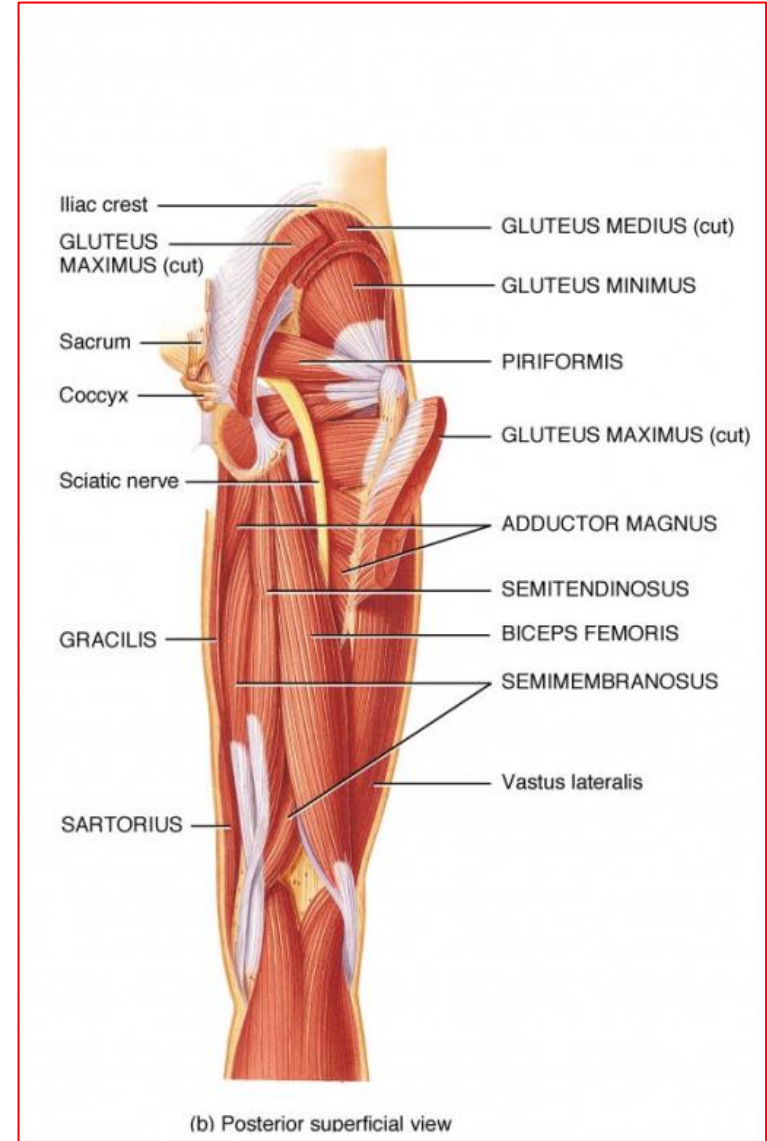
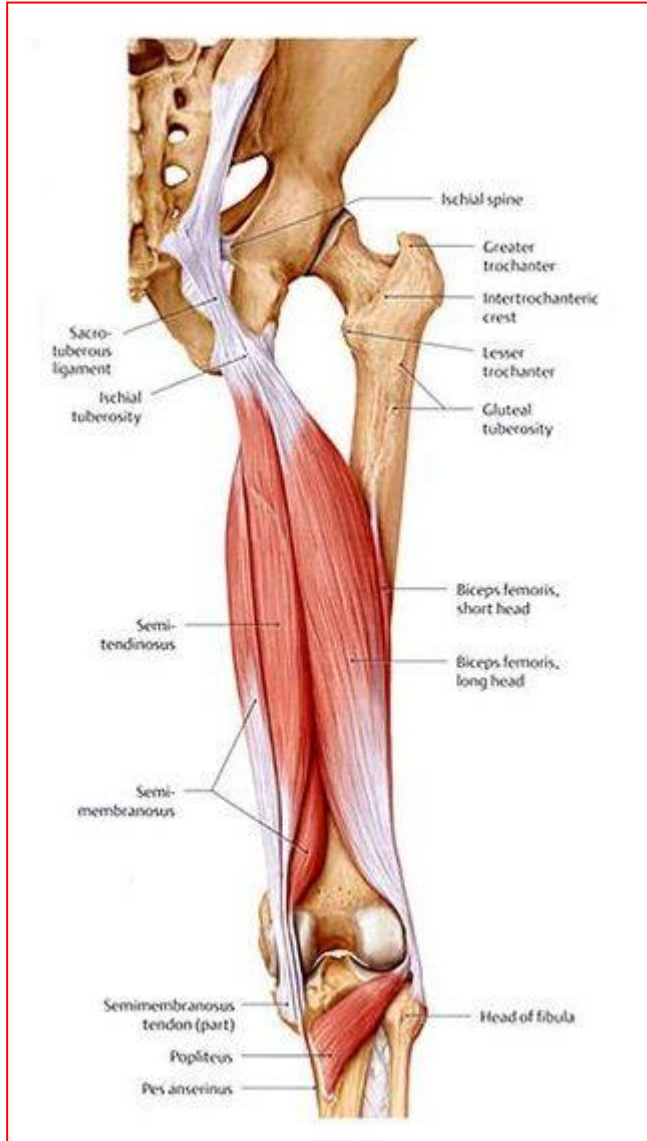


# **HAMSTRİNG YARALANMALARI**

Dr. Emin BAL

- Kas Anatomisi
- Epidemiyoloji
- Yaralanma Şekilleri
- Tanı ve Sınıflama
- Tedavi
- Komplikasyonlar
- Korunma

# ANATOMI



# EPİDEMİYOLOJİ

- Kas yaralanmalarının %37'si Hamstring
- Sportif aktivite kayıplarının %25'i
- Ort. Gün kaybı : 14,3 +\_ 14,9

## **Epidemiology of Muscle Injuries in Professional Football (Soccer)**

Jan Ekstrand, Martin Hägglund and Markus Waldén

*Am J Sports Med* 2011 39: 1226 originally published online February 18, 2011

DOI: 10.1177/0363546510395879

# EPİDEMİYOLOJİ

- Biceps Femoris Uzun Başı %84
- Semimembranosus %11
- Semitendinosus %5

Hamstring muscle injuries in professional football:  
the correlation of MRI findings with return to play

Jan Ekstrand,<sup>1</sup> Jeremiah C Healy,<sup>2</sup> Markus Waldén,<sup>1</sup> Justin C Lee,<sup>2</sup>  
Bryan English,<sup>3</sup> Martin Hägglund<sup>1</sup>

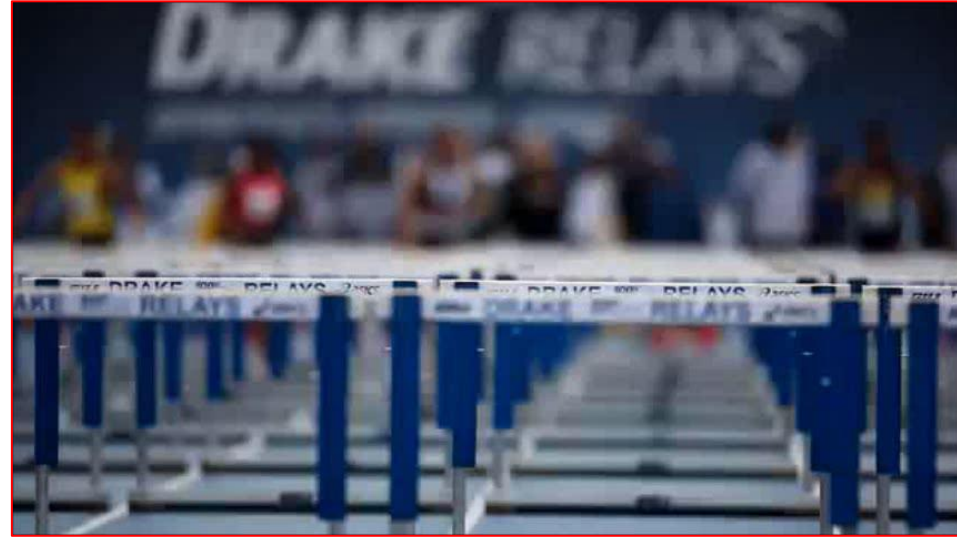
*Br J Sports Med* 2012;**46**:112–117. doi:10.1136/bjsports-2011-090155

# YARALANMA ŞEKLİ VE TİPLERİ

- Gerilme (stretching) : Max kalça fleksiyonu ve diz ekstansiyonu  
Genellikle Semimembranosus  
Avulsiyon tipi tendinöz yaralanma
- Sprinting : Koşmanın geç salınım ve erken stance fazında  
Sıklıkla Biceps Femoris  
Muskulotendinöz bileşke
- Kontüzyon: Nadir

# YARALANMA ŐEKLİ VE TİPLERİ

- Gerilme (stretching)



# YARALANMA ŐEKLİ VE TİPLERİ

- Sprinting





# YARALANMA ŐEKLİ VE TİPLERİ

## RİSK FAKTÖRLERİ

- Yetersiz ısınma
- Güç dengesizliđi
- Esneklik azlıđı
- Kas güçsüzlüđü
- Yorgunluk
- Dehidratasyon
- Core stabilizasyon eksikliđi
- Yaş
- Geçirilmiş Yaralanma: 2-6 kat

### **Evaluation and Management of Hamstring Injuries**

Christopher S. Ahmad, Lauren H. Redler, Michael G. Ciccotti, Nicola Maffulli, Umile Giuseppe Longo and James Bradley

*Am J Sports Med* 2013 41: 2933 originally published online May 23, 2013

DOI: 10.1177/0363546513487063

# YARALANMA ŐEKLİ VE TİPLERİ

## ZAMANLAMA

- Sezon öncesi hazırlık dönemleri
- Maçların veya atletik aktivitelerin sonlarına doğru

### **Evaluation and Management of Hamstring Injuries**

Christopher S. Ahmad, Lauren H. Redler, Michael G. Ciccotti, Nicola Maffulli, Umile Giuseppe Longo and James Bradley

*Am J Sports Med* 2013 41: 2933 originally published online May 23, 2013

DOI: 10.1177/0363546513487063

# TANI VE SINIFLAMA

## ÖYKÜ

- Uyluk arkasında ani başlayan, keskin tarzda AĞRI
  - Yırtılma hissi veya sesi
  - Kronik olgularda bir süredir devam eden rahatsızlık, sertlik hissi
- } AKUT

# TANI VE SINIFLAMA

## FİZİK MUAYENE

### İNSPEKSİYON

Yürüyüş şekli (Antaljik)  
Ekimoz varlığı



# TANI VE SINIFLAMA

## FİZİK MUAYENE

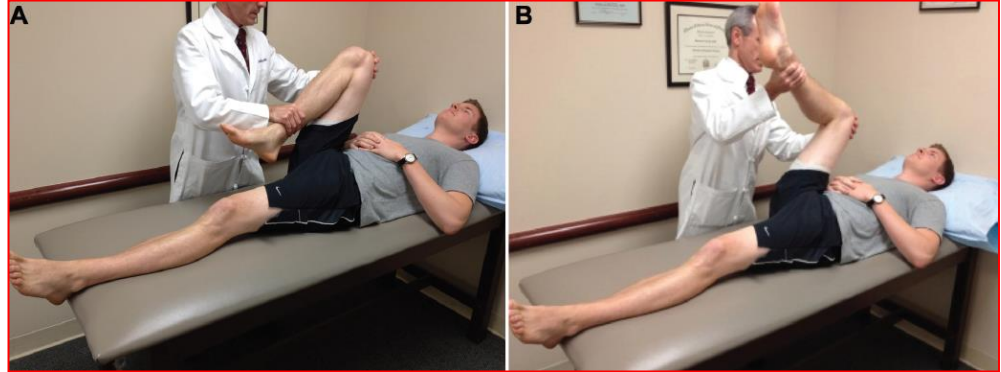


# TANI VE SINIFLAMA

## FİZİK MUAYENE PROVOKATİF TESTLER



Puranen-Orava Test



**Evaluation and Management of Hamstring Injuries**  
Christopher S. Ahmad, Lauren H. Redler, Michael G. Ciccotti, Nicola Maffulli, Umile Giuseppe Longo and James Bradley  
*Am J Sports Med* 2013 41: 2933 originally published online May 23, 2013  
DOI: 10.1177/0363546513487063

Geçerlilik ve güvenilirlik ?

# TANI VE SINIFLAMA

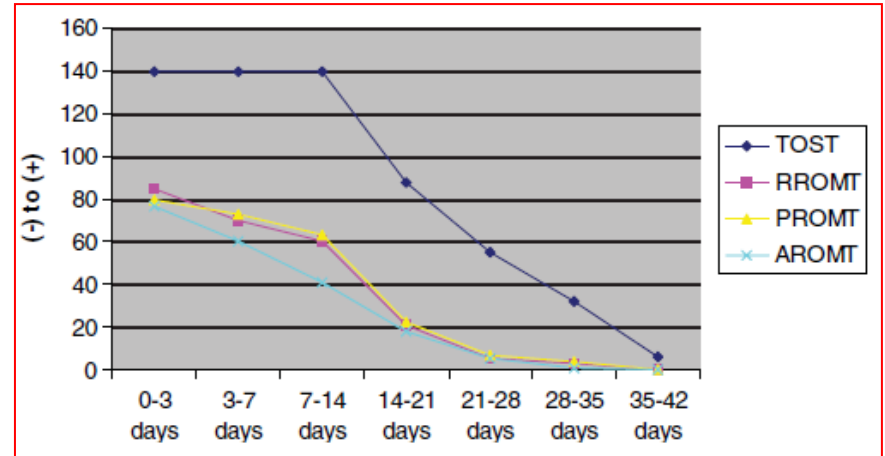
## FİZİK MUAYENE PROVOKATİF TESTLER

### A New Self-diagnostic Test for Biceps Femoris Muscle Strains

*Bülent Zeren, MD\* and Haluk H. Oztekin, MD†*

*Clin J Sport Med • Volume 16, Number 2, March 2006*

Ayakkabı Çıkarma Testi  
(TOST)



# TANI VE SINIFLAMA

## RADYOLOJİK TANI

### RÖNTGEN

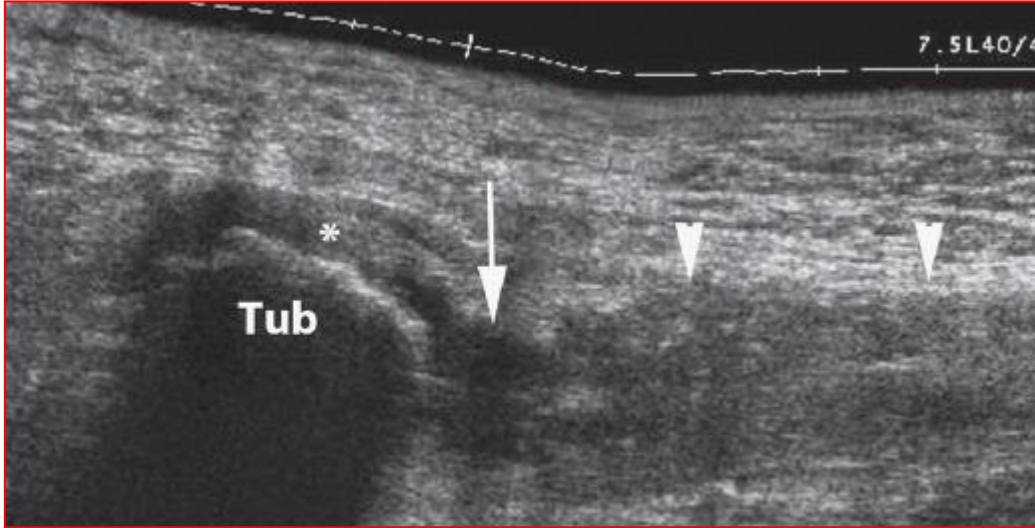




# TANI VE SINIFLAMA

## RADYOLOJİK TANI

## ULTRASONOGRAFİ



Kolay  
Ucuz  
Sık tekrarlanabilir  
Takipte kullanım  
Uygulayana bağımlı

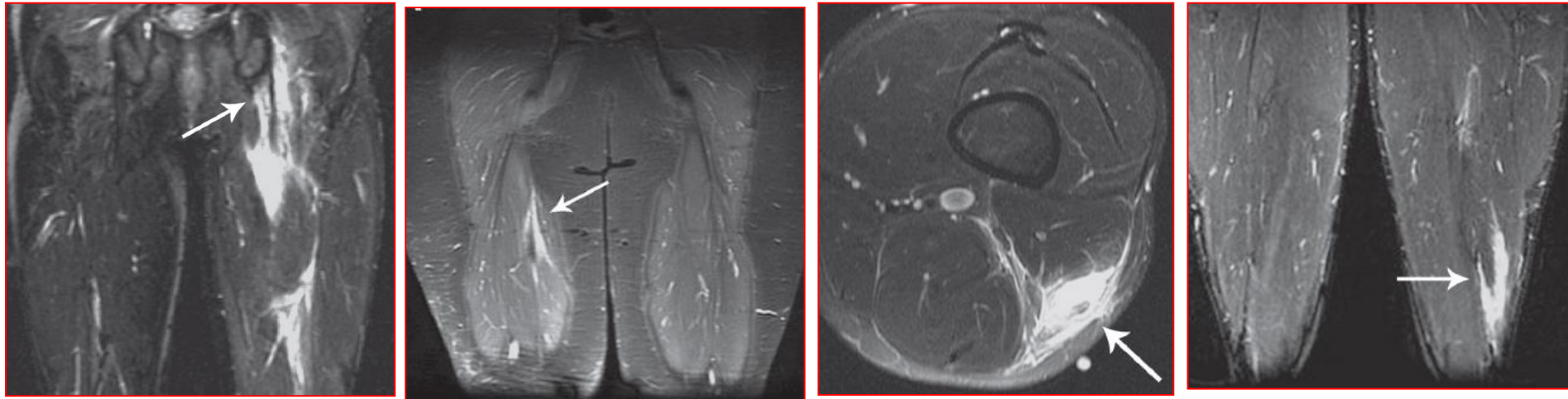
Ali K, Leland JM. Hamstring strains and tears in the athlete. *Clin Sports Med.* 2012;31(2):263-272.

Mariani C, Caldera FE, Kim W. Ultrasound versus magnetic resonance imaging in the diagnosis of an acute hamstring tear. *PM R.* 2012;4(2):154-155.

# TANI VE SINIFLAMA

## RADYOLOJİK TANI

### MANYETİK REZONANS GÖRÜNTÜLEME



Hamstring muscle injuries in professional football:  
the correlation of MRI findings with return to play

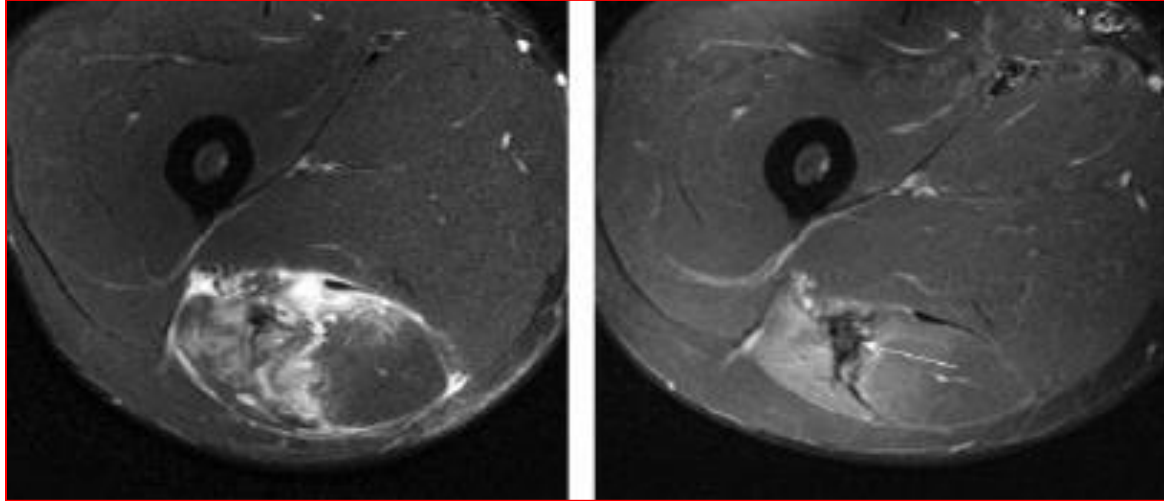
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*Br J Sports Med* 2012;**46**:112–117. doi:10.1136/bjsports-2011-090155

# TANI VE SINIFLAMA

## RADYOLOJİK TANI

### MANYETİK REZONANS GÖRÜNTÜLEME



Muscle Injury: The Role of Imaging in  
Prognostic Assignment and Monitoring  
of Muscle Repair

John P. Slavotinek, M.B.B.S., F.R.A.N.Z.C.R.<sup>1,2</sup>

# TANI VE SINIFLAMA

## KLASİK SINIFLAMA

Grade-I : Fibriler devamlılığın bozulmadığı

Ödem ve hafif kanama

Fonksiyon kaybı < %5

Grade-II : Fibriler devamlılığın bozulduğu

Şiddetli ödem ve kanama

Ciddi fonksiyon kaybı

Grade- III : Tam yırtık

Kas/tendon retraksiyonu

Tam fonksiyon kaybı

# TANI VE SINIFLAMA

## PEETRONS SINIFLAMASI

### MR'a Dayalı

Grade-0 : Bulgu yok

Grade-I : Sadece ödem  
Yapısal bozulma yok

Grade- II : Kısmi yapısal bozulma

Grade-III : Kas ya da tendonda total yırtık

Review Article

**Rehabilitation of hamstring muscle injuries: a  
literature review<sup>☆</sup>**

*Gabriel Amorim Ramos, Gustavo Gonçalves Arliani\*, Diego Costa Astur,  
Alberto de Castro Pochini, Benno Ejnisman, Moisés Cohen*

REV BRAS ORTOP. 2017;52(1):11-16

# PROGNOSTİK ÖZELLİK

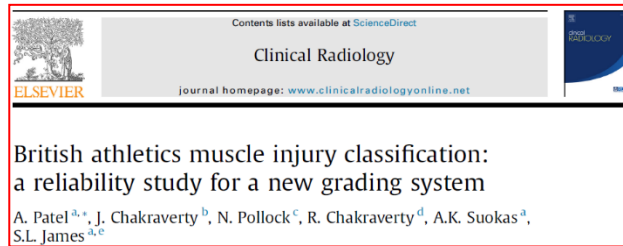
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*Br J Sports Med* 2012;**46**:112–117. doi:10.1136/bjsports-2011-090155

	Total	Grade 0	Grade 1	Grade 2	Grade 3
Injuries	207	27 (13%)	118 (57%)	56 (27%)	6 (3%)
Clinical severity					
Minimal	5 (2%)	1 (4%)	4 (3%)	0	0
Mild	29 (14%)	12 (44%)	13 (11%)	4 (7%)	0
Moderate	143 (69%)	14 (52%)	89 (75%)	38 (68%)	2 (33%)
Severe	30 (15%)	0	12 (10%)	14 (25%)	4 (67%)
Lay-off time (days)*	19±17	8±3	17±10	22±11	73±60
Muscles involved					
Biceps femoris	150 (84%)		101 (86%)	45 (81%)	5 (83%)
Semimembranosus	20 (11%)		12 (10%)	8 (14%)	1 (17%)
Semitendinosus	9 (5%)		5 (4%)	3 (5%)	0
Aetiology					
Trauma	130 (64%)	8 (31%)	79 (69%)	39 (70%)	4 (67%)
Overuse	72 (36%)	18 (69%)	35 (31%)	17 (30%)	2 (33%)
Recurrence	34 (16%)	2 (7%)	20 (17%)	12 (21%)	0

# PROGNOSTİK ÖZELLİK



Grade	Description	MRI (ideally 24–48 hours)
0n	Referred pain	MRI normal
0a	Focal area of muscle pain usually following exercise	MRI normal
0b	Generalised muscle pain following unaccustomed exercise	Patchy high signal change throughout one or more muscles
1a	Small myofascial tear	High signal change evident at the fascial border with < 10% extension into muscle belly CC distance of < 5 cm
1b	Small muscular/MTJ tear	High signal change of < 10% CSA of muscle usually at the MTJ High signal change of CC length < 5 cm (may note fibre disruption of < 1 cm)
2a	Moderate myofascial tear	High signal change evident at fascial border with extension into the muscle High signal change CSA of between 10% and 50% at maximal site High signal change of CC length > 5 and < 15 cm
2b	Moderate muscular/MTJ tear	Architectural fibre disruption usually noted over < 5 cm High signal change evident usually at the MTJ High signal change CSA of between 10% and 50% at maximal site High signal change of CC length > 5 and < 15 cm
2c	Moderate-sized intratendinous tear	Architectural fibre disruption usually noted over < 5 cm High signal change extends into the tendon with longitudinal length of tendon involvement < 5 cm CSA of tendon involvement < 50% of tendon CSA No discontinuity within the tendon
3a	Extensive myofascial tear	High signal change evident at fascial border with extension into the muscle High signal change CSA of > 50% at maximal site High signal change of CC length of > 15 cm
3b	Extensive muscular/MTJ tear	Architectural fibre disruption usually noted over > 5 cm High signal change CSA of > 50% at maximal site High signal change of CC length of > 15 cm
3c	Extensive intratendinous tear	Architectural fibre disruption usually noted over > 5 cm High signal change extends into the tendon Longitudinal length of tendon involvement > 5 cm CSA of tendon involvement > 50% of tendon CSA
4	Full-thickness tear of muscle	There may be loss of tendon tension although no discontinuity is evident
4c	Full-thickness tear of tendon	Complete discontinuity of the muscle with retraction Complete discontinuity of the tendon with retraction

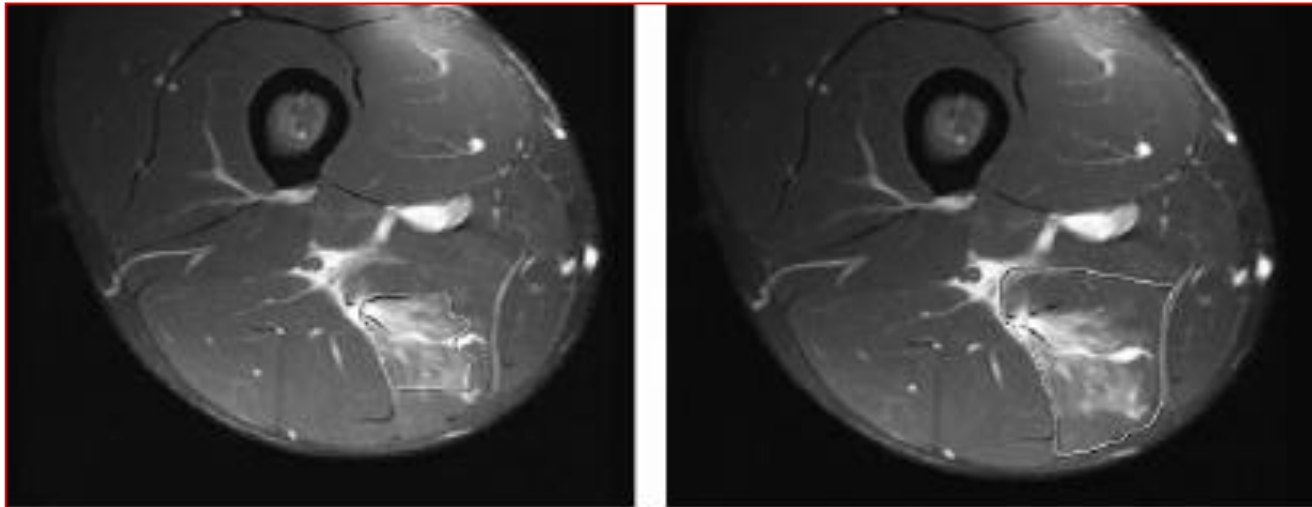
MTJ, muscle-tendon junction; MRI, magnetic resonance imaging; CC, cranio-caudal; CSA, cross-sectional area.

# PROGNOSTİK ÖZELLİK

## Muscle Injury: The Role of Imaging in Prognostic Assignment and Monitoring of Muscle Repair

John P. Slavotinek, M.B.B.S., F.R.A.N.Z.C.R.<sup>1,2</sup>

SEMINARS IN MUSCULOSKELETAL RADIOLOGY/VOLUME 14, NUMBER 2 2010





# PROGNOSTİK ÖZELLİK

Points	Age, y	No. of Muscles Involved	Location	Insertion Involvement	Cross-sectional Injury, %	Retraction, cm	Long-Axis T2 Length, cm
0				No	0	None	0
1	≤25	1	Proximal		25	<2	1-5
2	26-31	2	Middle	Yes	50	≥2	6-10
3	≥32	3	Distal		≥75		>10

## Evaluation and Management of Hamstring Injuries

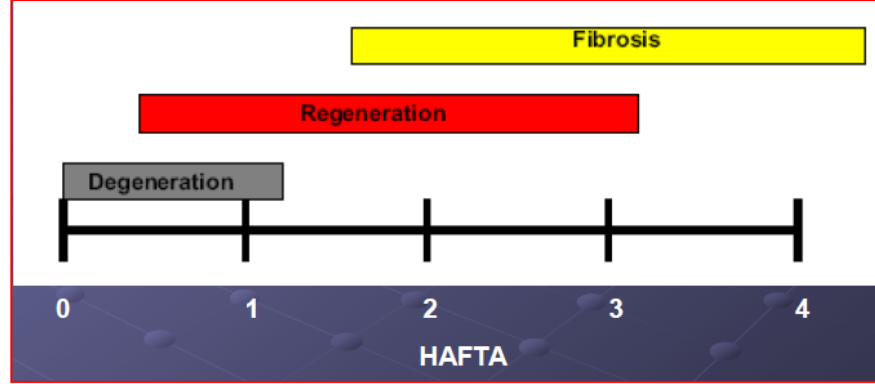
Christopher S. Ahmad, Lauren H. Redler, Michael G. Ciccotti, Nicola Maffulli, Umile Giuseppe Longo and James Bradley

*Am J Sports Med* 2013 41: 2933 originally published online May 23, 2013

DOI: 10.1177/0363546513487063

# TEDAVİ

## KAS İYİLEŞMESİ



Dejenerasyon Evresi: (3-7 gün)

Myofibriler nekroz, hematom oluşumu, inf hücre proliferasyonu

Rejenerasyon Evresi : (4-21 gün)

Nekrotik dokuların fagositozu, myofibril rejenerasyonu, skar oluşumu, neovaskülarizasyon ve sinir onarım

Yeniden şekillenme Evresi: (14gün-14 hafta)

Rejenere myofibrillerin olgunlaşması, kas fonksiyonel kapasitesinin yeniden organizasyonu

# TEDAVİ

## AKUT FAZ (<5 GÜN)

### Amaç:

Yeni yaralanmaların önlenmesi

Aşırı enflamasyon ve skar oluşumunun önlenmesi

Yeni granülasyon dokusunun tensil gücü ve elastisitesinin arttırılması

Ödemin azaltılması

Lumbopelvik disfonksiyon saptanması ve tedavisi

Masterclass

A return-to-sport algorithm for acute hamstring injuries

Jurdan Mendiguchia <sup>a,\*</sup>, Matt Brughelli <sup>b</sup>

<sup>a</sup>Head of Rehabilitation Department at Athletic Club de Bilbao, Garaioltza 147 CP:48196, Lezama (Bizkaia), Spain

<sup>b</sup>School of Exercise, Biomedical and Health Sciences, Edith Cowan University, Australia

**Physical Therapy in Sport 12 (2011) 2–14**

# TEDAVİ

## AKUT FAZ (<5 GÜN)

Amaç:

KORUMA-DİNLENME  $\neq$  İMMOBİLİZASYON  
SOĞUK UYGULAMA /HİDROTERAPİ  
KOMPRESYON  
ELEVASYON  
SAKROİLİAK MANİPLASYON

Masterclass

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<sup>b</sup>School of Exercise, Biomedical and Health Sciences, Edith Cowan University, Australia

Physical Therapy in Sport 12 (2011) 2–14

# TEDAVİ

## AKUT FAZ (<5 GÜN)

### İLAÇ VE BİYOLOJİK TEDAVİLER

NSAİ

GLİKOKORTİKÖİD TED **X**

PRP **?**

HÜCRE TEDAVİLERİ

#### **Evaluation and Management of Hamstring Injuries**

Christopher S. Ahmad, Lauren H. Redler, Michael G. Ciccotti, Nicola Maffulli, Umile Giuseppe Longo and James Bradley

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# TEDAVİ

## AKUT FAZ (<5 GÜN)

Yakınmalarda azalma yoksa tekrar değerlendirmek gerekir

Yaygın doku hasarı  
İntramuskuler hematom

Masterclass

A return-to-sport algorithm for acute hamstring injuries

Jurdan Mendiguchia<sup>a,\*</sup>, Matt Brughelli<sup>b</sup>

<sup>a</sup>Head of Rehabilitation Department at Athletic Club de Bilbao, Garaioltza 147 CP:48196, Lezama (Bizkaia), Spain

<sup>b</sup>School of Exercise, Biomedical and Health Sciences, Edith Cowan University, Australia

**Physical Therapy in Sport 12 (2011) 2–14**

# TEDAVİ

## FİZİK TEDAVİ MODALİTELERİ

### TERAPÖTİK ULTRASONOGRAFİ DÜŞÜK DÜZEYLİ LAZER ŞOK DALGA TEDAVİSİ

#### **Evaluation and Management of Hamstring Injuries**

Christopher S. Ahmad, Lauren H. Redler, Michael G. Ciccotti, Nicola Maffulli, Umile Giuseppe Longo and James Bradley  
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DOI: 10.1177/0363546513487063

#### Review Article

#### **Rehabilitation of hamstring muscle injuries: a literature review<sup>☆</sup>**

Gabriel Amorim Ramos, Gustavo Gonçalves Arliani\*, Diego Costa Astur, Alberto de Castro Pochini, Benno Ejnisman, Moisés Cohen

REV BRAS ORTOP. 2017;52(1):11-16

# TEDAVİ

## YUMUŞAK DOKU MANİPLASYONU

### Soft Tissue Mobilization



# TEDAVİ

## SUB-AKUT/REJENERASYON FAZI

### Amaç:

- Core stabilitenin sağlanması
- Güç ve simetrinin sağlanması
- Pron pozisyonda diz 15° izometrik hamstring kasılmalarında ağrının giderilmesi
- Hamstring fleksibilitesinin sağlanması
- Kalça fleksör fleksibilitesinin sağlanması
- Nöromuskuler kontrolün sağlanması

Masterclass

A return-to-sport algorithm for acute hamstring injuries

Jurdan Mendiguchia<sup>a,\*</sup>, Matt Brughelli<sup>b</sup>

<sup>a</sup>Head of Rehabilitation Department at Athletic Club de Bilbao, Garaioltza 147 CP:48196, Lezama (Bizkaia), Spain

<sup>b</sup>School of Exercise, Biomedical and Health Sciences, Edith Cowan University, Australia

**Physical Therapy in Sport 12 (2011) 2–14**

# TEDAVİ

## SUB-AKUT/REJENERASYON FAZI



Masterclass  
A return-to-sport algorithm for acute hamstring injuries  
Jardan Mendiguchia<sup>a,\*</sup>, Matt Brughelli<sup>b</sup>  
<sup>a</sup>Head of Rehabilitation Department at Athletic Club de Bilbao, Gasteiz 48941 CP-48941, Lezama (Bizkaia), Spain  
<sup>b</sup>School of Exercise, Biomedical and Health Sciences, Edith Cowan University, Australia

# TEDAVİ

## FONKSİYONEL FAZ

### Amaç:

Hamstringlerin optimum uzunluğunun arttırılması

Optimum uzunlukta güç bacak eşitsizliğinin giderilmesi

Konsantrik kalça ekstansiyon güç eşitsizliğinin giderilmesi

Koşu sırasında horizontal güç üretim eşitsizliğinin giderilmesi

Masterclass

A return-to-sport algorithm for acute hamstring injuries

Jordan Mendiguchia <sup>a,\*</sup>, Matt Brughelli <sup>b</sup>

<sup>a</sup>Head of Rehabilitation Department at Athletic Club de Bilbao, Garaioltza 147 CP:48196, Lezama (Bizkaia), Spain

<sup>b</sup>School of Exercise, Biomedical and Health Sciences, Edith Cowan University, Australia

**Physical Therapy in Sport 12 (2011) 2–14**

## Stage 1-3



# TEDAVİ

## Sahaya Dönüş

Sorunsuz, max hızda koşu, sıçrama, top sürme  
Sağlam taraf kas gücüne ulaşmış  
Fleksibilitenin eşitlenmiş olması  
Max ekzantrik diz fleks ve max ekzantrik kalça ekstansiyon  
testlerinin sorunsuz olması  
İzokinetik güç testlerinde farkın %10'dan az olması  
Oyuncunun geri bildirimini  
Sorunsuz 4 antrenmanı tamamlamış olması

Masterclass

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Jordan Mendiguchia<sup>a,\*</sup>, Matt Brughelli<sup>b</sup>

<sup>a</sup> Head of Rehabilitation Department at Athletic Club de Bilbao, Garaioitza 147 CP-48196, Lezama (Bizkaia), Spain  
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**Physical Therapy in Sport 12 (2011) 2–14**

Asian J Sports Med. 2015 December; 6(4): e25411.

doi: 10.5812/asjms.25411

Published online 2015 December 1.

Review Article

Hamstring Muscle Injuries, a Rehabilitation Protocol Purpose

Xavier Valle,<sup>1</sup> Johannes L.Tol,<sup>2</sup> Bruce Hamilton,<sup>3</sup> Gil Rodas,<sup>1</sup> Peter Malliaras,<sup>4</sup> Nikos Malliaropoulos,<sup>4,5</sup> Vicenc Rizo,<sup>1</sup> Marcel Moreno,<sup>1</sup> and Jaume Jordi<sup>1</sup>

# TEDAVİ

## CERRAHİ TEDAVİ

Endikasyonlar:

Proksimal tendon avulsiyonları(<4 hafta)  
Geniş hematomlu Grade-III yaralanmalar

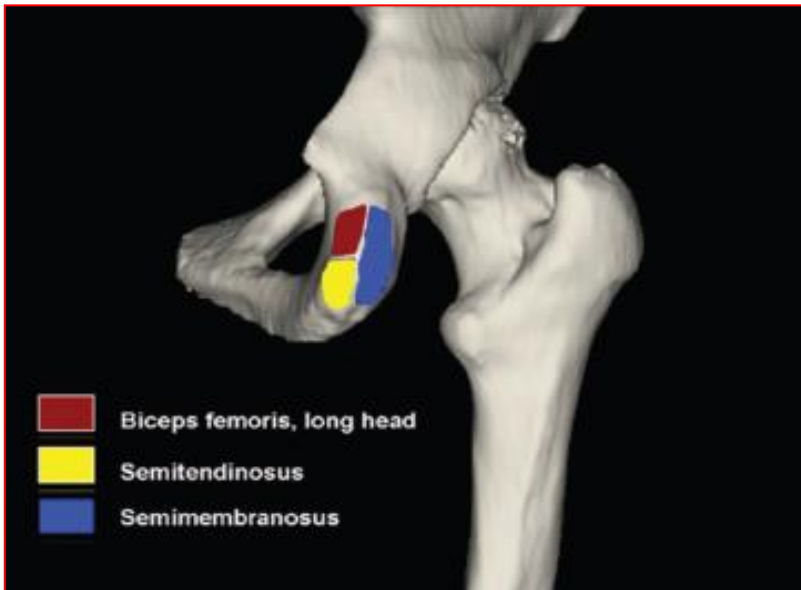
**Clinical principles in the management of hamstring injuries**

Lasse Lempainen · Ingo J. Banke · Kristian Johansson ·  
Peter U. Brucker · Janne Sarimo · Sakari Orava ·  
Andreas B. Imhoff

Knee Surg Sports Traumatol Arthrosc  
DOI 10.1007/s00167-014-2912-x

# TEDAVİ

## CERRAHİ TEDAVİ



### **Evaluation and Management of Hamstring Injuries**

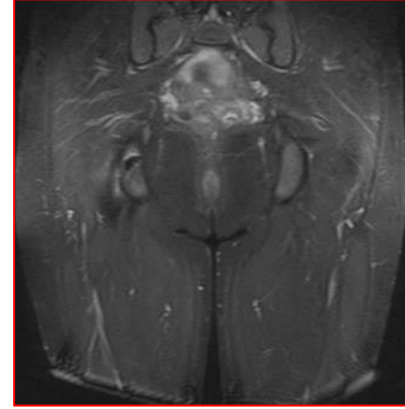
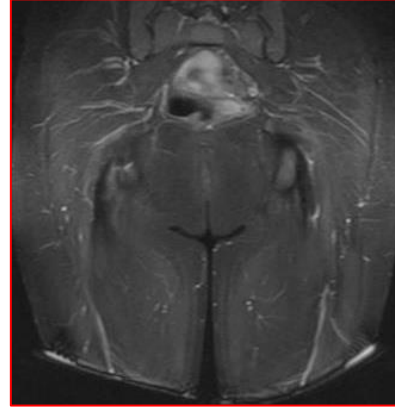
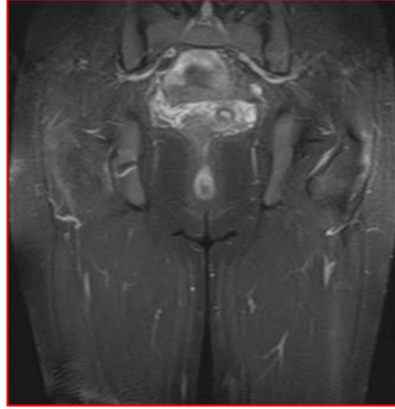
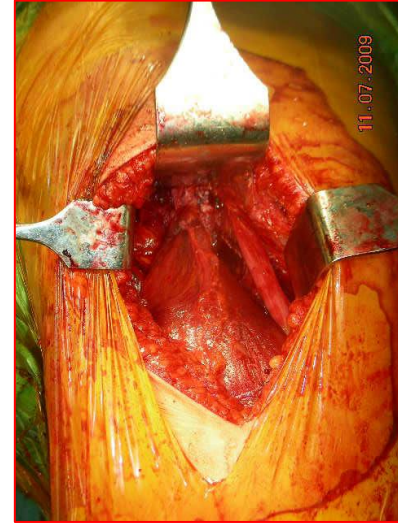
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# TEDAVİ

## CERRAHİ TEDAVİ





# TEDAVİ

## CERRAHİ TEDAVİ



# KOMPLİKASYONLAR

## TEKRAR YARALANMA (RE-INJURY)

%15-37

Spora döndükten sonraki 2 aydan 1 yıla kadar

Biceps Femoris yaralanmalarında daha sık

Grade I ve II yaralanmalarda daha sık

Prognozu daha kötü değil

Ancak tekrar yaralanma riskini arttırır

Hamstring muscle injuries in professional football:  
the correlation of MRI findings with return to play

Jan Ekstrand,<sup>1</sup> Jeremiah C Healy,<sup>2</sup> Markus Waldén,<sup>1</sup> Justin C Lee,<sup>2</sup>  
Bryan English,<sup>3</sup> Martin Hägglund<sup>1</sup>

*Br J Sports Med* 2012;**46**:112–117. doi:10.1136/bjsports-2011-090155

The prognostic value of MRI in determining  
reinjury risk following acute hamstring injury:  
a systematic review

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*Br J Sports Med* 2017;**0**:1–10. doi:10.1136/bjsports-2016-096790

# KORUNMA

Uygun egzersiz programları ile Hamstringlerin uygun uzunlukta gücünü, dayanıklılığını, fleksibilitesini arttırmak

*1.1. Eccentric training*

*Nordic Hamstring*

A composite image featuring a black and white portrait of Mustafa Kemal Atatürk on the left and a stylized Turkish flag on the right. The flag is red with a white crescent and star, set against a background of dark, textured red. The portrait is in a three-quarter view, looking upwards and to the right.

*K. Atatürk*