Quantification of Ankle Function and Confidence Following Ankle Injury in High School and College Athletes

Aynsley D. Entrekin, MS, ATC; Micah E. LaJoie, MS, ATC; Gary B. Wilkerson, EdD, ATC; Marisa A. Colston, PhD, ATC

THE UNIVERSITY of TENNESSEE CHATTANOOGA

BACKGROUND AND PURPOSE

- The ankle is one of the most common sites of acute musculoskeletal injury
  - Sprains account for 75% of ankle injuries; > 40% of which present chronic problems[1]
- Return-to-play (RTP) decision-making is complicated by physical, psychological, and social considerations[2]
  - Evidence-based guidelines for RTP are not well-established[3]
  - Sport, age, gender, and anthropometric characteristics may be important considerations[3,4]
- Physical and psychological readiness for return to high-demand activities do not necessarily coincide[2,5]
  - An athlete may be fearful of re-injury upon RTP, which may contribute to elevated risk[2]
  - 13% of athletes with orthopedic injuries have reported fear of re-injury during the rehabilitation process[2]
    - 40% of those who feared re-injury during rehabilitation reported fear upon RTP
- The purposes of this study were to quantify levels of confidence and function among college and high school athletes upon RTP following a lateral ankle sprain, and to assess long-term recovery of ankle function

PARTICIPANTS AND PROCEDURES

- 8 student-athletes who sustained a lateral ankle sprain participated in this study
  - 5 college student-athletes: 3 male (2 football & 1 basketball) and 2 female (1 volleyball & 1 soccer)
  - 3 female high school student-athletes (soccer)
    - Inclusion criterion: sprain sustained during sport season, which resulted in ≥ 1 day of lost participation
    - Exclusion criteria: fracture or immediate RTP on the day of sprain occurrence
- Clinical assessment performed by a licensed athletic trainer within 24-48 hours of sprain occurrence
  - Swelling, tenderness, pain, and patient ratings of pain, functional status, and level of confidence
    - Foot and Ankle Ability Measure – Sport subscale (FAAM-S)
    - 0-10 scale for Single-Number Function Rating (SNFR) and Single-Number Confidence Rating (SNCR)
- Follow-up assessments upon RTP, 1 week after RTP, and 2 weeks after RTP
  - Functional status (FAAM-S and SNFR) and SNCR
- Follow-up assessment at 4 months post-injury: SNCR and isokinetic testing of eversion-inversion @ 30°/sec

RESULTS

- Post-injury clinical assessment results and 4-month post-injury SNCR for each case presented in Table 1
- Change in status from Post-Injury Day 1 through 2 weeks after RTP presented in Figures 1-3
- Number of days to RTP demonstrated linear relationships to FAAM-S, SNFR, SNCR; presented in Figures 4-6
  - Strong RTP correlation between FAAM-S and SNCR (r=.85; p=.008)
  - Good RTP correlation between SNFR and SNCR (r=.73; p=.039)
  - Moderate RTP correlation between FAAM-S and SNFR (r=.64; p=.085)
- No discernible relationships were evident between post-injury assessment results and isokinetic testing results

Table 1

CASE	MOI	SWELLING	PALPATION TENDERNESS	PAIN RESPONSE TO STRESS	SNCR @ 4 mo
1 (College Football – Male)	Uneven Surface	None	ATFL 2, AMJ 1	AD 1, TT 2	9
2 (College Football – Male)	Cut/ Pivot	LM 1	ATFL 2	ER 2	8
3 (College Volleyball – Female)	Jump/ Land	LM 3, MM 2, Syn 1	ATFL 3, CFL 3, Syn 1, AMJL 3	AD 3, TT 3, TFSq 3	9
4 (High School Soccer – Female)	Uneven Surface	LM 3	AFTL 2, CFL 2, CPT 1	AD 3, TT 3, TFSq 3, EFR 3	9
5 (High School Soccer – Female)	External Blow	LM 2	ATFL 2, CFL 2	AD 1, TT 1, TFSq 1, EFR 1	9
6 (College Basketball – Male)	Running	LM 1	AFTL 3, CFL 1, ST 1	TT 2, EFR 3	10
7 (College Soccer – Female)	Cut/ Pivot	LM 1, Syn 2	ATFL 2, CFL 1, ST 2, Syn 2	AD 2, TT 2, EFR 1	10
8 (High School Soccer – Female)	External Blow	LM 2, Syn 1	ATFL 2, CFL 1, Syn 1, CPT 2	AD 2, TT 1, EFR 1	10

LM: Lat. Malleolus Syn: Syndesmosis ATFL: Ant. Talo-Fibular Lig. AMJL: Ant.-Med. Joint Line AD: Ant. Drawer TFSq: Tib.-Fib. Squeeze
MM: Med. Malleolus ST: Sinus Tarsi CFL: Calcaneo-Fibular Lig. CPT: Common Peroneal Tendons TT: Talar Tilt EFR: Ext. Foot Rotation

Figure 1

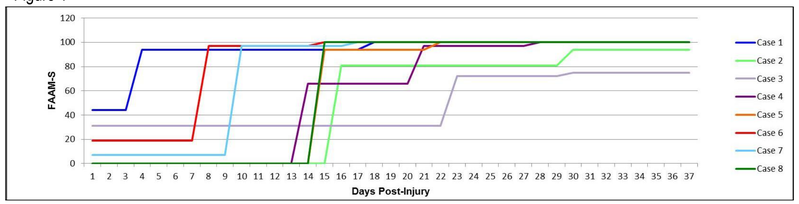


Figure 2

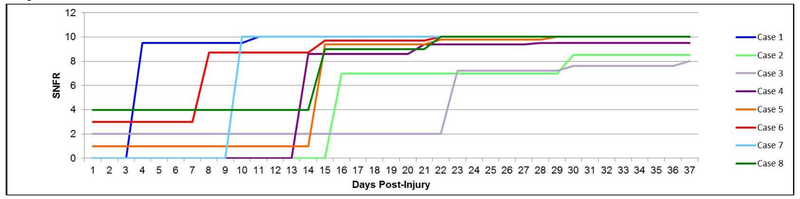
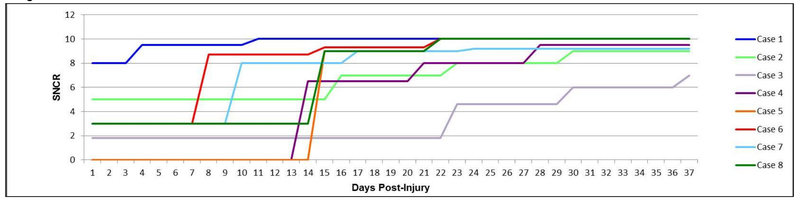
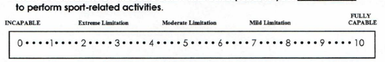


Figure 3



SNFR

Draw a vertical line on the scale below that corresponds to your overall ability to perform sport-related activities.



SNCR

Draw a vertical line on the scale below that corresponds to your overall confidence to perform sport-related activities.

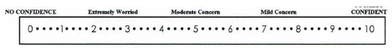


Figure 4

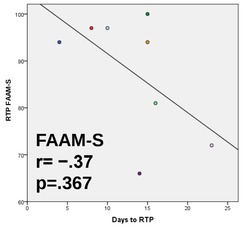


Figure 5

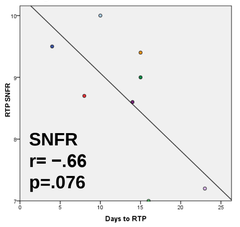
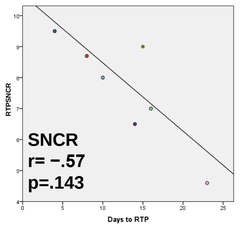


Figure 6



CLINICAL RELEVANCE

- Severity of early post-injury physical impairments has been related to duration of disability following lateral ankle sprain, but self-reported functional limitations may provide a stronger prediction of disability duration[6,7]
  - Recovery duration was inversely correlated with FAAM-S at RTP, but inverse correlation was stronger for SNFR
    - This finding supports the value of a single-question assessment of functional status as an alternative to administration of a multi-item joint specific survey instrument[8]
- Confidence is a factor that can greatly affect recovery duration and readiness for RTP, which has not historically been quantified during the injury rehabilitation process[6,7]
  - The SNCR correlation with FAAM-S upon RTP was strong, and its correlation with SNFR was good, but a combination of confidence and functional status probably influences the number of days required for RTP
    - The single-question assessment method makes routine acquisition of patient data highly efficient
- Daily acquisition of SNFR and SNCR may establish a pattern that will facilitate estimation of the amount of time required for injury recovery and successful RTP

REFERENCES

1. Wolfe MW, et al. Management of ankle sprains. *Am Fam Phys*. 2001;63:93-105.
2. Podlog L, Eklund RC. The psychosocial aspects of a return to sport following serious injury: A review of the literature from a self-determination perspective. *Psychol Sport Exerc*. 2007;8:535-566.
3. Creighton DW, et al. Return-to-play in sport: A decision-based model. *Clin J Sports Med*. 2010;20:379-385.
4. Arciero RA, et al. Doc, when can he go back in the game? *Instr Course Lect*, 2009;58:437-443.
5. Short SE, et al. The relationships among three components of perceived risk of injury, previous injuries and gender in contact sport athletes. *Athl Insight*. 2004;6(3):78-85.
6. Wilson RW, Gansneder BM. Measures of function limitation as predictors of disablement in athletes with acute ankle sprains. *J Orthop Sports Phys Ther*. 2000;30:528-535.
7. Wilson RW, et al. Reliability and responsiveness of disablement measures following acute ankle sprains among athletes. *J Orthop Sports Phys Ther*. 1998;27:348-354.
8. Williams GN, et al. Evaluation of the sports ankle rating system in young, athletic individuals with acute lateral ankle sprains. *Foot Ankle Int*. 2003;24:274-282.