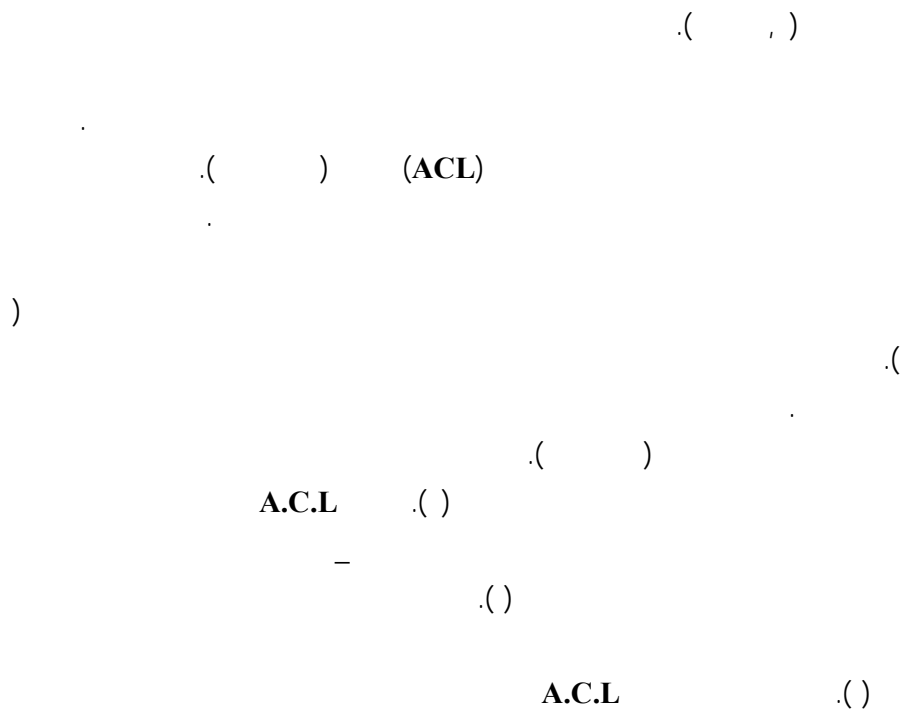


-  
:  
/ / :  
/ / :

- - - - -

( ) ( )  
± / ± / )  
(BPTB ) ( )  
(P< / )



- 1 - Anterior Cruciate Ligament
- 2 - Muscle reaction
- 3 - Muscle Spindle System
- 4 - Joint Position Sense
- 5 - Kinesthesia
- 6 - Proprioception
- 7 - Partial De-Afferentation

...



A.C.L

.( )

A.C.L

.( )

Bonfim

Bonfim.

A.C.L

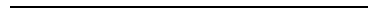
.( )

Birmingham

، ( soft يا rigid)

.( )

Beynnon



- 1 - A.C.L. Reconstruction
- 2 - Functional Recovery



( )

Bone Patellar Tendon Bone A.C.L

(Convenience sampling)

Inclusive

Exclusive

Inclusive

Bone Patellar Tendon

Bone

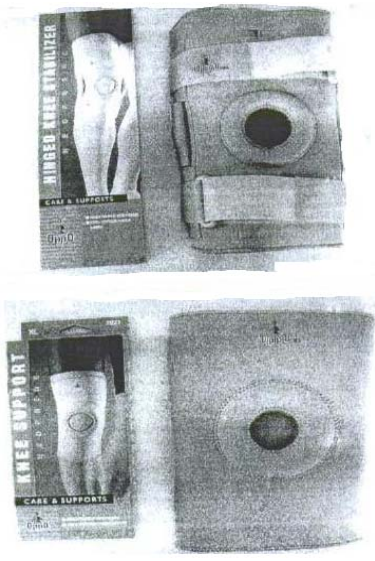
Exclusive

( ) ( )

( ) oppo

- 1 - Neoprene Knee Stabilizer
- 2 - Neoprene Knee Support

...



( )

( )

-

/

Active knee Ext

(

)



.( )

)

5

.( ) (

.( )

.( ) ( )

.( )

.( , )

)

.( )

( )

.(

.( )

.( , , )

.( )

.( )

.( )

...



=                    =                    )  
( =                    =

/	/	( )
/	/	( )
/	/	( )
/	/	

" "

" "

" "



/	/		/	/	
/	/		/	/	
/	/		/	/	
/	/		/	/	
/	/		/	/	
/	/		/	/	
/	/		/	/	
/	/		/	/	
/	/		/	/	
/	/		/	/	
/	/		/	/	
/	/		/	/	
/	/		/	/	
/	/		/	/	

**One way repeated**

**One sample t test**

**measurement ANOVA**

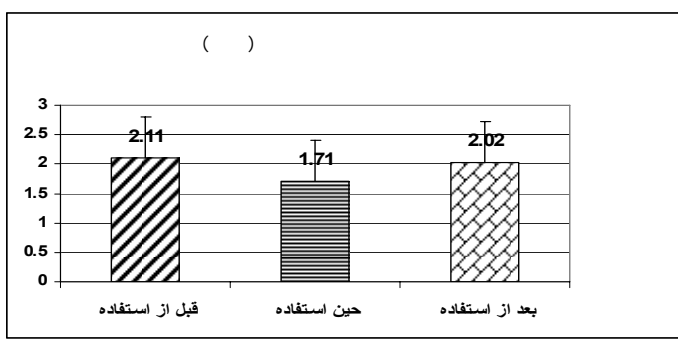
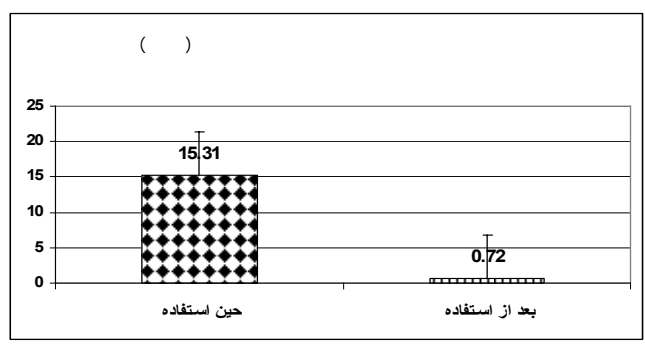
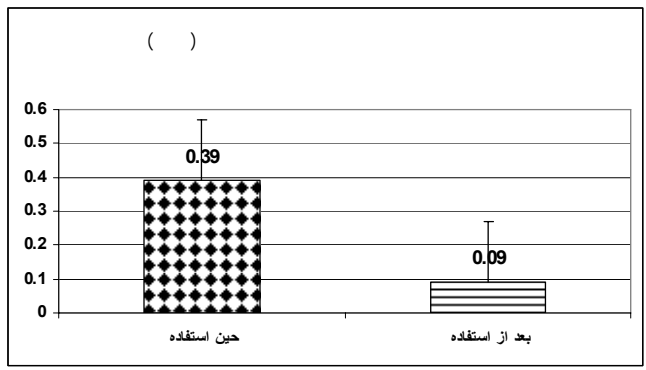
.( )

( )

.( )



...





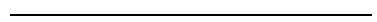
...



.( )  
. ( )  
. ( )

Hassan BS, Perlau

( )  
( )





Beynnon

( )

( )

Birmingham

( )

( )

:

...



firing rate

( )

.( )

.( )

( )  
( )

-

( )

6

- 
- 1 - Hysteresis phenomenon
  - 2 - Contact area
  - 3 - Higher fidelity Kinesthetic image



( )

Fremery Pincivero  
Proske U. <sup>٤</sup>

Weiler

( )

( )

Pincivero

DM

( )

( )

(Neoprene knee stabilizer)

...

---

1. Beynnon BD, Good L, Risbeng MA. (2002). "The effect of bracing on proprioception of knee with A.C.L Injury". *Journal of orthopedic sports physical therapy*. 32:PP: 11-15.

2. Bonfim TR, Jansen Pac Colla CA, Barela JA. (2003). "Proprioception and behavior impairments in individuals with anterior cruciat ligament reconstruction knees". *Archive of physical medicine rehabilitation*. 84:PP: 1217-1223.

3. Birmingham T.B, Inglis J.T., Kremer J.F. (2000). "Effect of a neoprene sleeve on knee joint kinesthesia: influence of different testing procedures". *Medicine and science in sports and exercise*. 32:PP: 304-308.

4. Birmingham T.B, Kramer J.F., Kirkley A. (2001). "Knee bracing after ACL reconstruction: effect on postural control and proprioception". *Medicine and science in sport exercise*. 33: PP: 1253-1258.

5. Birmingham T.B, MSc, Kramer J.F.(1998). "Effect of a neoprene sleeve on knee joint position sense during sitting open kinetic chain and supine closed kinetic chain tests". *Amercian journal of sport medicine*. 26:PP: 562-566.

6. Brownsten B, Bronner S.(1997). "Functional movement in orthopedic and sport physical therapy evaluation, treatment and outcomes". *Chrhill livingtons Inc*. PP:43-65.

7. Fisher – rasmussen T, Jensen PE. (2000). "Proprioception sensitivity and performance in anterior cruciate ligament – deficient knee joints". *Scand journal of medical science and sports*. 10: PP:85-89.

8. Fremerey R, Lobenhoffer P, Skatek M, Gerich T, Bosch U. (2001). "proprioception in A.C.L reconstruction endoscopic versus open two tunnel technique". *A prospective study. Internaltional journal of sports medicine*. 22: PP:144-148.

9. Friemert B, Bach C, Schwarz W, Gerngross H. (2006). "Benefits of active motion for joint position sense". *Knee surgery and sports traumatology arthroscopy*. 14: PP:564-570.

10. Handi M, Drzik M, Cerulli G, Povysil C. (2007). "Reconstruction of the anterior cruciate ligament: dynamic strain evaluation of the graft". *Knee surgery and sports traumatology Arthroscopy*. 15:PP: 233-241.

11. Harner C.D, Vicke K G, Fu F.H. (2001). "Techniques in kneww surgery". *Lippincott Williams and Wilkins*,PP: 41-81.

12. Hassan BS, Mockett S, Doherty M. (2002). "Influence of elastic bandage on Knee pain". *Prorioception and postural sway in subject with knee osteoarthritis. Ann rheumatology disease*. 61:PP: 24-28.

13. Hopper D.M, Creagh M.J, Formby, Goh SC, Boyle J, Strauss. (2003). "Functional measurement of knee joint position sense after anterior cruciat ligament reconstruction". *Archive of physical medicene rehabilitation*. 84: PP:868-872.

- 
14. Moisala AS, Jarvela T, Kannus P, Jarvinen M.(2007). "Muscle strength evaluation after ACL reconstruction". *International journal of sports medicine*. 2007 Mar. 15. Epub ahead of print.
  15. Patton HD, Fuchs A.F. Hille B and Schr. A.M. (1999). "Text book of physiology". W.B. Sanders company, 21<sup>st</sup> ed:PP: 298-320.
  16. Perla R, FRCSC, Cyril. (1995). "The effect of elastic Bandage on human knee proprioception in the uninjured population". *The American journal of sports Medicine*. 23: PP:251-255.
  17. Phelan DT, Cohen AB, Fithian DC. (2006). "Complication of Anterior Cruciate Ligament reconstruction". *Instr Course Lect*. 55:PP: 465-474.
  18. Pincivero DM, Bachmeier B, Coelho AJ.(2001). "The effects of joint angle and reliability on knee proprioception". *Medical science in sports and exercise*. 33: PP:1708-1712.
  19. Prentic W.E. *Rehabilitation techniques in sport medicine*. Mosby. 1994 2<sup>nd</sup> ed: 118-132.
  20. Prentice W.E, voigh M.L. Davis M. (2001). "Techniques in musculoskeletal rehabilitation". *The McGraw Hill company, Inc*. PP:541-555.
  21. Proske U. (2006). "Kinesthesia: the role of muscle reseptors". *Muscle Nerve*. 34: PP:454-558.
  22. Weiler HT, Awiszus F. (2000). "Influence of hysteresis on joint position sense in the human knee joint". *Experimental Brain Research*. 135:PP: 215-221.