Rehabilitation of Running Injuries

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Abstract

unning is becoming one of the most popular leisure Sports. The growing popularity of running is due in part to its easy accessibility and health benefits. The incidence of running injuries ranges from 37% to 56%, which is still 2 to 6 times lower than in other sports. Most running injuries are musculoskeletal overuse syndrome of the lower extremities. The risk factors of running injuries include training errors, improper running surface, worn shoes, body flexibility, and prior injury. The knee is the most common site of injury and accounts for 25% to 33% of all, and patellofemoral stress syndrome is most commonly known as 'runner's knee'. Iliotibial band syndrome, medial tibial stress syndrome, plantar fascitis, Achilles tendinitis, and stress fracture are all common injuries among runners. The process of rehabilitation is to be divided into four stages according to the athlete's level of function; the initial stage, intermediate stage, advanced stage, and final stage.

Keywords : Runner; Injury; Patelofemoral; Foot; Rehabilitation

; ; ;

.

, ,

3 ~ 4

,

(1~4). , 가 , 가 . 1

37~56% , 1,000 2.5~5.8 , 1,000 2.5 ,

5.8

```
2~6
                                                     가 2가
                     70%
                              가
                                                         (5, 8).
                       70%
                              가
                                         1.
                                                             가
 (overuse)
     가
                          가
                                                                    32km
 (4 \sim 6).
                                                    가 .
                                                                      5
                                                  8 (1km 5)
                                           , 1
                       가가
                                                       가
                       . 가
                                         가
        가 25%,
                     가 20%,
                              가 16%,
                                                                  가
      가15%,
                   가10%,
                                 7%,
                                                  40
                                                       (64km)
  7%
                                70~80%
                                               가 . 70
                                                          (112km)
                                         3
가
                                         가
                                                                  가
                        가
                                                           3 ~ 4
          25 ~ 30%
                         30%,
20%,
            (shin splint) 15%,
            10%
15%,
                40% 가
                                         (warm up) 32 ~ 40 km
                                                                2
15%,
               15%,
                                15%,
                                               (peak training) 72km 2
                               (4 \sim 7).
         10%,
                5%
                                                (interval training), (tapering)
                                                  25%
                                                            (5, 6, 9 \sim 11).
                                           (dirt) ,
                                                     가
                                   가
                                                          가가
              (training error) , 가
                                     3
                                                      400km
가
                                           30~50%
```

가 가 가 (Novice) 가 가 가 (4, 7, 10). 1 가 (4, 8, 10). 1.5 가 2. 1. 가 가 (excessive pronation) (cavus) . (weekly mileage), (current long 가 run), 6 가, 가 가 (12). (10). 2. 가 (standing screening

```
(heel
test),
                  (quick dynamic test),
                                                   counter)
                                                                   (last)
                                                   (13, 14).
                                              가
(tibial varus),
                       (navicular drop)
                              (toe stand),
                                                                   가
   (heel stand), (one leg stand),
                                                                       30 ~ 50%
     (single leg squat)
                                         (track
                                                                     (Patellofemoral pain syndrome),
ing)
                 (tuberclesulcus angle),
                                                                        (Iliotibial band syndrome),
     (hamstring tightness) 가
                                   (femoral tor-
                                                                         (Popliteal tendinitis),
                                                              (Pes anserinus bursitis),
sion),
              (tibial torsion), Q,
(patella tilt), (patella glide),
                                                                                           (9, 10).
     (anterior drawer test),
           (valgus varus stress test),
                                                                       가
                                                   (runner's knee)
       (Ober test)
                                         (subta
                                                                               가
lar ROM),
                     (leg-rearfoot alignment),
         (rearfoot forefoot alignment)
   (antal-gia)
                       (kinetic chain)
                                   가
                                                                                      (vastus medi-
                                                   alis oblique)
                                                                   (vastus lateralis oblique)
                                                   (retinaculum),
```

```
20。
(13, 15).
                                     가6
 가
                      15cm
                       가
             J-sign
                   20,
(glide test)
                       가
                                        (con-
                                       16°
gruence angle)가
                         6°
                           (patella tilt
angle∦ 10°
                          (13, 15).
                              가
                   가
                                        가
                                                      가
                                                               가
                                                      1.
                                                                       (Step down exercise)
                      가
               (open chain kinetic)
                                   가
                                                        (leg press)
                                                            가
            (closed chain kinetic)
                                                         (13).
                                0~45
              가
                                                                                     (one leg
                      (trochlea)
                                               swing back and forward),
                                                                               가
                                                                                       (step
                                               down exercise)
               (lunge),
                                (wall slides),
```

1)	. 가 (67
가 (13).	, 가	
2.		
가	, 12% (tensor fascia lata) Gerdy's tuber-	
cle ,	. 가	
	30,	가 2. (Iliotibial band standing stret- ching)
	・ , , , , , , , , , , , , , , , , , , ,	
	가	. 30,
	가	Noble Compression test . Ober . Modified Thomas test ,
가		가
,	가 (13, 16).	, (tensor fascia lata),





3. (Pelvic drop exercise)

. 가 (step down exercise),
, 가 가 (pelvic drop exercise) .
(13).

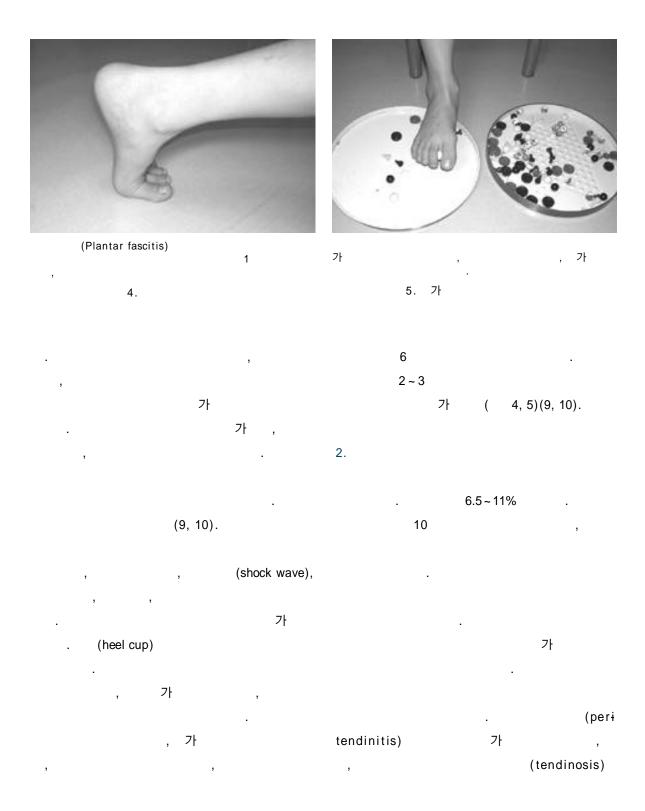
(2), .

, (3)(13). (foam roll)

3. 30, , (5, 12).

```
가
                32km
                                                    가
                                                                     (Grade 2)
                         1.5 \sim 3.5
                                                          (Grade 3)
                                            (fracture line)
(fulcrum),
                          (vibration)
                                                  (hopping)
                        2/3
 , ' gray cortex '
                                                               가
                                                                            (20).
   (triple phase bone scan) 1
                                                              (periostitis),
   가 .
                     가
                                                         3
                                                               12
1 T2-signal
                      가
                           (17, 19, 20).
(shin pain)
                                            1/3
                                                              (cavus)
                                                                                . 6
                                                    가가
                                                            (21).
                                                          가
           10~15%
                                                      (pool running),
            , 가
                                                2
                                                              10
                               가
                                                   4~6
   (periosteal reaction)
                                   (stress
                                             , 3
                                                     6~9,4
                                                                  12
reaction)
                                      T2
                                            (impact activity)
                                                                        (cross-train
                   가가
                                            ing)
가
                             . 1
               (Grade 1)
```

					(9, 10).
1/3	, ,	가		(ischial bursitis)	
(20~22).				, 가	
4.					
		,	,	,	
가		,		(9, 10).	
3	,			(Hamstring injury)	,
	,	가		,	
	가가 .				
		(fibular			
collateral ligment)	,				
				,	
			(9,	10, 23).	
		,			
	(10, 13	3).			
	,	4			
				(Plantar fascitis),	(Achilles
,	,		tendinitis),	,	
,	,				
	(10, 13).		1.		
					가
5.				7~9%	
	,			가	9 ~ 12%
,	,			(heel strike)	
				,	
				가가	가
					가



		3.	가 ,	2 가 가 가	, 가
, 가			,		,
6.				가	,
,			가 , (9, 10).	·	
2 ~ 6cm		4.			
가				,	
	, ,		(invertor) .		가
, (10, 24).		,			
가	,				
	(wall				
leaning) , ,	(friction	가			
massage), 가 (mobilization)	가 .				
		가			
,		가	(9, 10, 23).		
, (toe- up using a	stair).				
가			가		•
(6)(9, 10, 23).			가		

```
가
                                                                         (control abuse, modifying
   가
                                                  improper sports technique) '
                             (resting),
(initial),
                    (control inflammation)
                                                     가
     1~2
               가
                      가
                                       가
                                                                                         BAPS
RICE(rest, ice, compression, and elevation)
                                                                                   (Fitter)
                    가 PRICEMM(Prevention,
RICE, modalities, and medications)
                                                         , S
                                                                              , Z
                                                                    , 8
                                       (isome-
tric),
                                                               (9, 10, 13, 22).
          (Pool)
                                (9, 10, 20).
                                                                                 (Stage IV),
   2
                   (intermediate),
                                                        (Return to sports)
           (promote healing)
     4~6 가
                                            가
      가
                                      (granula
                                                                                   가
tion가
(pre-participation)
                                                                 (goal setting) '
                                                        '(winning competition)
                                                  (performance)
  가 가
                                                       5km
                                                                   가 10
                                                                                               가
                   (10, 20).
                                                        1km 5
             3
                           (advanced),
   (pre-sports),
                            (increase fitness)
                                                                     3
```

10				3		가
		•		0 ~	- 10	,
0 ~ 2						
			가4	~ 6		
				,	7	
		(10, 13).				
			10%		가	
		가	10km	3	,	
	6	:	가		(10, 13).	

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- Manson JE. Triggering of sudden death from cardiac causes by vigorous exertion. N Engl J Med 2000; 343: 1355 6
- Lane NE, Bloch DA, Jones HH. Long distance running, bone density, and osteoarthritis. JAMA 1986; 255: 1141 - 51
- Rich BS. Sudden death screening. Med Clin North Am 1994;
 267 88
- Van Mechelen W. Running injuries; A review of the epidemiological literature. Sports Med 1992; 14: 320 - 5
- Walter S, Hart L, McIntosh J, Sutton J. The Ontario Cohort Study of running - related injuries. Arch Intern Med 1989; 149: 2561 - 4
- 6. Lysholm J, Wilkander J. Injuries in runners. Am J Sports Med 1987; 15: 168 73
- Jacobs S, Berson B. Injuries to runners: A study of entrants to a 10,000 meter race. Am J Sports Med 1986; 14: 151 - 5
- Macera CA. Lower extremity injuries in runners. Advances in prediction. Sports Med 1992; 13: 50 - 7
- Fredericson M, Bergman AG. A comprehensive review of running injuries. Crit Rev Phys Rehabil Med 1999; 11: 1 - 34
- Fredericson M. Common injuries in runners. Diagnosis, rehabilitation, and prevention. Sports Med 1996: 21: 50 71
- 11. Wen D, Puffer J, Schmalzried T. Lower extremity alignment and risk of overuse injuries in runners. Am Coll Sports Med 1997; 29: 1291 - 8
- Brody DM. Techniques in the evaluation and treatment of the injured runner. Orthop Clin North Am 1982; 13: 541 - 58
- 13. O'connor FG, Wilder RP, ed. Textbook of running medicine.

 New York: McGraw Hill, 2001: 48 57, 157 180, 512 3
- Valmassy RL, ed. Clinical biomechanics of the lower extremities, St. Louis: Mosby Year Book, 1996: 78 9
- Lun V, Meeuwisse WH, Stergiou P, Stefanyshyn D. Relation between running injury and static lower limb alignment in recreational runners. Br J Sports Med 2004; 38: 576 - 80
- 16. Barber FA, Sutker AN. Iliotibial band syndrome. Sports Med 1992: 14: 144 8
- 17. Bergman AG, Fredericson M, Ho C, Matheson GO. Asymp-

1. Albert CM, Mittleman MA, Chae CU, Lee IM, Hennekens CH,

- tomatic tibial stress reactions: MRI detection and clinical follow up in distance runners. Am J Roentgenol 2004; 183: 635 8
- Johnson AW, Weiss CB, Wheeler DL. Stress fractures of the femoral shaft in athletes more common than expected: A new clinical test. Am J Sports Med 1994; 22: 248 - 56
- Fredericson M, Bergman AG, Matheson GO. Stress fractures in athletes. Orthopaedic 1997; 26: 961 - 71
- 20. Fredericson M, Bergman AG, Hoffman KL, Dillingham MS. Tibial stress reaction in runners: Correlation of clinical symptoms and scintigraphy with a new magnetic resonance grading system. Am J Sports Med 1995; 23: 472 - 81
- Bergman AG, Fredericson M. MR imaging of stress reactions, muscle injuries, and other overuse injuries in runners. MRI Clinics North Am 1999; 7: 151 - 74
- 22. Freslon M, Soyer J, Iborra JP, Hadjadj S, Pries P, Clarac JP. An unusual cause of a stress femoral fracture in a long distance runner: a case of bilateral fracture. J Trauma 2004; 56: 433 6
- 23. Hart LE. Prevention of lower limb soft tissue injuries in runners: a review. Clin J Sport Med 2002; 12: 320 1
- 24. Scioli MW. Achilles tendinitis. Orthop Clin North Am 1994; 25; 177 82

