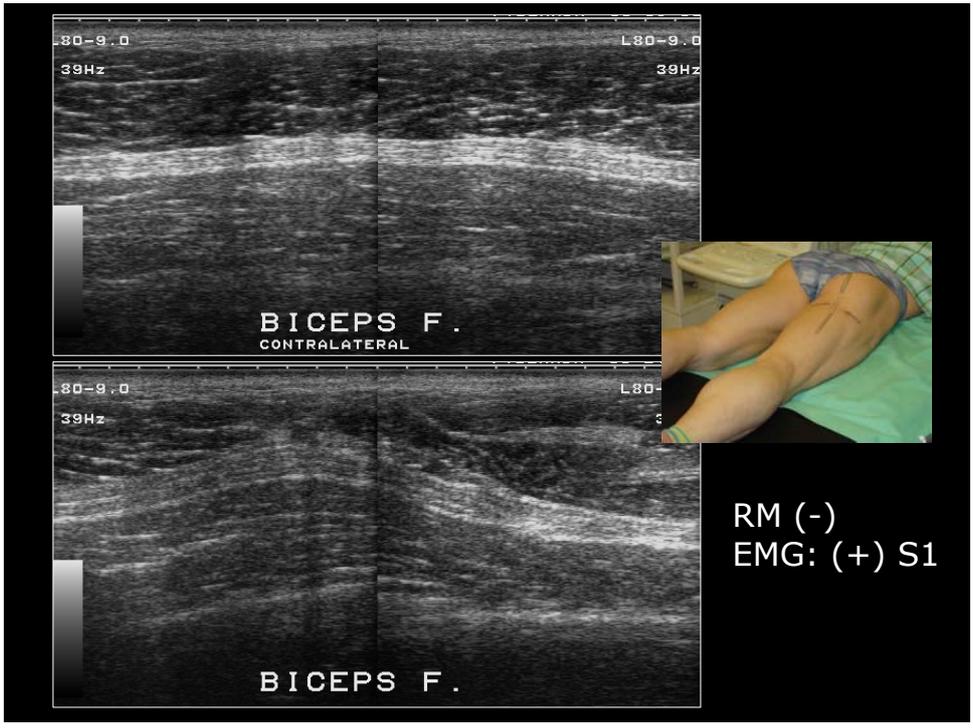
Tendinopatía por sobreuso  
Por extensión y aducción de cadera  
Dolor detrás EIAS



## Detalles finos

- Similar Meràlgia Parestésica Post Muslo
- Valoración solo ecográfica





4. La ecografía no siempre es apta para realizar estudios y ensayos clínicos.  
Es más útil la RM.

### **"RETURN TO PLAY"**

#### Determinantes:

- Flexibilidad y tests de Fuerza
- **Criterios de Imagen**
- Test funcionales de campo
- Control de los factores de riesgo



*Clin J Sports Med 2005*

- En músculo, suelen ser estudios pronóstico
- La ecografía puede ser útil, pero la RM es superior
- Habitualmente, los US exportan los estudios de RM

## EFFECTO DE LOS HIDROLIZADOS DE GELATINA EN LA PREVENCIÓN DE LAS LESIONES EN DEPORTISTAS

### EFFECTS OF GELATINE HYDROLYSATES IN THE PREVENTION OF SPORTSMEN AND WOMEN INJURIES

Kiitaro Kubo<sup>1</sup>, Hiroshi Akima<sup>2</sup>, Junichi Uchiyama<sup>3</sup>, Izumi Yahata<sup>4</sup>, Hiroaki Fukawa<sup>5</sup>, Hiroaki Katsuhira<sup>1</sup>

SITIO	LATERAL			MEDIAL		
	HC	HM	FCM	HC	HM	FCM
1	1.8	2.1	2.2	1.9	2.2	2.3
2	2.0	2.2	2.3	2.0	2.3	2.4
3	1.9	2.2	2.3	2.1	2.4	2.5
4	2.0	2.3	2.4	2.1	2.4	2.5
5	1.9	2.2	2.3	2.0	2.3	2.4
6	1.8	2.1	2.2	1.9	2.2	2.3
7	1.9	2.2	2.3	2.0	2.3	2.4
8	2.0	2.3	2.4	2.1	2.4	2.5
9	1.9	2.2	2.3	2.0	2.3	2.4
10	1.8	2.1	2.2	1.9	2.2	2.3

HC: Cartilago femorotibial; HM: Cartilago femoropatellar; FCM: Cartilago femorocapital

Grupos suplementados	Grupos control
HC	4.2333 ± 0.855
HM	3.9200 ± 0.700*
FCM	2.9267 ± 0.640
HC	2.9267 ± 0.640
HM	2.9267 ± 0.640
FCM	2.9267 ± 0.640

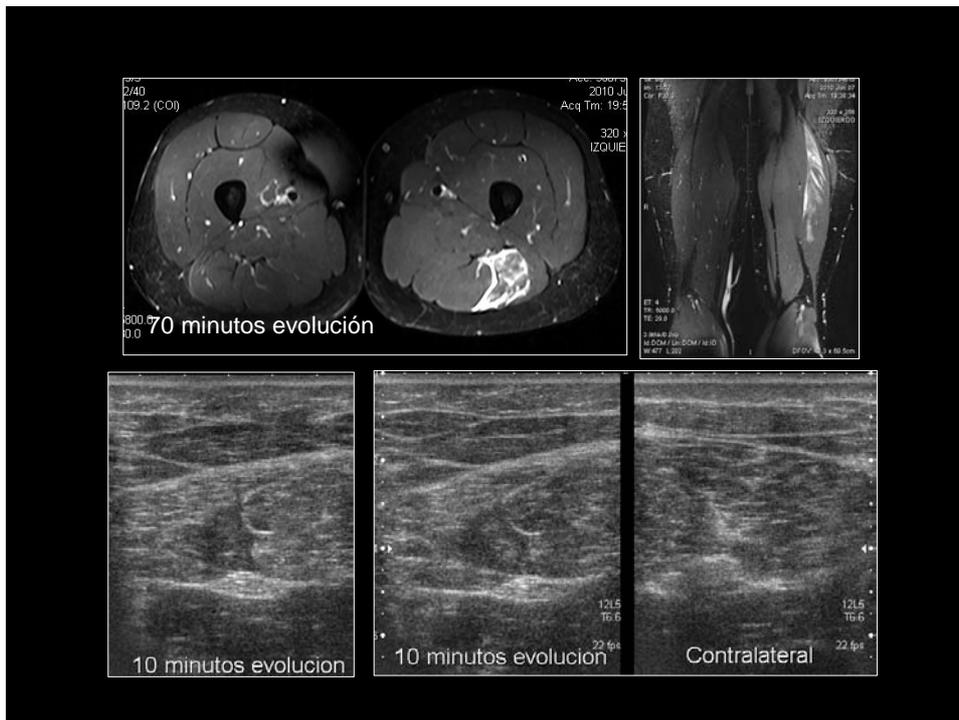
\* p < 0.05

Mientras duró el estudio sólo se produjo un caso de intolerancia a la suplementación, mediante la aparición de náuseas y vómitos, en una jugadora de baloncesto, siendo posteriormente diagnosticada de Hepatitis A, atribuyéndose la sintomatología antedicha a esta patología.

#### CONCLUSIONES



5. La ecografía no  
objetiva de forma fiable  
la lesión las primeras  
72 horas.  
Es más útil la RM.



**6. La ecografía no  
objetiva todas las  
lesiones musculares.  
Es más útil la RM.**

**Lesión muscular por Mecanismo Indirecto  
Importancia del defecto fibrilar: US  
(Peetrans, 2002)**

Eur Radiol (2002) 12:35-43  
DOI 10.1007/s00130401-1104-6

ULTRASOUND\*

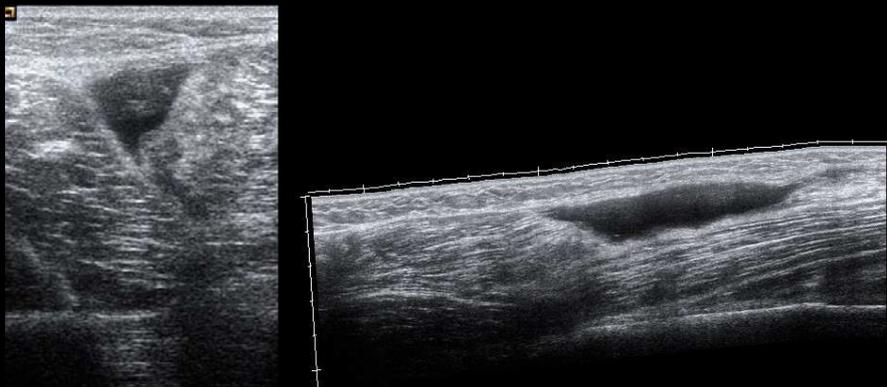
P. Peetrans

Ultrasound of muscles

Grado I (Peetrons, 2002)  
Área mal definida hiperecólica



Grado II (Peetrons, 2002).  
Rotura Parcial (discontinuidad fibrilar parcial)



Grado III (Peetrons, 2002).  
Rotura Total (discontinuidad fibrilar completa)



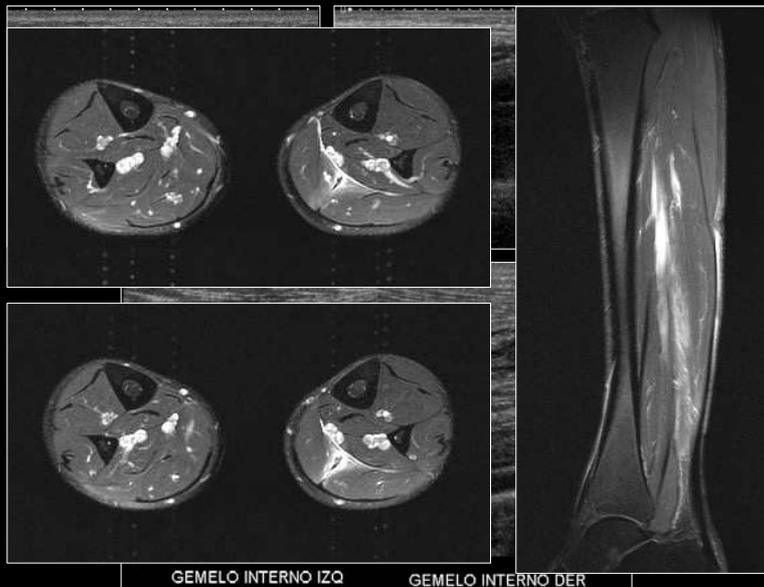
Lesión muscular por **Mecanismo Indirecto**  
**Importancia del defecto fibrilar: US**  
(Peetrons, 2002)

**Grado 0: US normal**  
**Grado I:** Elongación. Área mal definida hiperecoica  
**Grado II:** Rotura Parcial (discontinuidad fibrilar parcial)  
**Grado III:** Rotura Total (discontinuidad fibrilar completa)

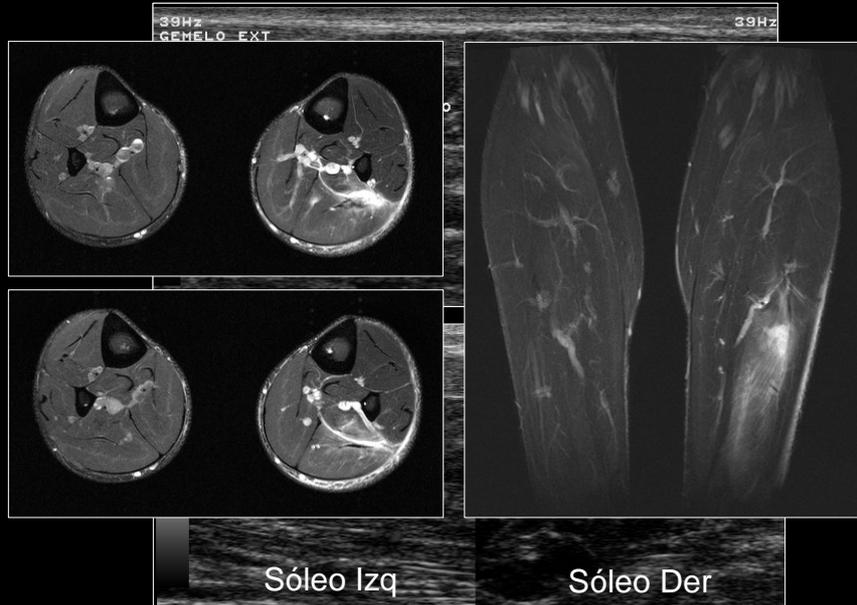
## 7. La ecografía no ve la lesión de algunos músculos.

Soleus  
Bíceps Femoris (caput brevis)  
Aductor Magnus

### Tennis Leg con US (-)

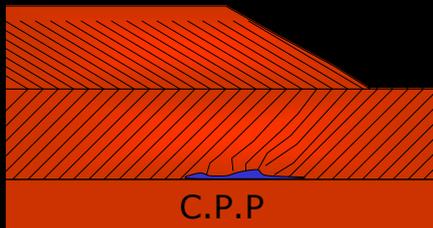


## Tennis Leg con US (+)



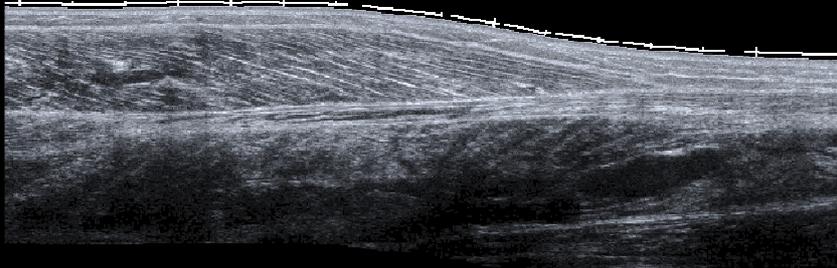
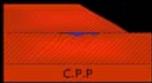
Clasificación de las lesiones del Sóleo  
 Lesiones Miofasciales (visibles por US)  
 Lesiones Musculotendinosas (no visibles por US)

Scientific Article  
**Magnetic resonance imaging findings of injuries to the calf muscle complex**  
 George Kambouris - Amy Y. L. Tang - Asha Bhandi - David Connell - Eoin C. Kavanagh

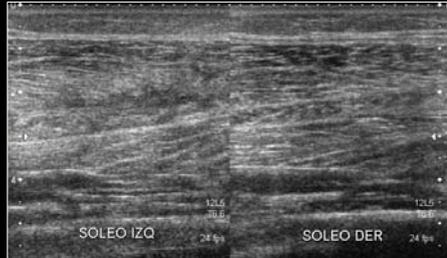
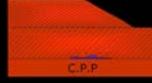


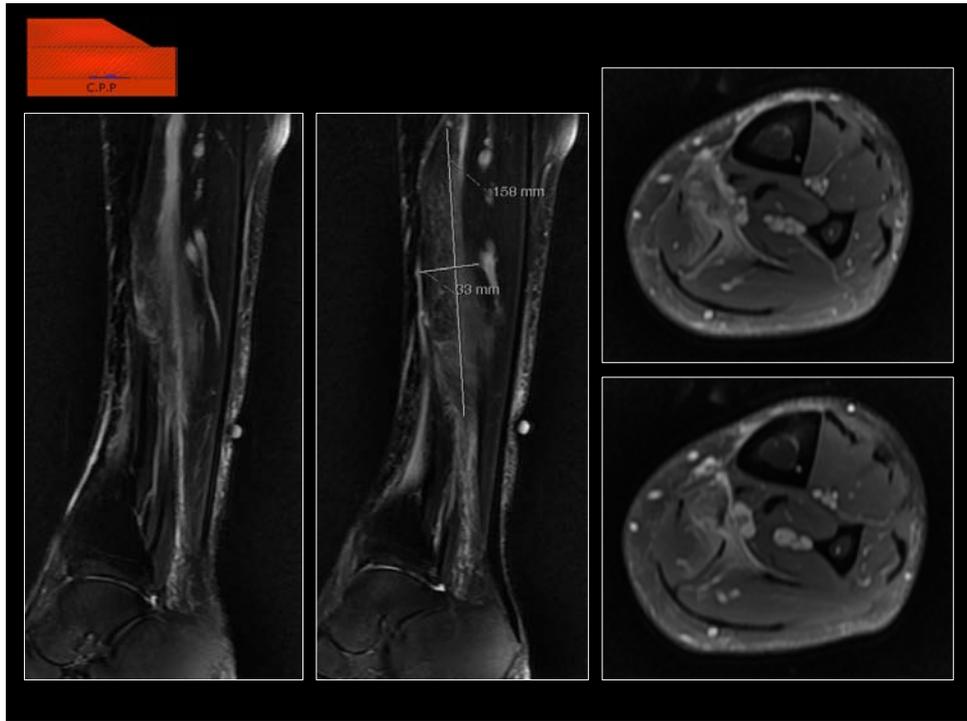
**Lesión Miofascial:**  
 Clínica de Síndrome de la Piedra  
 Paratendinitis  
 Vasculopatía (no visible por US (solo si evolución tórpida))  
 Se relaciona con expansiones tendinosas

# Lesión Miofascial del Sóleo

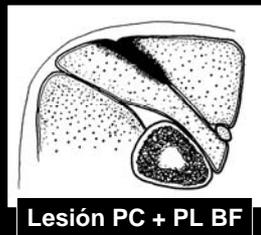
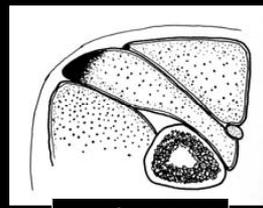
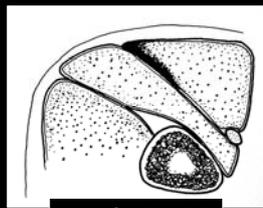


# Lesión Musculotendinosa del Sóleo



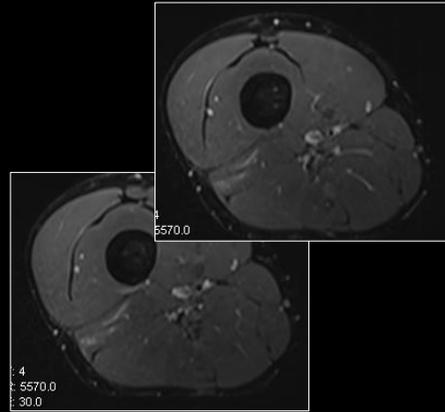
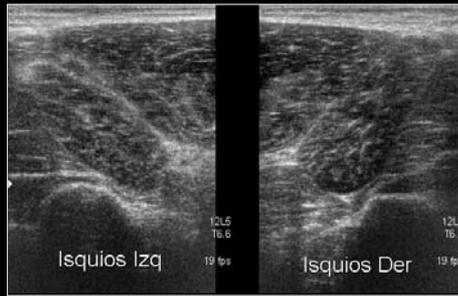
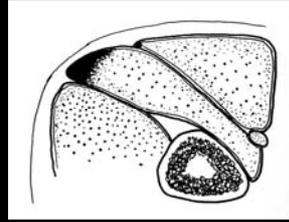


## MITAD DISTAL LATERAL

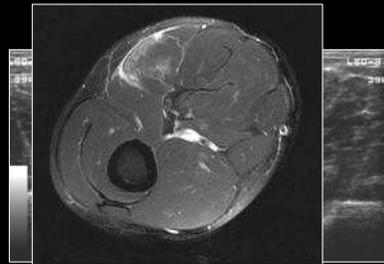
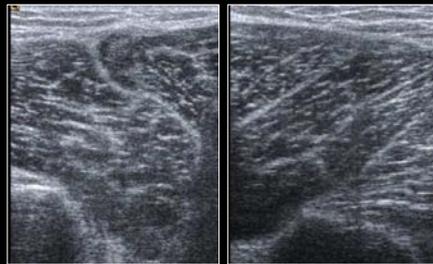


## Rotura Porción Corta

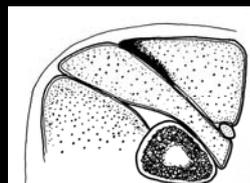
Contacto con el fémur  
Lesiones pequeñas: no US  
Rara. Buen Pronóstico



## Rotura Porción Larga

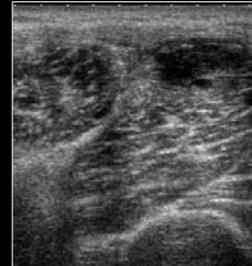
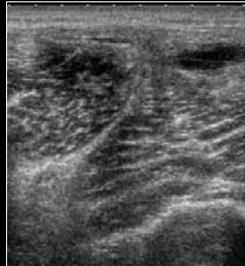
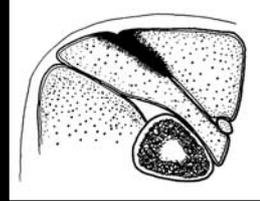


- Más frecuente
- A veces, difícil de ver
- Si distal (tendón): mal pronóstico



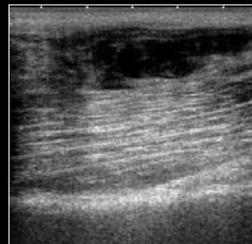
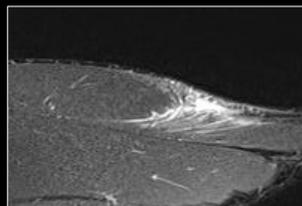
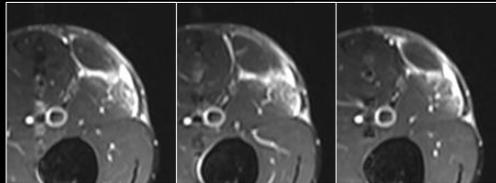
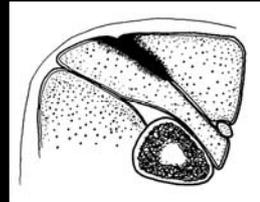
## Rotura Porción Larga + Porción Corta

- Poco frecuente
- PC + PL = *CREMALLERA*
- Porción Larga: Nervio Tibial
- Porción Corta: Nervio Peroneal



## ROTURA PORCIÓN LARGA + PORCIÓN CORTA

- Poco frecuente
- PC + PL = *CREMALLERA*
- Porción Larga: Nervio Tibial
- Porción Corta: Nervio Peroneal

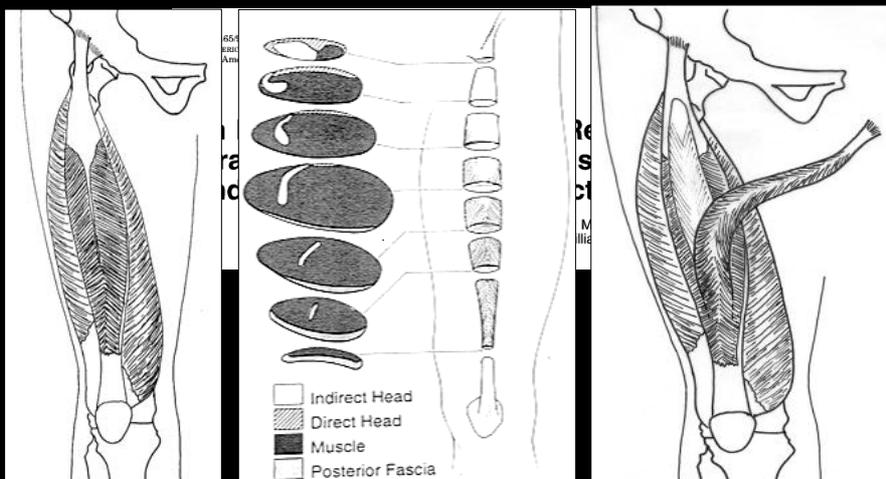


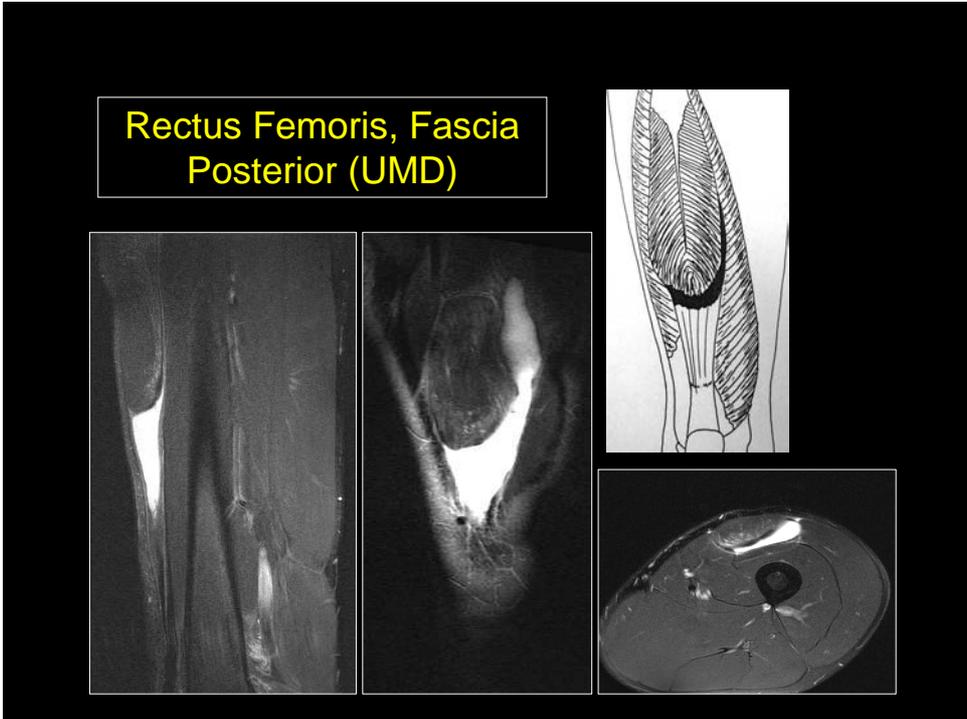
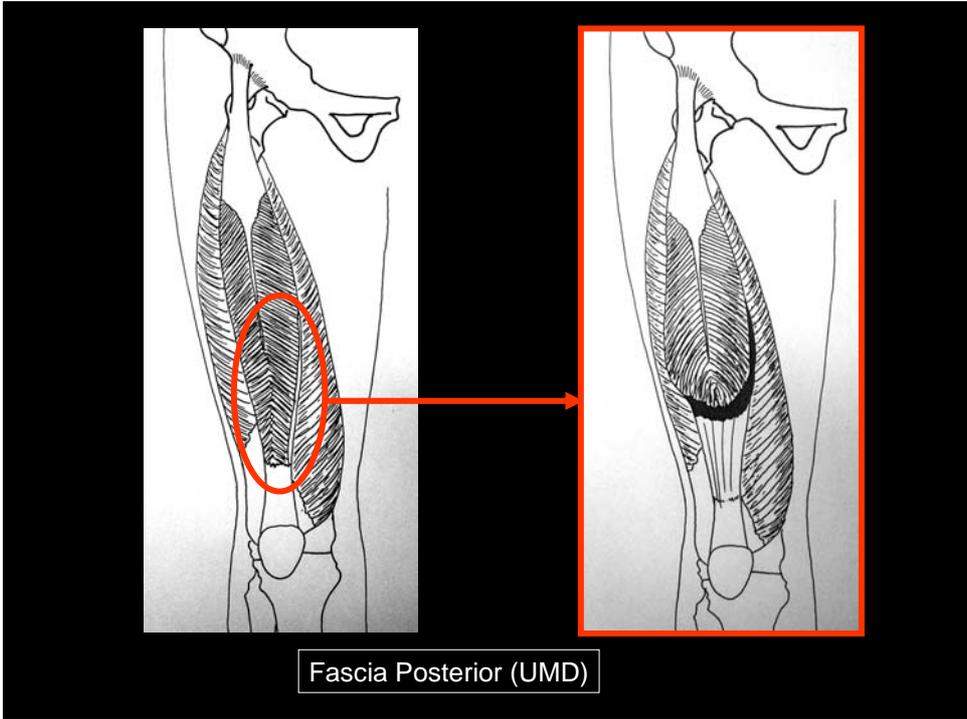
8. Con la ecografía podemos monitorizar la lesión muscular y detectar complicaciones.

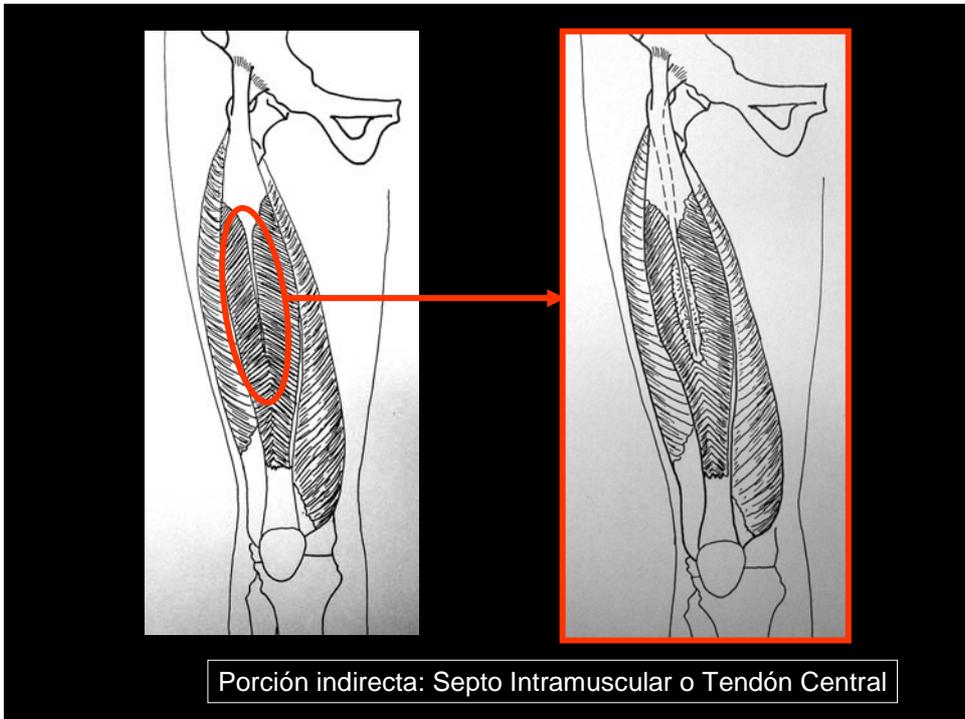
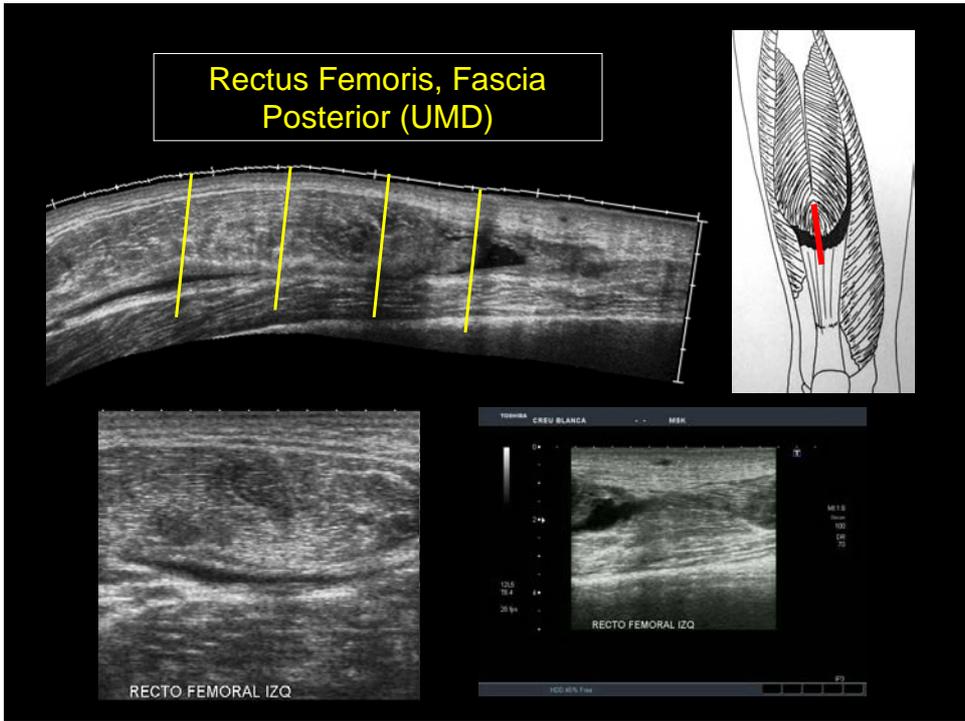
Problema: reparación  
Muy útil para pronóstico

### Recto Femoral

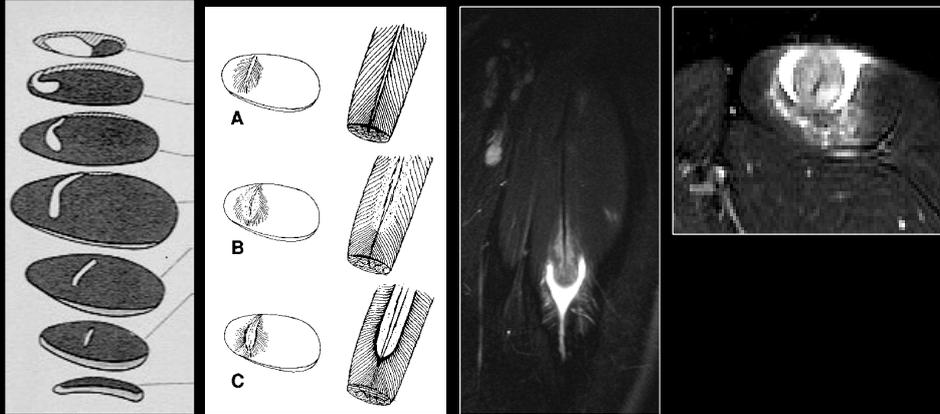
*"Músculo dentro un músculo"*



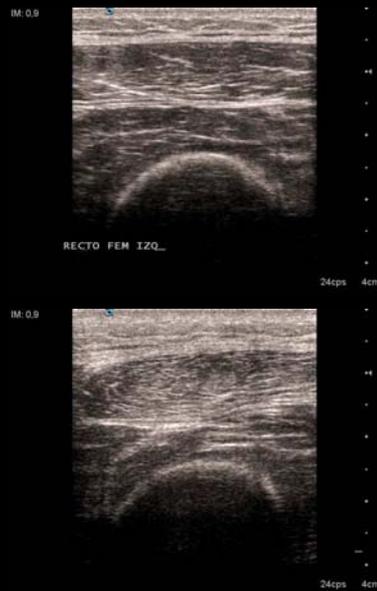
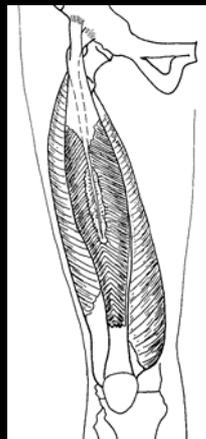




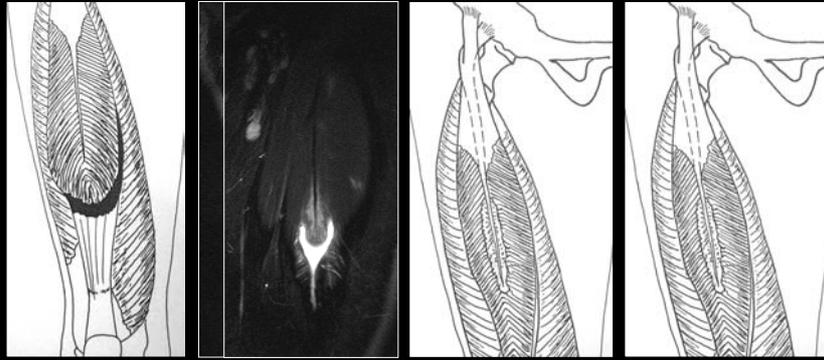
## Rectus Femoris, Tendón Central



## Rectus Femoris, Tendón Central



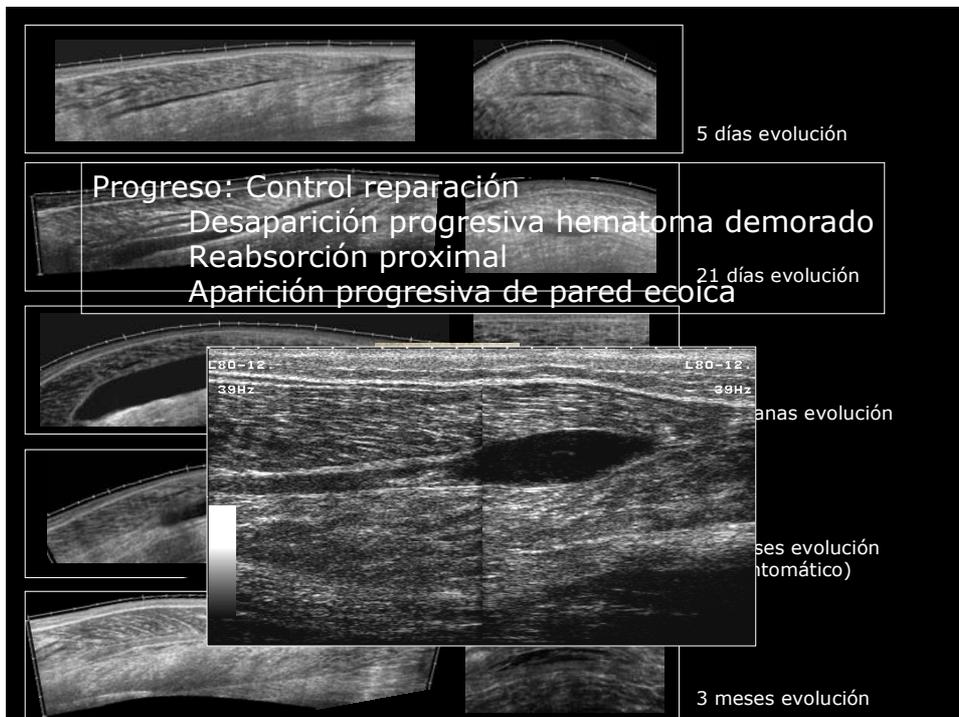
Porción indirecta: Septo Intramuscular o Tendón Central



**Table 10** Regression model (regression coefficients)

	Proximal level		Distal level		Total	
	Coefficient $\beta_i$	p Value	Coefficient $\beta_i$	p Value	Coefficient $\beta_i$	p Value
(Constant)	$\beta_0 = 45.1$	<0.001	$\beta_0 = 32.9$	<0.001	$\beta_0 = 39.1$	<0.001
Length (cm)	$\beta_1 = 5.3$	<0.001	$\beta_1 = 3.4$	0.005	$\beta_1 = 4.2$	<0.001
Model	SPA = 45.1 + 5.3(long - 4.0)		SPA = 32.9 + 3.4(long - 3.9)		SPA = 39.1 + 4.2(long - 4.0)	
R <sup>2</sup>	0.667		0.422		0.442	

$\beta_i$ , Lineal regression model coefficients; R<sup>2</sup>, fit goodness coefficient. SPA, sports participation absence.



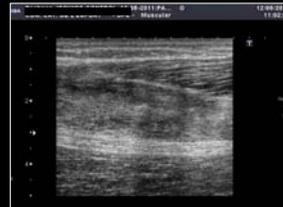
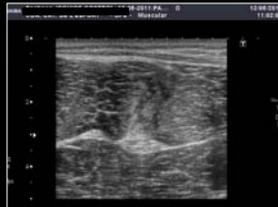
Progreso: Complicaciones.



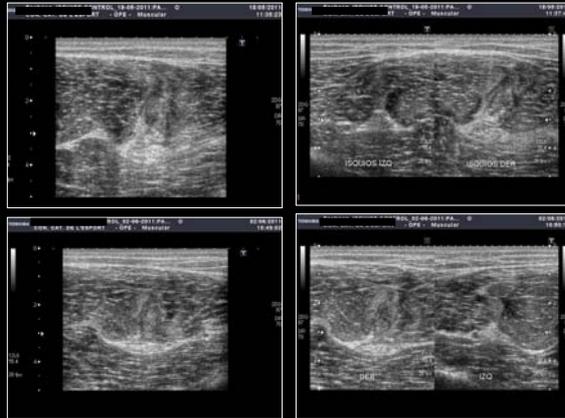
48 horas evolución:  
Crioterapia



9 días evolución:  
Carrera Continua



16 días evolución  
Inicia Progressivos



23 días evolución  
Inicia Cambios Ritmo

30 días evolución  
Cambios de ritmo  
Inicia Entrenamientos  
Progresivos (clavos)

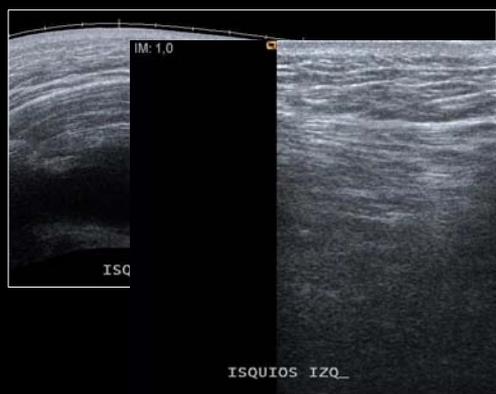


## PROGRAMA CIENTÍFICO

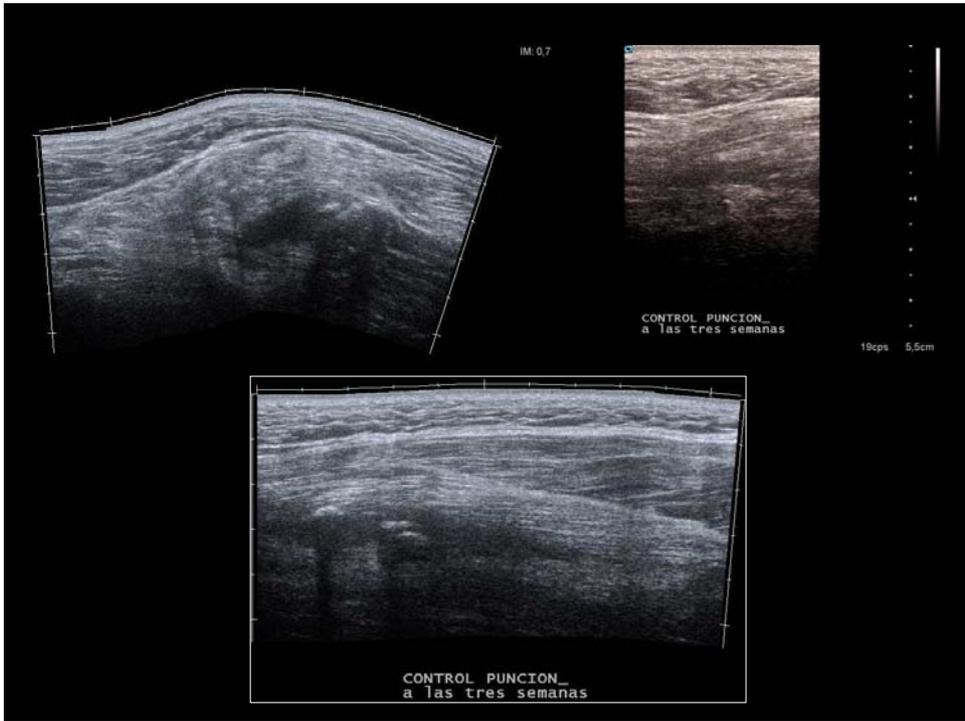
- Dr. Arturo Goicoechea Uriarte (Neurólogo, miembro de SEFID (Sociedad Española de Fisioterapia y Dolor, Vitoria): "Neurociencia y estrategias de gestión del dolor en el deportista"
- D. Raúl Martínez Rodríguez (Fisioterapeuta Selección Nacional Absoluta de Fútbol, Prof. Univ. Europea de Madrid): "Control sonopelostográfico de evolución en lesiones musculares"
- D. Orlando Mayoral del Moral (Fisioterapeuta, Presidente de la International Myopain Society, UCLM, Toledo): "Presente y futuro del síndrome de dolor miofascial y de la punción seca"
- D. José Luis Sánchez Sánchez (Fisioterapeuta, Gabinete Dr. Garrido y Clínica CENTRO, Prof. Univ. Salamanca): "Avances en las lesiones articulares del deportista"

## 9. La ecografía permite intervencionismo

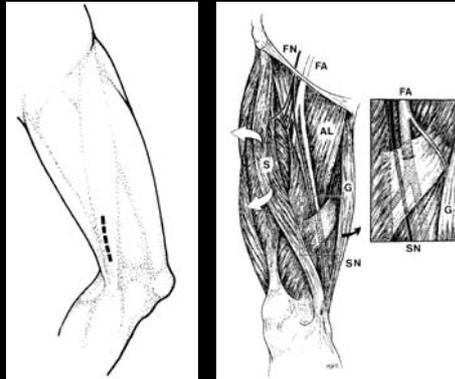
### Punción Aspiración



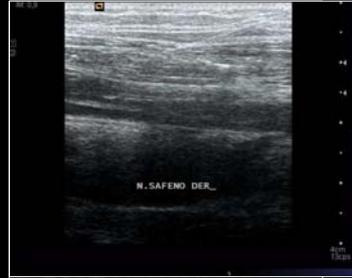
Hematoma a tensión



## Punciones de Precisión



Síndrome del Safeno



## Sd ISQUIOTIBIALES

- Antecedente de lesión fibrilar isquios
- Valorar. RM > US

Musculoskeletal Imaging • Clinical Perspective

AJR:195, October 2010

### High Hamstring Tendinopathy: MRI and Ultrasound Imaging and Therapeutic Efficacy of Percutaneous Corticosteroid Injection

Maurice H. Zissen<sup>1</sup>  
Grant Wallace<sup>1</sup>  
Kathryn J. Stevens<sup>1</sup>  
Michael Fredericson<sup>2</sup>  
Christopher F. Beaulieu<sup>1</sup>

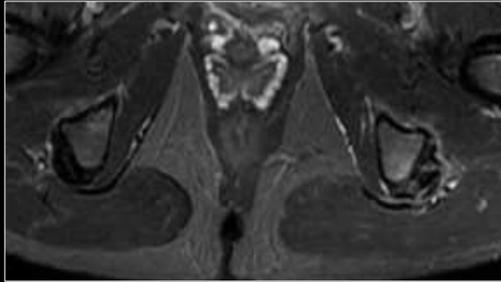
**OBJECTIVE.** The goals of this study were to review the MRI and sonographic findings in patients diagnosed clinically with high hamstring tendinopathy and to evaluate the efficacy of ultrasound-guided corticosteroid injections in providing symptomatic relief.

**CONCLUSION.** MRI is more sensitive than ultrasound in detecting peritendinous edema and tendinopathy at the proximal hamstring origin. Fifty percent of patients had symptomatic improvement lasting longer than 1 month after percutaneous corticosteroid injection, and 24% of patients had symptom relief for more than 6 months.

## Punciones de Precisión

### Sd ISQUIOTIBIALES

- Infiltración Ecoguiada: Diagnóstica
- Corticoides, PRPs.



Punciones de Precisión

### Sd ISQUIOTIBIALES

- Infiltración Ecoguiada: Diagnóstica
- Corticoides, PRPs.



Punciones de Precisión

10. La ecografía es accesible y barata, pero tiene una alta curva de aprendizaje



- Disminución del precio  
Aumento de las prestaciones
- Fácil movilidad del aparataje
- Repetitividad del método
- Acceso de las especialidades

¿Pueden hacer ecos los fisioterapeutas?

Diagnostic ultrasound has in recent years been shown to be an extremely versatile and cost effective tool in the assessment of a wide range of musculoskeletal injuries and diseases. For superficial soft tissue structures such as the Achilles, patellar, rotator cuff, and plantar aponeurotic tendons, high resolution high frequency diagnostic ultrasound, in the hands of an appropriately trained sonologist, has a greater spatial and contrast resolution than magnetic resonance imaging. Until recently the ultrasound systems capable of producing the required image quality were the "top of the range" units costing around £80 000-£120 000. It is important to realise, however, that a number of manufacturers' "flagship" systems, although expensive, are unable to provide good images for musculoskeletal ultrasound. Conversely, certain ultrasound equipment manufacturers have now started to develop dedicated portable musculoskeletal systems (for a quarter to a third of this price). Dynamic Imaging Limited (Livingston, UK) for instance will be launching early in 1998 their application specific ultrasound systems - that is, the DIASUS - with one of these systems being specifically modified and targeted at the musculoskeletal ultrasound market. Also, interestingly it was recently announced by one large manufacturer from the USA that they will be releasing in the next two years a "pocket" unit which by the year 2005 may have a similar image quality to current high resolution systems. Like many things in life it is not necessarily size that counts!

Musculoskeletal ultrasound is able to be used to distinguish between chronic tendinitis, bursitis, and tenosynovitis/paratenonitis, to classify and quantify extent of muscle injury, to evaluate joint dynamic and static stabilisers, and to assess joint synovitis or fluid. It also able to identify the precise site of superficial soft tissue inflammatory processes for localisation of therapeutic modalities and direct needle placement for aspiratic local anaesthetic/corticosteroid infiltration. Perhaps more important in chronic repetitive minor injury on phenomena is the fact that musculoskeletal ultrasound able to identify precise patterns of disease and then provide information about the underlying mechanism - that is, it is not only able to demonstrate cause of an athlete's symptoms but the "cause of cause". The fact that the imaging method is sensitive enough to demonstrate subclinical soft tissue degenerative changes and that there is no ionising radiation involved means that ultrasound may also be used as a screening procedure in an attempt to diagnose and correct underlying biomechanical faults before they even present symptoms. It may also be used for follow up studies to assess the efficacy of therapeutic regimes.

The dedicated musculoskeletal ultrasound systems recently being developed are being aimed at the rheumatology, orthopaedic, sports medicine, and possibly physiotherapy markets. An increasing number of individuals involved in musculoskeletal injuries believe that in the years time,

if the most useful role for musculoskeletal ultrasound is in the clinic setting as an extension of physical examination, it would appear to be logical that either the ultrasound investigation should be performed by a radiologist with appropriate clinical experience in musculoskeletal injury and disease or a clinician/physiotherapist with appropriate ultrasound training and experience. Indeed in many countries throughout the world - for example, Spain - most musculoskeletal ultrasound is performed by rheumatologists or sports physicians. The only important consideration should be that a patient/athlete receives the most cost effective high quality

insurance organisation about their liability against the important factor would seem to be the level of training and experience achieved.

non-radiologists, European Law must have a precedent. Perhaps anyone considering performing musculoskeletal ultrasound should, however, initially consult their Trust or insurance organisation about their liability. Again the important factor would seem to be the level of training and experience achieved.

In the diagnostic range, ultrasound itself is inherently safe. The health risks from ultrasound relate to misdiagnosis and not any radiation produced. Integral to the expansion

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La ecografía la de hacer quién sepa hacerla.





Lewis Carroll (1832-1898)