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The Application of a Return-to-Performance Pathway for an International Soccer Player Recovering From Ankle Syndesmosis Stabilization in Time for the 2022 FIFA World Cup. A Case Report

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A 26-year-old male international soccer player suffered a West Point Ankle Grade III syndesmosis injury leading up to the 2022 Fédération Internationale de Football Association (FIFA) World Cup. After surgical stabilization, the player completed an 11-phase return-to-performance pathway designed to ensure rapid and safe return to play. The pathway employs distinct phases that incorporate clinical, psychological, and sports-specific criteria to inform decision-making throughout the process. In this case report, we outline the phases and criteria used in conjunction with shared decision-making by the interdisciplinary team to ensure a successful return to play at the highest level. The effectiveness of this pathway was demonstrated by the player competing at the 2022 FIFA World Cup.

Key Words: professional soccer, criteria based, interdisciplinary team

Key Points

- Unstable ankle syndesmosis injuries can be effectively managed by surgical stabilization and adherence to a progressive rehabilitation pathway.
- For a professional soccer player undergoing rehabilitation, protocols should be evidence-based and objective rather than time based.
- Communication between the interdisciplinary team and player was central to all decisions made during the completion of the return-to-performance pathway.

Playing in a World Cup is a dream for any player, and suffering a complex syndesmosis injury requiring surgery before competing presents catastrophic psychological and physical trauma. In professional soccer, ankle injuries account for 13% of all soccer injuries, with 7% of these believed to involve the syndesmotic complex.[1] This may well be an underestimation, as syndesmotic injuries are often misdiagnosed as ankle sprains. Currently, consensus is lacking on surgical management, a valid rehabilitation regimen, and objective criteria to be met before returning to play.[2] These factors can contribute to inadequate rehabilitation, premature return to play, and reinjury.[3] This mismanagement of syndesmosis injuries can lead to residual pain, decreased performance, prolonged recovery times, and adverse psychological effects.[4] However, by carefully considering all available options, following criteria-based progressions, and working collaboratively with the interdisciplinary team (IDT), athletes can make informed decisions about their recovery and return to play.[5]

To help overcome these problems, in this report, we use the previously cited return-to-performance (RTP_{erf}) pathway by Mitchell and Gimpel to manage the recovery and preparation of this player for participation in the 2022 Fédération Internationale de Football Association (FIFA) World Cup.[6] The pathway serves as a rehabilitation framework (Figure 1) with clear progressions and objective criteria to guide decision-making throughout its phases. On completing acute management, normal movement patterns are restored, along with strength, endurance, power, and injury-specific function. Objective profiling is then conducted to determine readiness to return to running. Once running, players are reintroduced to on-field sports-specific actions.

Players progress through 6 phases, starting with a reloading phase (Grass Phase 1) and moving to more intensive actions (Grass Phase 2), followed by maximum speed and positional drills (Grass Phase 3). Once they have completed these 3 initial grass phases, players resume competitive team training (Grass Phase 4) before returning to play in competitive matches (Grass Phase 5). Once players have reached or exceeded the previous injury metrics with no match restrictions, they have reached true RTP_{erf} (Grass Phase 6). At this point, players are not viewed as injured, as they have achieved full RTP_{erf}. This approach ensures a comprehensive and effective rehabilitation process.

The purpose of this case report is to describe how an international soccer player, after a syndesmosis stabilization, successfully progressed through a RTP_{erf} pathway using objective criteria and shared decision-making to return to play at the 2022 FIFA World Cup.

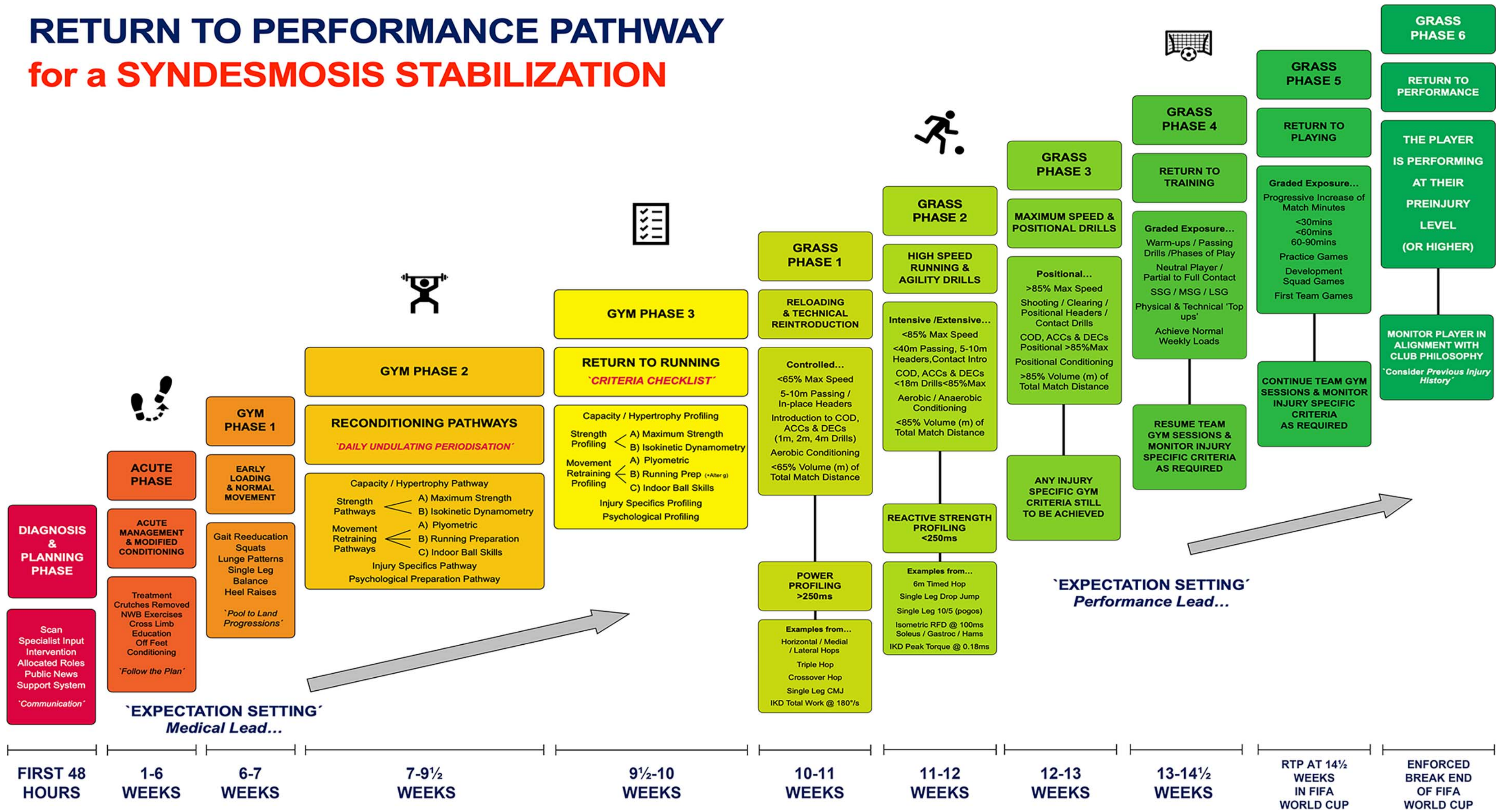

Figure 1. Return-to-performance pathway for a syndesmosis stabilization. Abbreviations: ACCs, accelerations; CMJ, countermovement jump; COD, change of direction; DECs, decelerations; Hams, hamstrings; LSG, large-sided games; Max, maximum; MSG, medium-sided games; NWB, nonweight bearing; RFD, rate of force development; SL, single leg; SSG, small-sided games.

Figure 2. Highlights the injury mechanism of forced hyperdorsiflexion and external rotation, which account for 74% of all syndesmosis injuries.

CASE PRESENTATION

This 26-year-old professional soccer player was playing in a match when he was tackled by an opponent, forcing his left ankle into a hyperdorsiflexed and externally rotated position (Figure 2). This mechanism of contact injury from an opponent accounts for 74% of all cases, causing external rotation of the talus with posterior and lateral displacement of the fibula.[1] Ligamentous stability is provided by the anterior inferior tibiofibular ligament (TFL; 35%), interosseus TFL (25%), and a combination of the posterior inferior TFL and inferior transverse TFL (45%).[7] With increased displacement, the anterior inferior TFL tears, followed by the interosseus TFL, and finally, the posterior inferior TFL and inferior transverse TFL, as in this case.[8] After the tackle, the player was immediately removed from the field of play for clinical assessment.

From the outset, the player presented with classic signs and symptoms of syndesmosis injury. Accurate diagnosis from a solidarity test is not possible; rather, a combination of tests, such as a positive squeeze test, dorsiflexion external rotation stress test, and palpatory tenderness, was used.[9] The player was immediately immobilized in an Aircast boot (DJO Global). The following day, magnetic resonance imaging was performed to assess the structural damage as well as dynamic ultrasound to observe functional joint diastasis. Using the West Point Ankle Grading System, the player was diagnosed with a Grade III injury (unstable with complete disruption of all syndesmotic ligaments with frank diastasis).[10] A shared decision-making process was undertaken by members of the IDT (Table 1), with the player electing for surgical stabilization if his World Cup dream was to be fulfilled.[5]

Intervention

The surgical procedure consisted of the insertion of a 3.5-cm syndesmotic screw parallel to the joint. The ankle was maintained in a dorsiflexion-neutral position as the screw was inserted through the lateral fibula into the tibia to ensure anatomical fixation of the distal tibiofibular joint. The player was immobilized in an Aircast boot with nonweight bearing for 2 weeks to promote healing and reduce pain and swelling. Weight bearing up to 25% of body weight (player self-assessment) was allowed for the following 2 weeks, before progressing to full weight bearing for weeks 5 and 6. During this time, the first psychological checkpoint was completed. At 6 weeks, the screw was removed, and the player weaned off crutches.

The first 6 weeks incorporated the acute management and modified conditioning phase of the RTP_{erf} pathway. The player used cryotherapy and compression along with effleurage massage from the therapist to reduce edema. Active range of motion exercises in all planes were started after 2 weeks, avoiding excessive dorsiflexion and external rotation. Disuse atrophy

Table 1. Members of the IDT and Their Role in the Decision-Making Process During the RTP_{erf} Pathway

IDT Member	Role in Decision-Making
Surgeon	Provides an overall timeline of recovery in the diagnosis and planning phase. Conducts examinations at key check points, eg, acute phase, return-to-running phase (Gym Phase 3), and return-to-training phase (Grass Phase 4), ensuring surgical readiness to progress to the next phase of the RTP_{erf} pathway.
Team doctor	Gathers information from all IDT members to make final decisions and recommendations during all phases of the RTP_{erf} pathway.
Physical therapist	Provides clinical feedback on the player's responses (see Table 2) to daily load.
Athletic trainer	Provides exercise related feedback on the player's movement proficiency and data collected during the RTP_{erf} pathway.
Performance athletic trainer	Provides performance-related feedback on the player's grass-based profiling. This starts from Grass Phase 3 (maximum speed and positional drills) and is completed in each phase back to performance (Grass Phase 6).
Psychologist	Provides psychological feedback on the player at 4 key check points in the RTP_{erf} pathway.
Head coach and coaching team	Decides on the types of training that can be completed during the return-to-training phase (Grass Phase 4) and the progression of match minutes during the return-to-playing phase (Grass Phase 5), offering performance-related judgments.
Club management	Balancing the implications of the player's injury within the overall structure and policy of the football club.

Abbreviations: IDT, interdisciplinary team; RTP_{erf}, return to performance.

Table 2. **Supplementary Clinical, Physical, and Psychological Criteria Used to Safely Progress Through the Phases of the Return-to-Performance Pathway**[a]

Clinical	Physical	Psychological
• Must not experience an increase in injury-specific pain (>2–4/10 on a visual analog scale). • Must not experience an exacerbation of swelling levels (limb girth measurements [cm]) suggesting excessive loading.	• Must demonstrate movement proficiency. • Assessed visually to ascertain no loss of balance, contralateral hip drop, ipsilateral knee valgus, or any excessive trunk movement.	• Must not experience fear. • Must not experience anxiety. • Use of the global rating scale from 0% to 100% on a daily and sessional basis. • A score of 0% being the feeling of an inability to start the next progression and 100% being complete confidence to start the next progression.

[a] Experience from the interdisciplinary team suggests that the premature exit of a phase leads to recurrent episodes of swelling, increases in pain, and compensatory movement strategies that reduce players' well-being and overall confidence.

was minimized using neuromuscular electrical stimulation and isometric exercise. Manual resistance training at low intensities (15–20 seconds × 3 repetitions × 2–3 sets at 25% maximal voluntary contraction [MVC]) has been shown to decrease pain and increase MVC.[11] Similarly, the use of contralateral limb cross-education strength and single-leg (SL) plyometric activities was performed early to minimize detraining.

At 6 weeks, the screw was removed, and the player started Gym Phase 1 (early loading and normal movement retraining). This began in the pool, with gait reeducation patterns and heel raise exercises aimed at restoring neuromuscular control and coordination. Subsequent progressions were gym based, with restoration of normal gait and fundamental exercises including double-leg squats, lunge patterns, and rudimentary SL balance activities.[12]

Alongside the above exercises, isometrics became an increasingly key theme. Exercise positions in this phase became more functional. The gastrocnemius was targeted with SL heel raises in near terminal knee extension to mimic the stance of running. To target soleus and mimic accelerations (ACCs) and decelerations (DECs), the exercises were performed in greater than 90° of knee flexion. Throughout both examples, the heel was elevated off the ground, maintaining an isometric position to maximize force production in the calf. Longer durations of up to 30 seconds × 4 repetitions × 2–3 sets at 60%–80% MVC were used to stimulate hypertrophy.[11] To exit this and the remaining phases of the RTP_{erf} pathway, the player must have met the specific phase criteria as well as the supplementary, clinical, physical, and psychological criteria (Table 2).[6]

Once the player was proficient in gait and the basic movement patterns of Gym Phase 1, he commenced Gym Phase 2. This phase lasted 2.5 weeks, as the player progressed step by step through the multiple reconditioning pathways (Figure 1). Inevitably reconditioning the calf was a priority because of atrophy resulting from the restricted weight bearing in the first 6 weeks. Calf exercises ranged from heel raises (gastrocnemius and soleus), heel walks, ankling patterns (alternate plantarflexing and dorsiflexing each foot in a modified straight-leg cycling fashion, landing on the forefoot, and immediately propelling himself vertically and forward), wall drill patterns, and light-weight-sled pushing exercises. The IDT decided on daily undulating periodization, involving a 3-day cycle. Day 1 consisted of primarily strength, day 2 was more focused on hypertrophy and capacity, and the third day was used as a recovery day.[13,14]

On strength days, low volumes were used (3–5 repetitions × 3–5 sets); this was also represented in the strength-based isometric variables (3–5 seconds × 5 repetitions × 2–3 sets at 80%–100% + MVC) biasing maximal force production to enhance strength gains.[11] Conversely, hypertrophy and capacity days involved high volumes (10–20 + repetitions × 3–5 sets) in the conventional exercises and longer durations in the isometric exercises (30 seconds × 4 repetitions × 2–3 sets at 60%–80% MVC). After progressing along the reconditioning pathways of Gym Phase 2, the player was profiled in the return-to-running criteria (Gym Phase 3) at weeks 9.5–10 to determine his readiness to run.

From the outset of the rehabilitation process, players often ask the IDT when they can start running again. Gym Phase 3 profiled the player in multiple themes that support running and the initiation of low-intensity sports-specific activities in Grass Phase 1.

Capacity profiling assessed the player's capability to perform SL heel raises (gastrocnemius and soleus), hamstring bridges (in 90° and 30° of knee flexion), and squats to fatigue. Strength was assessed through 3–5 repetition maximum testing in the posterior chain (hamstring bridge, Nordics) anterior chain (leg press, rear foot elevated split squat), and isometric profiling of the gastrocnemius and soleus (Figure 3). Indoor ball skills were incorporated early, aiding motivation and the relearning of simple sports-specific patterns. The player also completed a 20-minute running preparation session including 1000 single-foot ground contacts along with an additional antigravity treadmill running session at 95% body weight. To restore the elastic components of the ankle complex, plyometrics were introduced early and continued to be assessed at this point in the form of a hop battery and force plate jumping techniques (Table 3).[6]

At the second psychological checkpoint (10 weeks postsurgery), the player's confidence (>80%) to progress to Grass Phase 1 matched profiling results of the key themes described above (Figure 3).

At 10 weeks, the player started Grass Phase 1 (reloading and technical reintroduction) with low-intensity pitch length runs (100 m), box-to-box runs (70 m), and soccer-specific dribble circuits such as the Hoff drill (≤65% of his maximum speed). These running variations, coupled with simple passing (0–10 m), ball manipulations, and in-place heading drills, were performed to enhance motivation, confidence, and skill retraining.

Accelerations and DECs were introduced (≤65% of his maximum intensity) but confined to small spaces (≤4 m), limiting any exposure to high-speed running or high-intensity ACCs and DECs.[15] Live data monitoring (global positioning system [GPS]) was used throughout to allow instant player

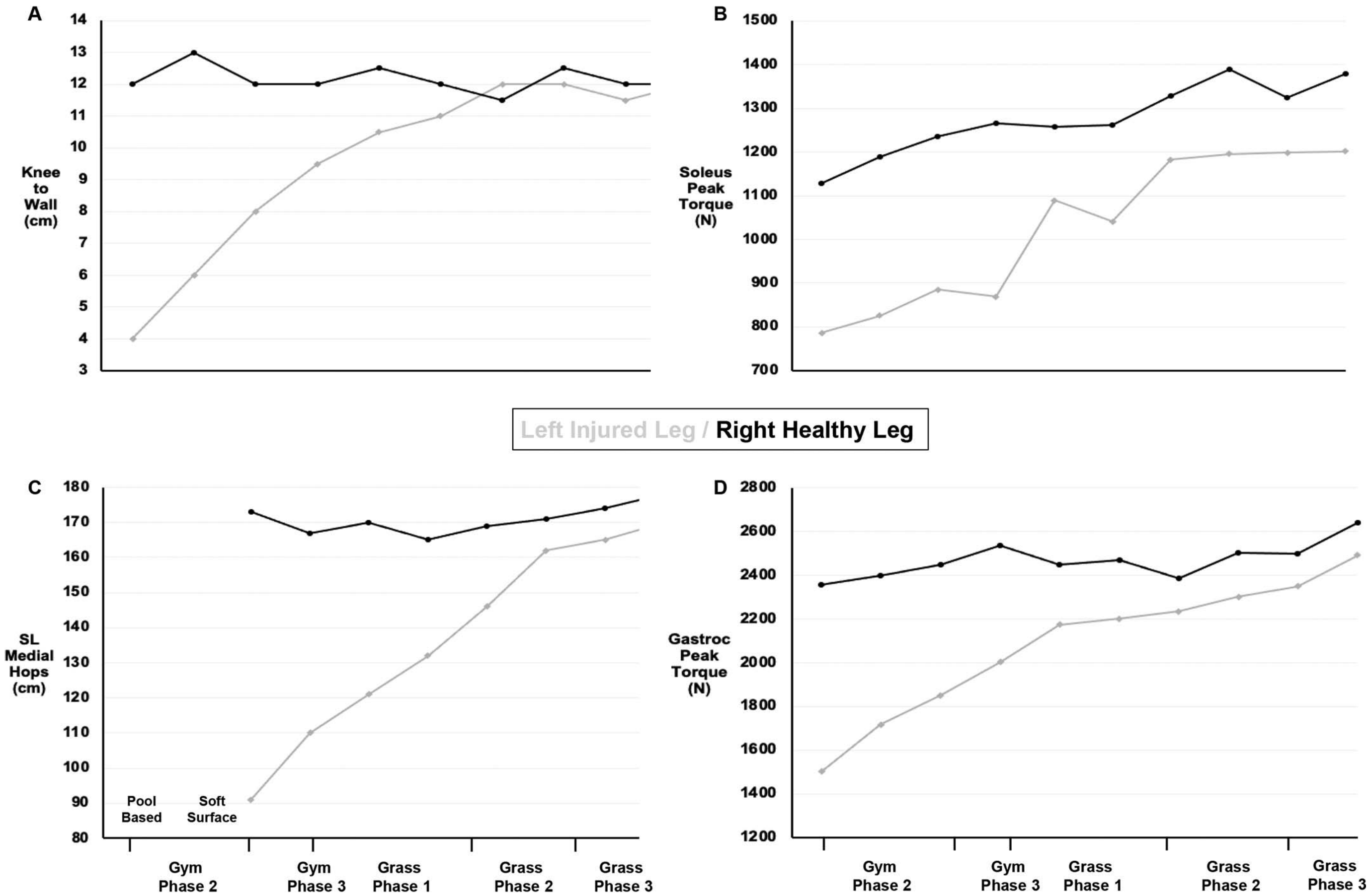

Figure 3. Demonstrates the monitoring of key objective criteria during the return-to-performance pathway. A, Ankle dorsiflexion range of movement in the knee-to-wall test. B, Seated (soleus) unilateral plantarflexion peak torque scores. C, Medial hop scores. D, Standing (gastrocnemius [gastroc]) unilateral plantarflexion peak torque scores.

and practitioner feedback, helping inform decisions regarding the progression of the session distances from 2.5 to 3.5 to 4.6 km (Table 3). In addition, the player continued to progress key gym-based metrics (Table 3), with particular attention paid to the medial hop for distance (Figure 3). During the landing phase of this technique, shock absorption occurs through dorsiflexion and external rotation.[16] This test mimics the injury biomechanics; therefore, clearing this provided substantial confidence to the player.

At 11 weeks, the player transitioned into Grass Phase 2, completing high-speed running and intensive agility drills (including exercises with reactive decision-making). Throughout weeks 11 to 12, the speed and intensity of these exercises were increased as measured by GPS. The player was continually monitored for a change in his symptoms with daily monitoring of the supplementary criteria (Table 2). In this phase, running speeds were progressed but limited to a maximum of $\leq$85% of the player's maximum speed. Acceleration and DEC actions were progressed by gradually increasing drill distance from 4 to 18 m, which has been shown to increase the intensity of these types of actions.[15] Similarly, the passing distances (10–20 to 30–40 m) and heading distances (0–5 to 5–10 m) increased, helping to replicate more sport-specific actions. In the gym, reactive strength (contraction times <250 milliseconds) metrics were the final parameter to be profiled. This specifically included the SL drop jump and 10/5 repeated jumps (Table 3).[17,18]

From weeks 12 to 13, the player completed the maximum speed and positional drills of Grass Phase 3. Drills were more chaotic and highly variable, often enhanced by the support of a technical coach or additional players. Defending drills involving positional heading, clearing, and blocking movements were incorporated. The player reached 95% of peak speed, 92% of peak ACCs intensity, and 84% of peak DECs intensity (Table 3). In the gym, he continued to work on strength (gastrocnemius and soleus isometric exercises), power, and reactive strength exercises (Table 3), seeking further improvements and for prophylaxis. The player expressed >90% confidence at the third psychological checkpoint to resume team training (Grass Phase 4) in week 13.

Comparative Outcomes

At 13 weeks, the player resumed team training (Grass Phase 4), which consisted of passing drills, phases of play, and small (4 versus 4), medium (5 versus 5 to 8 versus 8), and large (9 versus 9 to 11 versus 11) practice games (9 versus 9 to 11 versus 11). Underpinning the player's performance were the respective grass- and gym-based metrics (Figure 3, Table 3). After 10 days of team training (Grass Phase 4), the player returned to play for 45 minutes in a pretournament match (Grass Phase 5) before RTP_{erf} in subsequent matches of the 2022 FIFA World Cup (Grass Phase 6). Unfortunately, due to team elimination from the competition, he endured a forced break before actively resuming regular club matches (Grass Phase 6) and his final psychological checkpoint without any further problems.

Table 3. Grass and Gym-Based Metrics Collected During Gym Phase 3 (Return to Running) and the Subsequent Grass Phases

Phase	Gym Phase 3 Return-to-running criteria checklist	Grass Phase 1 Reloading and technical reintroduction	Grass Phase 2 HSR and agility drills	Grass Phase 3 Maximum speed and positional drills	Grass Phase 4 Return to training	Grass Phase 5 Return to playing	Grass Phase 6 Return to performance
Metrics	9.5–10 wk	10–11 wk	11–12 wk	12–13 wk	13–14.5 wk	RTP at 14.5 wk in FIFA World Cup	Enforced break, end of FIFA World Cup
Grass criteria							
Total m (in 1 session)	2500 (antigravity treadmill)	4673 (45%)	6173 (59%)	6574 (63%)	7020 (67%)	5902 (57%)	Enforced break
HSR m (>19.8 km/h)	0 (0%)	0 (0%)	299 (57%)	475 (90%)	420 (79%)	588 (111%)	
Peak speed (km/h)	12 (35%)	18.8 (54%)	28.9 (83%)	33 (95%)	32.2 (93%)	33.6 (97%)	
Sprint m (>25.2 km/h)	0 (0%)	0 (0%)	83 (44%)	164 (87%)	166 (88%)	110 (59%)	
ACCs medium (2–3 m/s^2)	Player completed indoor balls skills and ABCs running preparation patterns	4 (7%)	29 (52%)	24 (43%)	29 (52%)	49 (88%)	
ACCs high (3–4 m/s^2)		2 (7%)	25 (86%)	41 (141%)	21 (72%)	25 (86%)	
ACCs very high (>4 m/s^2)		0 (0%)	7 (88%)	9 (113%)	11 (138%)	6 (75%)	
Peak ACC (m/s^2)		3.6 (64%)	4.4 (78%)	5.2 (92%)	5.2 (93%)	NA	
DECs medium (2–3 m/s^2)		2 (4%)	14 (29%)	23 (48%)	25 (52%)	37 (77%)	
DECs high (3–4 m/s^2)		3 (8%)	17 (47%)	25 (69%)	17 (47%)	21 (58%)	
DECs very high (>4 m/s^2)		0 (0%)	9 (64%)	11 (79%)	7 (50%)	5 (36%)	
Peak DEC (m/s^2)		3.48 (48%)	5.4 (75%)	6.1 (84%)	5.8 (80%)	NA	
No. sessions in 1 wk	4	4	5	5	5	6	
Gym criteria							
Horizontal hop (cm)						Player participating in the FIFA World Cup	Enforced break
L	162 (78%)	180 (87%)	205 (99%)	202 (98%)	199 (96%)		
R	203 (98%)	199 (96%)	201 (97%)	204 (95%)	208 (100%)		
Triple hop (cm)							
L	500 (67%)	545 (73%)	605 (81%)	641 (86%)	642 (86%)		
R	723 (97%)	704 (95%)	714 (96%)	728 (86%)	738 (99%)		
Lateral hop (cm)							
L	106 (66%)	127 (79%)	148 (93%)	152 (95%)	156 (98%)		
R	156 (98%)	155 (97%)	161 (101%)	162 (95%)	158 (99%)		
SL CMJ (jump height, cm)							
L	25.2 (89%)	24.9 (88%)	26.2 (93%)	26.7 (95%)	28.1 (100%)		
R	32.3 (115%)	32.1 (114%)	32.9 (117%)	32.4 (74%)	31.6 (112%)		
SL drop jump (jump height, cm)							
L	17.8 (74%)	18.9 (78%)	20.5 (85%)	20.9 (86%)	21.1 (87%)		
R	23.1 (95%)	22.9 (95%)	22.2 (92%)	24.1 (100%)	24.5 (101%)		
SL drop jump RSI (m/s)							
L	0.59 (79%)	0.63 (84%)	0.69 (92%)	0.73 (97%)	0.71 (95%)		
R	0.7 (93%)	0.82 (109%)	0.88 (117%)	0.81 (88%)	0.8 (107%)		
SL 10/5 repeated jumps (RSI mean)							
L	0.98 (60%)	1 (62%)	1.17 (72%)	1.21 (75%)	1.2 (74%)		
R	1.54 (95%)	1.6 (99%)	1.47 (91%)	1.54 (95%)	1.6 (99%)		

Abbreviations: ACCs, acceleration; CMJ, countermovement jump; DECs, deceleration; FIFA, Fédération Internationale de Football Association; HSR, high-speed running; NA, not available; RSI, reactive strength index; RTP, return to play; SL, single leg.

[a] Scores in brackets for the grass criteria are the absolute values attained, expressed as a percentage of match values. Scores in brackets for the gym-based criteria are the left leg (injured leg) scores expressed as a percentage of the highest preinjury score of either the right or left leg.

DISCUSSION

The most significant outcome of this case report was the player's successful RTP_{erf} at the 2022 FIFA World Cup. The purpose of this case report is to describe how an international soccer player, after stabilization of syndesmosis, progressed through the RTP_{erf} pathway using objective criteria and shared decision-making to successfully return to play. Syndesmosis injuries can be potentially problematic owing to the lack of consensus on surgical management and rehabilitation protocols.[2] Surgical stabilization is often performed with a transsyndesmotic screw, which undoubtably provides stability but poses problems due to the 6 weeks of nonweight bearing, such as muscle atrophy and limb deconditioning. In this case, screw removal was advocated at 6 weeks to avoid breakage before full weight bearing.[19] This safe approach provides inherent joint stability but at the cost of delayed weight bearing, as opposed to dynamic fixation, which advocates weight bearing at 10 days to 3 weeks.[10,20]

This marked difference in surgical approach results in altered return-to-play times in professional soccer, as screw fixation can take 120–180 days compared with 103 (±28) days in cases of dynamic stabilization.[10,21] Irrespective of the technique used, the lack of consensus on rehabilitation protocols and outcome measures poses a problem for the IDT working in a high-pressure sporting environment. This lack of criteria has historically led to the use of time-based protocols, as opposed to this case, which promoted a balance of clinical, psychological, and sports-specific parameters at all times to inform decisions.[22]

From the outset of this recovery process, time was an issue due to the FIFA World Cup, but certain factors aligned to optimize the process. Firstly, despite the initial fixed 6-week immobilization, all subsequent progressions of the RTP_{erf} pathway were criteria based and independent of time. Within this pathway, the player had to meet injury-specific psychological (Table 2), clinical (for example, Table 2, and knee-to-wall, Figure 3), and sports-specific (Table 3, Figure 3) criteria. Secondly, the player was highly motivated to meet the criteria presented at each stage. Player education, explaining the link between the exercises and the player's performance on the pitch, further increased his motivation and desire to maximize each repetition. Third, access to gold-standard equipment (neuromuscular electrical stimulation, isokinetic dynamometry, force plate technology, and GPS) allowed the exercises to progress and regress according to the player's responses as he strived to achieve the criteria. Even in settings with limited resources, low-tech options (tape measure, stopwatch, iPhone camera, and apps) can still provide objectivity to ensure that the progression through the phases of the RTP_{erf} pathway is criteria based. Finally, the collaboration and clear communication between the members of the IDT and the player ensured shared decision-making at all points to accelerate recovery in the safest way possible to achieve the desired outcome (Table 1). Communication and coordination may need to be further exercised in smaller IDTs in which external providers are sourced to provide expertise and services outside of the club setting.

CLINICAL BOTTOM LINE

Currently, consensus is lacking regarding surgical management, a rehabilitation regimen, and outcome measures surrounding return to play after syndesmosis injury. In this report, we outlined how a professional soccer player was effectively managed through surgical stabilization and adherence to a progressive rehabilitation pathway. Throughout the process, the player achieved all necessary clinical, psychological, and sports-specific criteria to fulfill his ultimate goal of playing in the 2022 FIFA World Cup. This aggressive approach after surgical stabilization was supported by the IDT's shared decision-making to ensure a positive outcome.

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