

## Functional Return to Play after Surgical Treatment of Lower-Extremity Injuries using Global Positioning System Profiles in Elite College Football Players

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**Introduction/Purpose:** Return to sport criteria after surgical treatment of lower extremity injuries are highly variable and without consensus. Thigh measurements assessing atrophy, single-leg hop testing and isokinetic strength measurements are commonly used metrics when considering return to sport after surgical treatment of lower-extremity injuries. Yet, these modalities are limited in scope, as they do not fully or accurately evaluate functional movements required in elite athletics. Alternatively, using new Global Positioning System (GPS) technology, a wide breadth of functional movements can be tracked for each athlete, which can be used as a comparative self-control in the event of an injury. This data proposes a more comprehensive, dynamic and longitudinal comparison of athlete performance, which may more accurately reflect functional return to sport in elite athletes after surgery.

**Methods:** Over a three-year period, GPS data was collected on thirteen elite American College Football players at a single FBS Subdivision University. A total of 300 data points per athlete were collected for every practice, scrimmage and game starting in spring prep and extending through regular season, and post-season play. A total of 5.7 million data points including total distance traveled, average and maximum velocity, acceleration profiles, and explosive change of direction through inertial movement analysis were prospectively collected and analyzed. Individual pre-injury GPS functional profiles for each of the thirteen athletes were used as baseline, healthy comparisons, and functional recovery was determined prospectively during return to play progression after lower extremity surgery. Return to sport was allowed when post-operative GPS profiles demonstrated equivalence or superiority of all parameters compared to pre-injury measurements.

**Results:** All thirteen players returned to sport after all measured parameters were equal to or greater than pre-injury levels.

**Conclusion:** Modern GPS technology employed during preseason, regular season and post-season establishes an individualized, baseline, profile of lower-extremity function which allows for postoperative comparison and prospective assessment of safe return to play in elite football players.

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