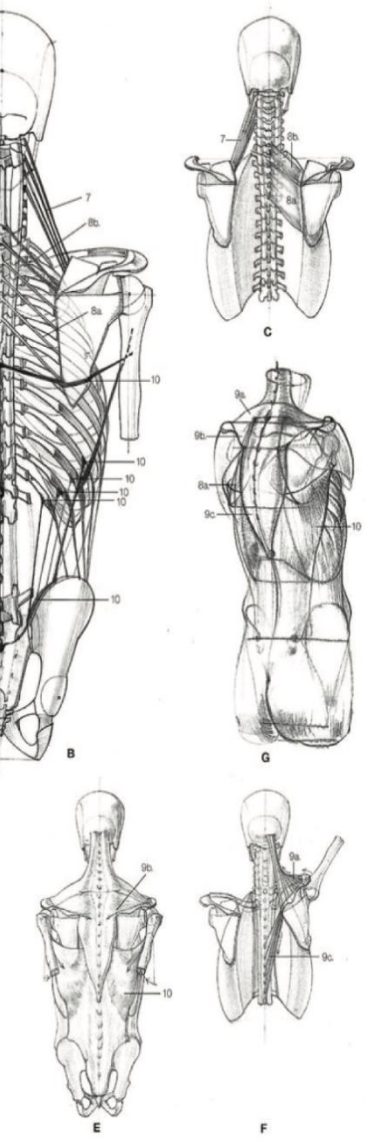
RENDIMENTO FÍSICO
E MEDICINA DESPORTIVA
2ª EDIÇÃO ESTÁDIO MUNICIPAL DE LEIRIA 17-18 JUNHO

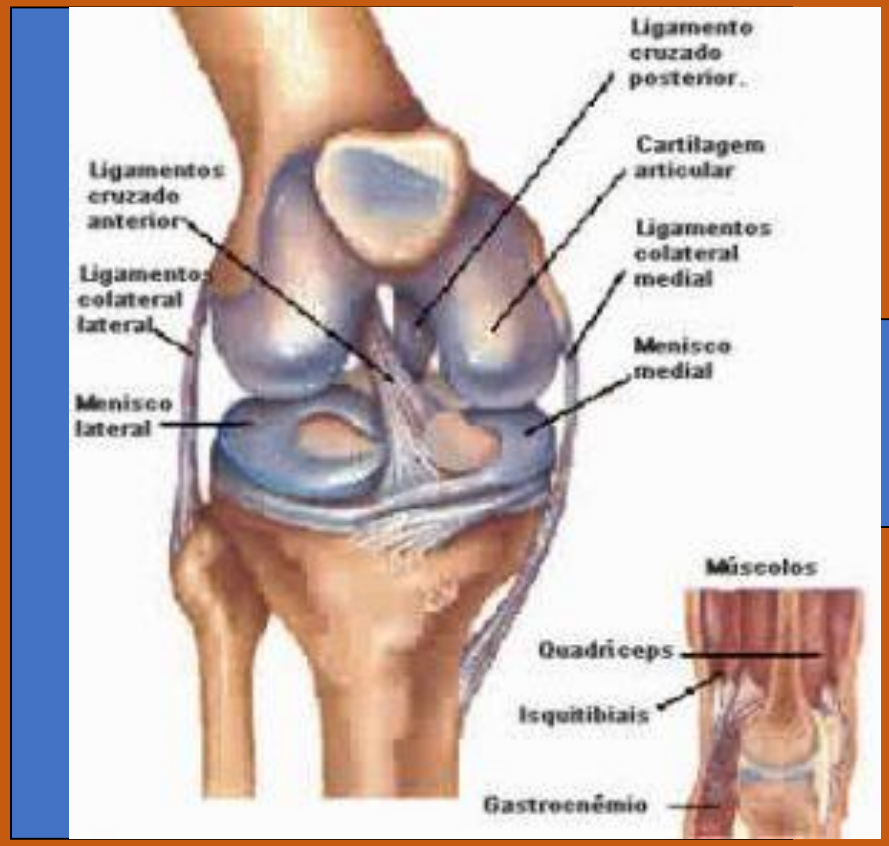


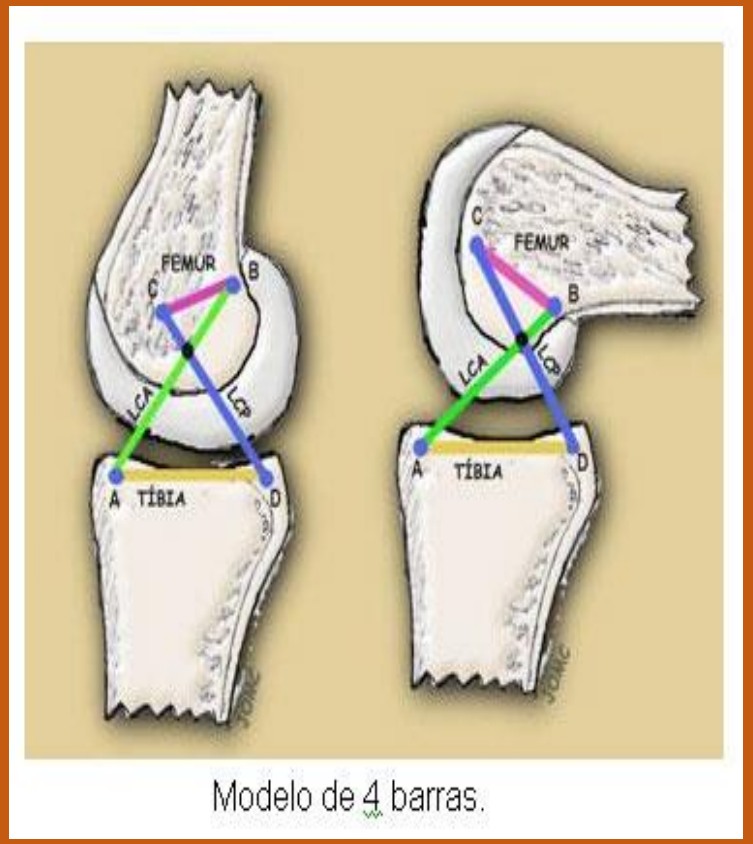
Lesão LCA para quando o retorno à Pratica?

Nuno Cordeiro

Ligamentos Cruzados

LCA





Modelo de 4 barras.

Ligamentoplastia do LCA

Varias técnicas – Enxertos – tuneis – fixações

Substituição do LCA

Qual a melhor?
A escolha do cirurgião!

85% dos cirurgiões fazem menos de 10 ligamentoplastias por ano

Harner et al 2008

Estabilidade articular

- Cirurgia só é insuficiente!
- Ênfase na fisioterapia

função proprioceptiva

Atenção,

Não existe nenhum bom programa de fisioterapia para uma cirurgia insuficiente!

Igualmente,

Não existe nenhuma excelente cirurgia que resulte sem fisioterapia!

(Shelbourne, K.D. *et al*, 1996; Sernert, N. *et al,* 2002; Ross, E.M., 2001; Zatterstrom, R., *et al*. 2000; Wojtys, E.M. *et al,* 2000)

Nivel de actividade pré-lesional

- Habitualmente decisão em função do tempo;
- Indicadores clássicos como:
  - Força (pico força);
  - Hidrartosis;
  - Estabilidade passiva;
  - Cicatrização;
  - Estado de saúde funcional;
  - Amplitude de Movimento;

(Shaw, T. *et al. 2002)*

  - (…)

Voltar rapidamente à pratica desportiva?

- Poucos artigos publicados para um retorno rápido à volta dos 4 a 6 meses (nível de evidência IV);
- Essencialmente de serie de casos:
  - Howell et al, JBJS 78ª:814-825, 1996
  - Shelbourne et al, AJSM 23:525-529, 1995

Atualmente muito questionados!

Treatment differs between elite or non-elite football/soccer players?

	Non-elite athletes eg. Tegner 4-9	Top level players eg Champions league
Time to diagnosis	Weeks	< 1 week
Operated on	30- 50%	97%
Time of surgery	1-3 months	3-5 weeks
Rehabilitation	1 hour x 2-3 /week	Several hours /day
Return to first training		7 months
Return to full training (94%)		10 months
Return to match play (89%)		12 months

Waldén et al. Knee Surg.Traum.Arthr. 19:11-19, 2011

Minha perspetiva

Cinesiofobia

Influência

Medo de executar movimento

Nível funcional pré-lesão

Kvist, J, *et al.* 2005

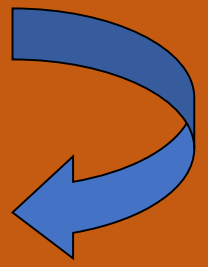
Tampa Scale for Kinesiophobia

Kori, SH, *et al.* 1990

Adaptação linguística

Original English TSK-13 items

Versão Portuguesa (TSKPT-13)



Procedimentos:

1º - TSK-13 Original → TSKPT-13 t1 e TSKPT-13 t2

2º - Versão de harmonização TSKPT-13 t12

3º - TSKPT-13 → BT1 e BT2

4º - Revisão de grupo (2 investigadores, t1, bt1 e bt2) – Versão pré-final TSKPT-13

5º - Pré-final TSKPT-13 a 10 sujeitos com dor crónica lombar.

(Beaton, Bombardier, Guillemin & Ferraz, 2000)

Dynamic Knee Stability and Ballistic Knee Movement after ACL Reconstruction: An Application on Instep Soccer Kick

Purpose

The instep soccer kick is a pre-programmed ballistic movement with a typical agonist/antagonist coordination pattern, denoting neuromuscular control system maturation or recovery. The purpose of this study was to investigate the kinematics of the movement and the hamstrings/quadriceps coordination pattern during the knee ballistic extension phase of the instep soccer kick, performed by professional soccer players six months after anterior cruciate ligament reconstruction (ACLR).

Methods

Seventeen players from the Major Soccer Portuguese League participated in this study. Eight ACLR athletes and 9 healthy individuals (control group) performed three instep kicks. Rectus femoris (RF), vastus lateralis (VL), vastus medialis oblique (VMO), biceps femoralis (BF) and semitendinosus (ST) muscle activation was measured during the extension knee phase. Kinematic measures of the knee movement were also attained.

Results

Within the EMG parameters, the RF had a significantly ($p< 0,034$) greater activity in the ACLR group (79,9 ± 27,76 % MVC) than in a control group (49,24 ± 20,78 % MVC). The kinematic data of the movement was similar for both groups, but the ACLR group perform had significantly lower knee extension angle associated ($p< 0,021$) with higher significant variability ($p< 0,012$).

Conclusions

The findings of this study demonstrate that changes in ACLR time were only observed on the extension angle and in the EMG intensity of the RF muscle. These findings are in accordance with the recovery knee stability after ACLR, justified with no differences observed in the ballistic control movement pattern obtained between normal and ACLR subjects.

Keywords: Movement pattern, neuromuscular control, open kinetic chain and coordination.

Introduction

Dynamic knee stability is the knee ability to remain stable through the different load changes on the joint during movement [55]. Williams et al. [55] described this function and identified four critical factors for knee stability: the joint geometry; soft tissue restraints; the load applied on the joint; and muscle action. Classic studies, particularly those related to the knee, have shown that increased stability and joint balance are achieved through muscle contraction, dependent on appropriate inter-muscular coordination activity. In particular, the contraction of the hamstring muscles seems to prevent high anterior cruciate ligament (ACL) strain [39,3,47,59,5,58,37,56].Other studies presented the hamstring arc reflex after ACL reconstruction as a sign of the neuromuscular strategy for improve joint stability [53,9].

The soccer kick is the most performed movement by soccer athletes. Kicking the ball is an essential and very distinctive task in soccer [13,11]. According to the game situation, different types of kicks from a variety of forms of kicking are constantly performed. The instep kick is used when the main goal is speed, and it is normally used to achieve long distance, such as during shooting or passing. It is a ballistic movement and is a result of high activation patterns of several muscles in order to achieve a fine coordinated movement [48,20]. This movement is usually divided in distinct four phases [34,20] with special focus on knee flexion and extension [29]. The knee joint reaches its maximum flexion angle around 82.4º [11], and then starts the acceleration for the ball impact [42]. There is a high activation of both medialis oblique and vastus lateralis to accelerate the leg during the extension phase, and the hamstrings and gluteus maximus show their peak activation just prior to ball impact [17,29]. This fact, may explain a decrease in angular velocity of the kicking leg immediately prior to ball impact as reported in several studies [32,29,42,18,3,33]. Nunome et al. [42] reported a rapid increase in the knee extension angular

Coordenação intermuscular

Futebolistas profissionais sem problemas anteriores no joelho

n=9

Padrão de coordenação da musculatura agonista e antagonista da extensão do joelho

Futebolistas profissionais que fizeram uma ligamentoplastia ao LCA há seis meses

n=8

Tarefa em estudo

Remate de futebol – extensão do joelho:

- Exige a actividade dos músculos com influência no joelho;
- Elevada velocidade angular;
- Cadeia cinética aberta.

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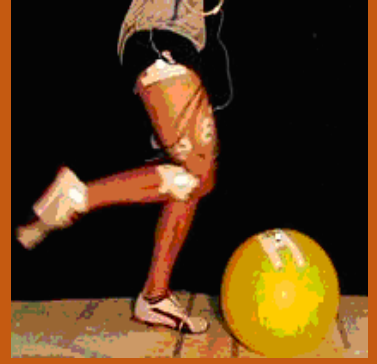
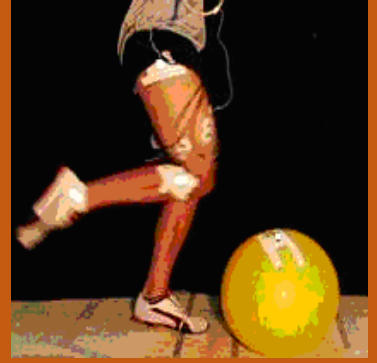
TSK score	ACLR group	8	49,20	1,62	,004
	Control group	9	37,00	7,65	
					,000
KOOS Symptoms score	ACLR group	8	74,40	7,32	,000
	Control group	9	96,92	3,73	
					,000
KOOS Sports and recreation score	ACLR group	8	88,00	2,58	,001
	Control group	9	95,00	4,26	
					,001

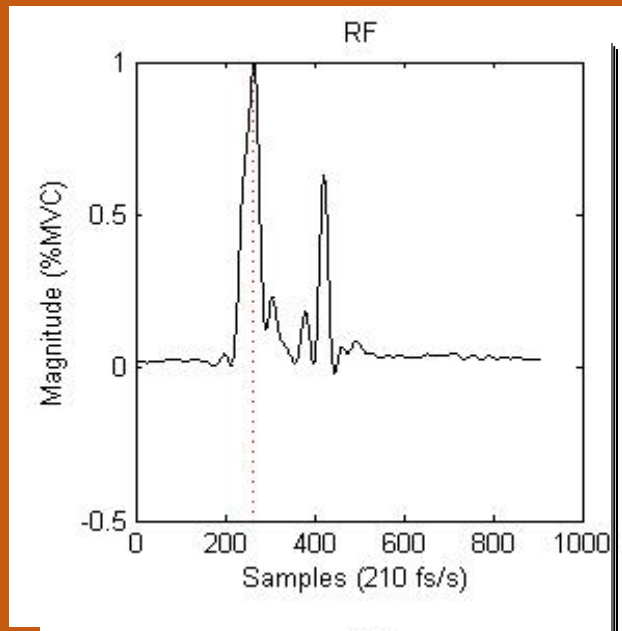


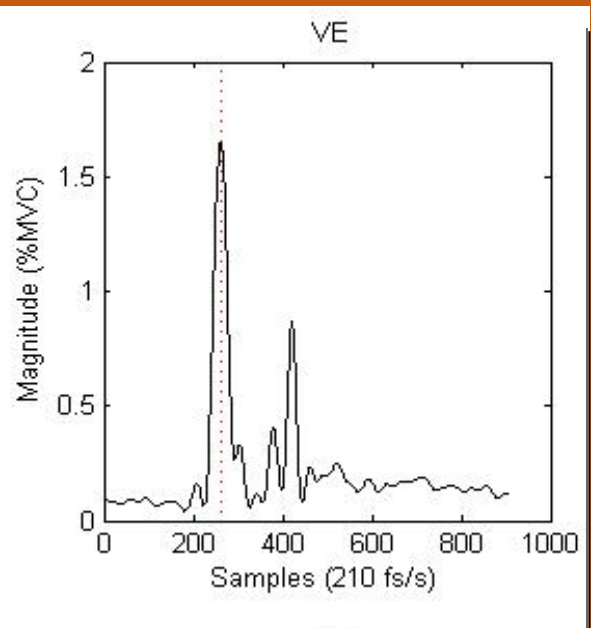
		Mean Comparisons			SD Comparisons		
	Group	Mean	SD	P	Mean	SD	P
Movement duration	ACLR	194,15	35,15		35,77	16,71	
(ms)	CG	195,28	32	0,923	34,06	13,29	0,810
Contact instant	ACLR	68,06	14,18		7,38	7,45	
(ms)	CG	64,07	9,95	0,412	7,56	5,64	0,735
Max velocity instant	ACLR	72,62	16,81		17,4	13,29	
(ms)	CG	66,25	8,65	0,289	7,27	4,19	**0,033**
Max velocity	ACLR	1069,31	194,55		148,73	99,68	
(grades/sec)	CG	1162,50	129,06	0,336	124,43	84,36	0,500
Max Flexion	ACLR	100,04	17,42		5,93	3,93	
(grades)	CG	93,25	5,20	0,700	4,43	3,59	0,211
Max Extension	ACLR	-1,23	1,55		1,11	1,21	
(°)	CG	-0,06	0,07	**0,021**	0,05	0,07	**0,012**
ROM	ACLR	98,81	16,78		6,07	4,00	
(°)	CG	93,20	5,23	1,000	4,42	3,59	0,388
Contact angle	ACLR	56,53	5,93		6,25	3,47	
(°)	CG	54,95	7,54	0,630	9,83	4,70	0,149
Peak velocity angle	ACLR	57,07	12,85		13,89	11,34	
(°)	CG	56,94	5,72	1,000	5,39	3,93	0,123
Acceleration phase	ACLR	39	10		13	9	
(% total movement)	CG	36	8	0,406	6	3	0,062
Deceleration phase	ACLR	61	10		13	9	
(% total movement)	CG	64	8	0,406	6	3	0,062
Velocity peak to fott/ball contact time (ms)	ACLR	4,56	24,55		19,79	20,77	
	CG	2,18	11,03	0,596	8,84	6,04	0,210

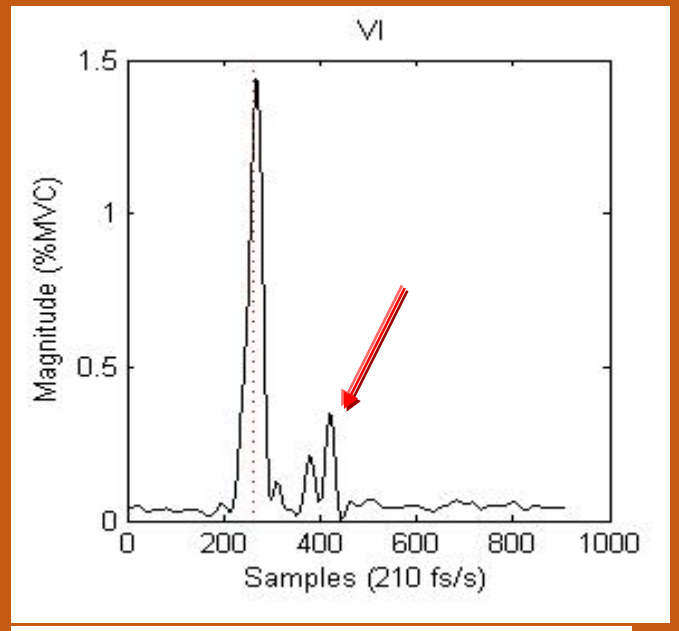


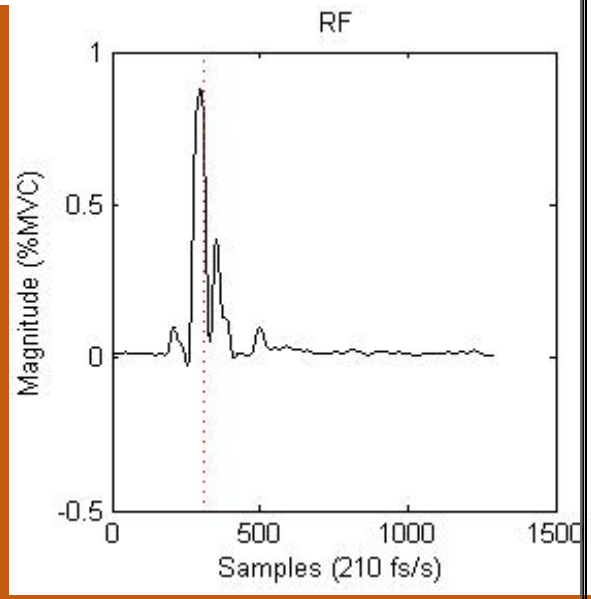
		Mean Comparisons			SD Comparisons		
	Group	Mean	SD	p	Mean	SD	P
RMS_RF	ACLR	79,90	27,76		18,43	14,73	
(% MVC)	CG	49,24	20,78	**0,034**	5,32	4,87	**0,021**
RMS_VMO	ACLR	88,96	39,78		10,04	7,18	
(% MVC)	CG	74,90	19,92	0,441	7,39	4,24	0,630
RMS_VL	ACLR	81,66	38,63		12,30	9,31	
(% MVC)	CG	94,01	21,99	0,178	10,72	4,04	0,847
RMS_BF	ACLR	43,45	27,03		11,31	8,39	
(% MVC)	CG	55,74	41,11	0,564	10,95	8,87	0,773
RMS_ST	ACLR	46,38	57,77		12,23	13,82	
(% MVC)	CG	33,45	11,72	0,336	12,12	5,53	0,441
RMS_BF/VMO	ACLR	57	47		17	17	
(%)	CG	68	41	0,613	14	8	0,700
RMS_ST/VMO	ACLR	73	116		17	2	
(%)	CG	46	11	0,149	17	6	0,149
RMS_BF/VL	ACLR	63	37		21	18	
(%)	CG	65	54	0,923	17	13	0,700
RMS_ST/VL	ACLR	101	189		3	58	
(%)	CG	38	16	0,847	15	7	0,501
RMS_ST/BF	ACLR	158	185		37	,28	
(%)	CG	95	59	0,382	39	37	0,923

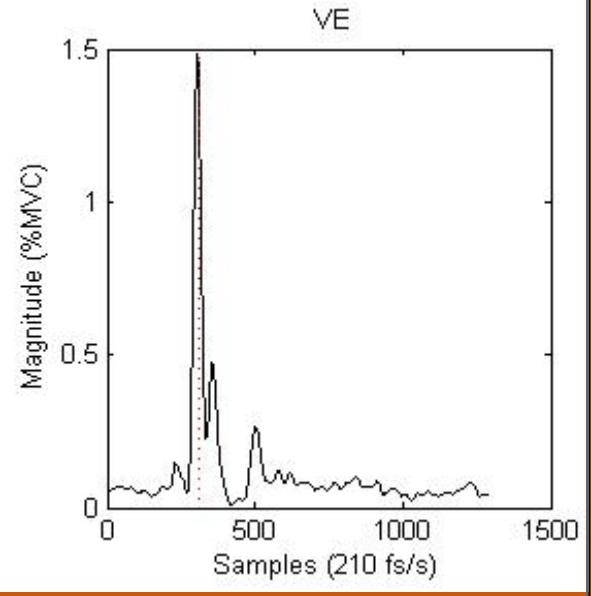
Pós-cirúrgico

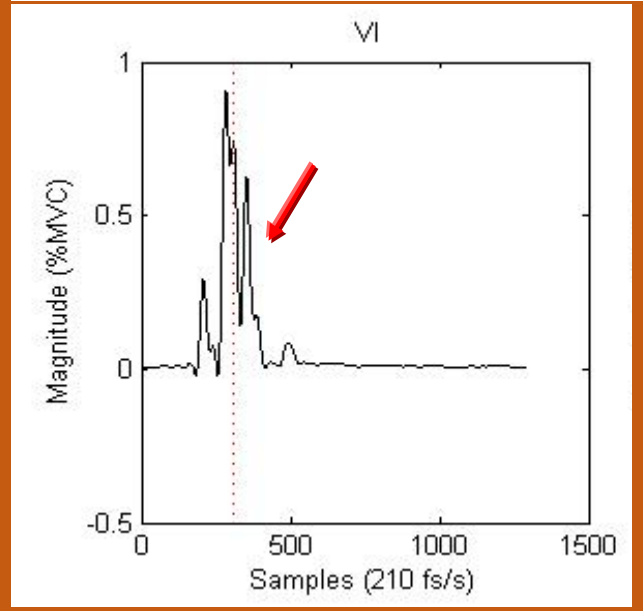






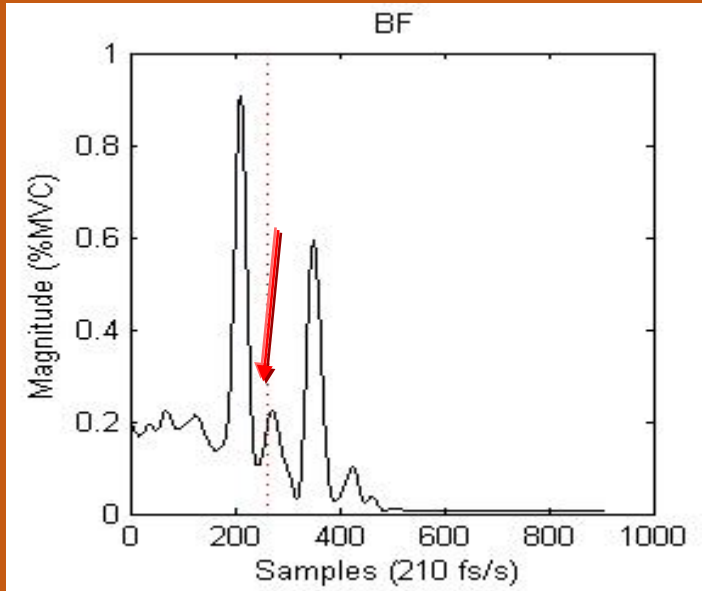


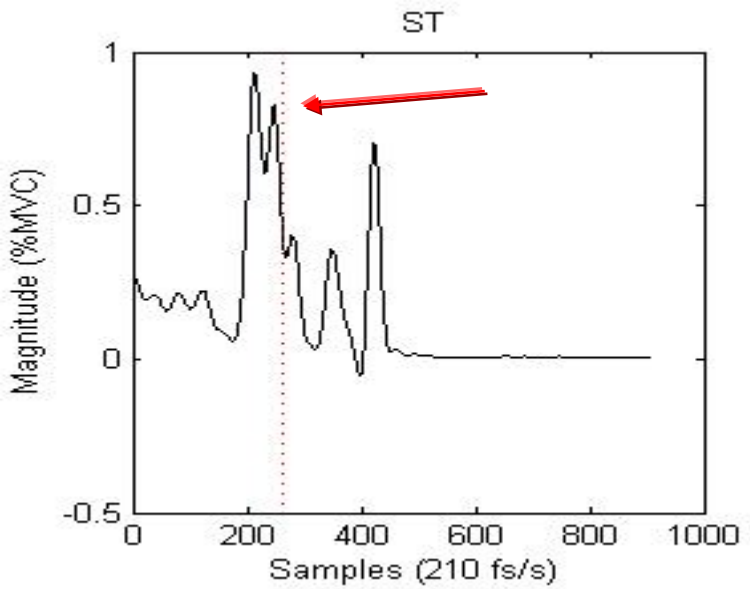


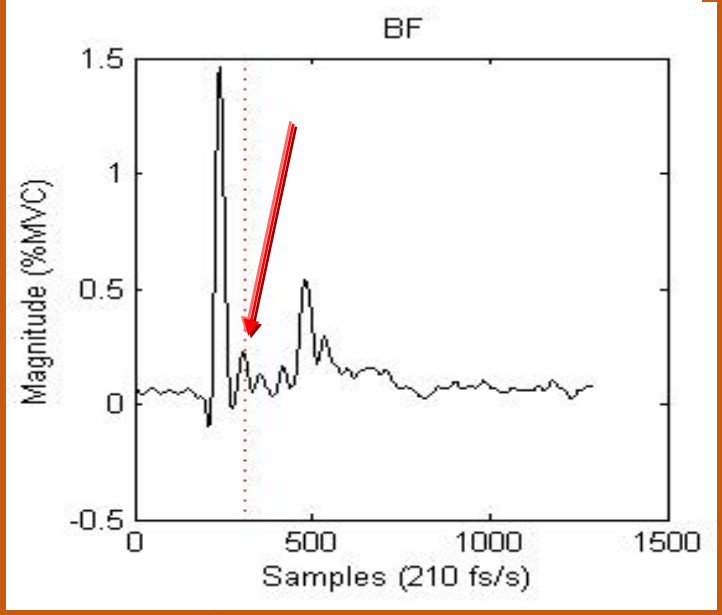


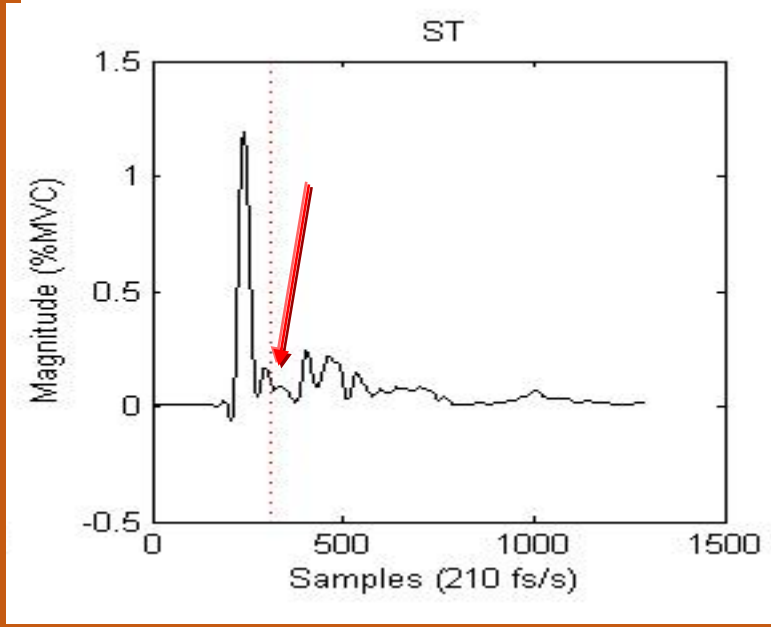
Controlo

Pós-cirúrgico









Controlo

Discussão e conclusões

ACLR:
> cinesiofobia (TSKPT-13);
< funcionalidade (KOOS);
< amplitude articular na extensão;
> actividade electromiográfica RF;
> variação dos instantes temporais.

Não produzem alterações no padrão cinemático e no padrão coordenativo dos músculos

Specific Isokinetic Angle Peak Torque of Fast Angular Knee Velocities on Soccer Players after Anterior Cruciate Ligament Reconstruction

Abstract

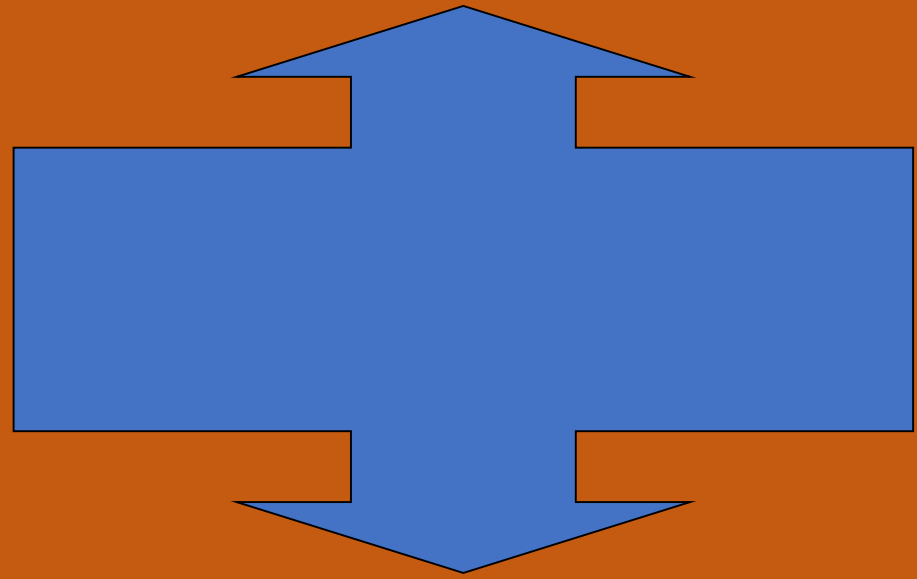
Anterior cruciate ligament tear is one of the most common injuries in sports (e.g., soccer). Knee extensors and flexors isokinetic peak torque (PT) is frequently used to evaluate muscle weakness, but usually presents limitations.. The angle of PT obtainment could present a better variable for assess muscle capacity. The purpose of this study was to explore the isokinetic muscle strength obtained in professional soccer players six months after surgery (ACLR) with special interest on the angle of PT. Eighty four players from the Portuguese Major Soccer League participated in this study. Fifteen ACLR athletes and 69 healthy individuals (control group) performed concentric/concentric flexion/extension movement of the knee at 60 °/s, 180 °/s and 300 °/s. The ACLR group developed ($p<0,007$) greater knee extension PT at a larger angle (44,73 ± 24,43º) than the CG group (29,72 ± 8,31º). The ACLR group presented lower PT values on both muscles for all angular velocities ($p<0,001$). This study is in accordance with lower quadriceps and hamstrings strength capacity in professional soccer players six months after ACLR, especially observed in both variables in fast knee extension movements.

Introduction

Knee injuries are very frequent among soccer players, particularly the anterior cruciate ligament (ACL) tear [1-3]. This injury is considered one of the most troublesome due to its impact on life's quality and on knee prognosis [3], leading to long periods of sport absenteeism or, in severe cases, to the end of professional sport careers [1]. The ACL controls the static knee stability through mechanoreceptors scattered by its surface and contributes to the knee dynamic stability, through neuromuscular reflexes. The ACL tear, on this way, promotes biomechanical modifications on the injured limb based on proprioception and balance deficits [2]. This phenomena promotes muscle hypotrophy and loss of motor units activation during muscle contraction [4] and contributes to quadriceps weakness, which often develops very quickly after ACL injury and reconstruction (ACLR) [5, 6].

Estruturas
peri-articulares
Força

Futebolistas profissionais sem problemas anteriores no joelho
n=69



Futebolistas profissionais que fizeram uma ligamentoplastia ao LCA há seis meses
n=15

Forca

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		N	Mean	SD	P
PT Qua 60	ACLR	15	181,22	28,35	
	CG	69	224,83	36,17	**0,000**
PT Qua 180	ACLR	15	151,32	38,9	
	CG	69	175,95	22,01	**0,001**
PT Qua 300	ACLR	15	116,64	25,84	
	CG	69	140,26	22,11	**0,000**
PT Ham 60	ACLR	15	281,84	61,71	
	CG	69	344,02	47,34	**0,000**
PT Ham 180	ACLR	15	182,27	32,61	
	CG	69	211,5	27,78	**0,001**
PT Ham 300	ACLR	15	123,93	24,79	
	CG	69	146,42	20,65	**0,001**
Ang Qua 60	ACLR	15	38,87	13,3	
	CG	69	36,91	10	0,598
Ang Qua 180	ACLR	15	39,53	13,03	
	CG	69	34,07	10,58	0,146
Ang Qua 300	ACLR	15	44,73	24,43	
	CG	69	29,72	8,31	**0,007**
Ang Ham 60	ACLR	15	74,6	8,22	
	CG	69	72,06	6,44	0,275
Ang Ham 180	ACLR	15	71,4	8,11	
	CG	69	69,88	7,59	0,359
Ang Ham 300	ACLR	15	71	17,42	
	CG	69	75,49	7,61	0,343
H Q ratio 60	ACLR	15	0,66	0,13	
	CG	69	0,66	0,11	0,958
H Q ratio 180	ACLR	15	0,86	0,32	
	CG	69	0,84	0,1	0,181
H Q ratio 300	ACLR	15	0,98	0,34	
	CG	69	0,97	0,14	0,130

Discussão e conclusões

ACLR:
< valores de PT 60º/s, 180º/s e 300º/s;

> ângulo PT extensão 300º/s.

PT + Ângulo PT = força absoluta e preparação plástica do tecido muscular à modalidade.

Conclusões Gerais (1)

Sujeitos em condição de 6 meses após cirurgia:

- Maior nível de cinesiofobia por pontuações mais elevadas na aplicação da TSKPT-13;
- Menor nível de funcionalidade do joelho por menores pontuações na KOOS;

Conclusões Gerais (2)

Sujeitos em condição de 6 meses após cirurgia:

- Menor grau de força isocinética dos músculos com expressão do joelho a 60º/s, 180º/s e 300º/s;
- Atípica relação força/comprimento em função da modalidade, pelo ângulo articular mais largo para obtenção do PT do quadricipite a 300º/s;

Conclusões Gerais (3)

Sujeitos em condição de 6 meses após cirurgia:

- Valores similares nos parâmetros cinemáticos e de ativação muscular na extensão balística do joelho – remate de futebol;
- Menor amplitude (cerca de 1º) de extensão no movimento de extensão balística do joelho – remate de futebol.

Voltar ao desporto? Perspetiva pessoal…

- Retorno pode começar mais cedo quando:
  - Rotura Isolada do LCA;
  - Sem lesão menisco ou de cartilagem.

Racional: O retorno ao nível pré-lesional pode não ocorrer;
A qualidade do padrão motor, nível de força e grau de cinesiofobia deverão fazer do critério para retorno;
O atleta deverá ser bem informado dos riscos duma integração rápida.

Obrigado

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