



Rehabilitation After Hip Arthroscopy

Steve Stalzer, MSPT, Michael Wahoff, PT, Molly Scanlan, MSPT, OCS, and Pete Draovitch, PT

Management of hip injuries has evolved significantly in recent years with the advancement of arthroscopic techniques. These recent surgical advances require establishment of rehabilitation protocols that follow several basic principles including: (1) consideration of soft-tissue healing constraints, (2) control of swelling and pain to limit muscular inhibition and atrophy, (3) early range of motion (ROM), (4) limitations on weight bearing, (5) early initiation of muscle activity and neuromuscular control, (6) progressive lower extremity strengthening and proprioceptive retraining, (7) cardiovascular training, and (8) sport-specific training. The following protocols should not be considered a cookbook approach to rehabilitation, but rather guidelines that are used to achieve consistent outcomes. These guidelines will continue to evolve as we learn more about the hip joint and surrounding musculature.

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The management of hip injuries has evolved significantly in recent years with the advancement of arthroscopic techniques. The application of minimally invasive surgical techniques has facilitated relatively rapid returns to sporting activity in both recreational and elite athletes.¹ These recent surgical advances require establishment of rehabilitation guidelines that consider the constraints of soft-tissue healing while advancing patients as rapidly and safely as possible.

Although rehabilitation guidelines after hip arthroscopy continue to evolve, the overall goal remains to return the patient to a preinjury level of activity. This involves restoration of normal range of motion, gait, and strength to allow return to functional activity. In the athlete, the rehabilitation program must also focus on restoration of power, speed, and agility for optimal return to competition.

Repaired tissue must be properly protected to allow healing and to prevent excessive stress on tissue. However, prolonged immobilization is not desired because of the numerous deleterious effects, including muscle atrophy, articular cartilage degeneration, ligament strength loss, and excessive adverse collagen formation.²⁻⁹ Rehabilitation protocols need to follow several basic principles including (1) consideration of soft-tissue healing constraints, (2) control of swelling and pain to limit muscular inhibition and atrophy, (3) early range of motion (ROM), (3) limitations on weight bearing, (4) early

initiation of muscle activity and neuromuscular control, (5) progressive lower extremity strengthening and proprioceptive retraining, (6) cardiovascular training, and (7) sport-specific training.

When multiple surgical procedures are performed, the most conservative approach for each aspect of rehabilitation should be used. Protocols should not be considered a cookbook approach to rehabilitation, rather guidelines that are used to achieve consistent outcomes. These guidelines will continue to evolve as we learn more about the basic science and biomechanics of the hip.

The following sections are meant to provide guidance during rehabilitation after common arthroscopic hip procedures. The exact time lines may vary based on the progression of each patient; however, the basic principles of rehabilitation should be strictly followed

Labral Repair

Specific rehabilitation guidelines after labral repair must take into consideration the location and size of the repair. The majority of labral tears occurring in the North American population are located on the anterior superior region of the labrum; the following rehabilitation guidelines are specific to these repairs (Appendix 1).^{1,10-12}

Intraoperative analysis reveals that ranges of motion that do not stress the labrum are: 0° to 90° flexion, 0° to 25° abduction, and 0° to 25° external rotation (Philippon MJ, personal communication, June 2005). Postoperatively, patients are instructed to limit ROM as follows: 25° of abduc-

Howard Head Sports Medicine Center, Vail, CO.

Address reprint requests to Steve Stalzer, MSPT, Howard Head Sports Medicine, 181 West Meadow Drive, Vail, CO 81657. E-mail: stalzer@vvmc.com



Figure 1 Quadruped rocking. (Color version of figure is available online.)

tion for 3 weeks, gentle external rotation and extension for 3 weeks, and 90° of flexion for 10 days. A brace can be used to maintain these motion restrictions and protect the surgical site for 10 days. Swelling and pain are controlled through the use of ice and nonsteroidal anti-inflammatory drugs (NSAIDs).



Figure 2 Standing hip internal rotation. (Color version of figure is available online.)



Figure 3 Sidelying clams. (Color version of figure is available online.)

Early ROM is initiated to restore joint motion and prevent tissue scarring in the joint. ROM is started the day of surgery using a continuous passive motion (CPM) machine, passive ROM exercises, and stationary bicycling. The CPM is used 8 to 12 hours per day for 4 weeks. Passive ROM should focus on restoring internal rotation, flexion, and progressive stretching of the piriformis. Stretching of the iliopsoas is initiated at the start of week 2 (day 8). Stationary bicycling with minimal resistance is done for 20 minutes daily starting the day of surgery.

Weight bearing is limited to foot flat weight bearing (20 lb) for 2 weeks. Aquatic walking with the use waterproof dressings in chest deep water can be initiated on postoperative day 1. Early ambulation in the pool allows patients to work on gait symmetry in an unweighted environment.

Initial strengthening needs to focus on the gluteus medius and core stabilizers while avoiding labral stress. Isometric strengthening of the gluteals, quadriceps, hamstrings, and transverse abdominals is initiated on the day of surgery. Quadruped rocking (Fig. 1), active internal rotation (Fig. 2), and hip isometrics are initiated at week 2. Sidelying clams (Fig. 3), bridging (Fig. 4), 3-way leg raises (Fig. 5), and short-lever hip flexion (Fig. 6) are initiated at week 3. Straight leg



Figure 4 Double-leg bridging. (Color version of figure is available online.)



Figure 5 Three-way leg raises. (Color version of figure is available online.)

raises, one-third knee bends (Fig. 7), and double-leg cord rotations (Fig. 8), are initiated at week 4.

Advanced strengthening and proprioceptive exercise should be progressed once the patient is full weight bearing. Rotational and lateral movements should be emphasized throughout this stage. Single-leg stance on a Dyna Disc (Ex-



Figure 6 Short-lever hip flexion. (Color version of figure is available online.)

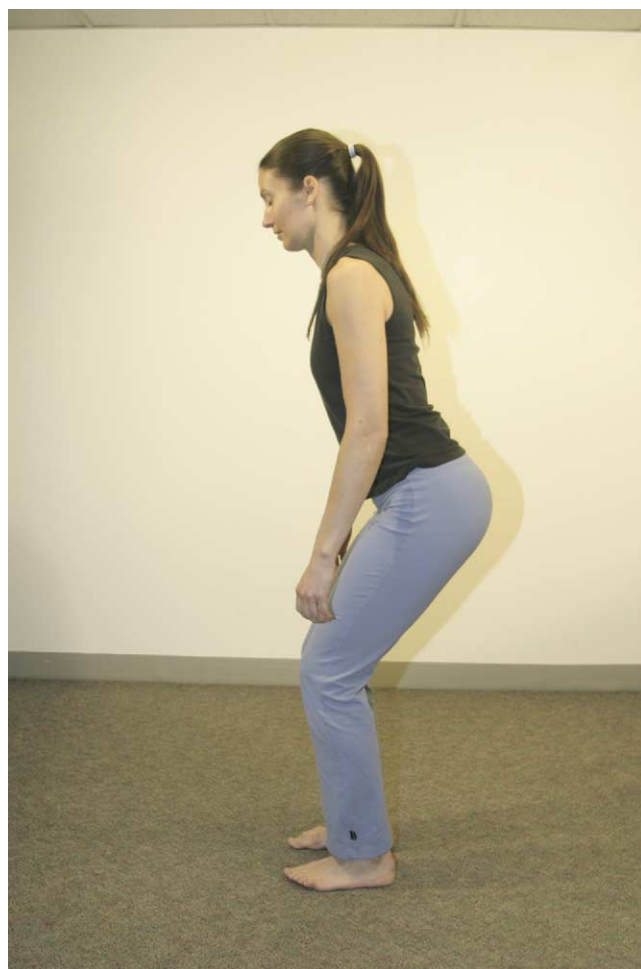


Figure 7 Double one-third knee bends. (Color version of figure is available online.)

ertools, Novato, CA) (Fig. 9), advanced bridging (Fig. 10), side bridging (Fig. 11), single-leg cord rotations (Fig. 12), sidestepping with resistance (Fig. 13), skaters on Pilates reformer (Fig. 14), and single-knee bends (Fig. 15) are initiated at week 5. Lunges, single-leg windmills (Fig. 16), and lateral agility exercises (Fig. 17) are added at week 6.

Cardiovascular fitness is achieved through the use of a stationary bike with resistance at week 3; the elliptical machine and stairclimber are added at week 5. Sport-specific training is initiated between weeks 7 and 10. Return to competition is contingent on assessment of ROM, strength, power, and agility.

Chondroplasty

The focus of rehabilitation after chondroplasty or osteoplasty is to avoid impingement of the hip while restoring full ROM. In cases that involve significant shaving of the femoral neck, caution must also be taken to limit impact activities that may increase risk of femoral neck fracture during the first 8 weeks (Appendix 2 and 3).

Postoperatively, flexion is limited to 90° for 10 days to protect the joint from impingement. A brace is used for 10 days to limit

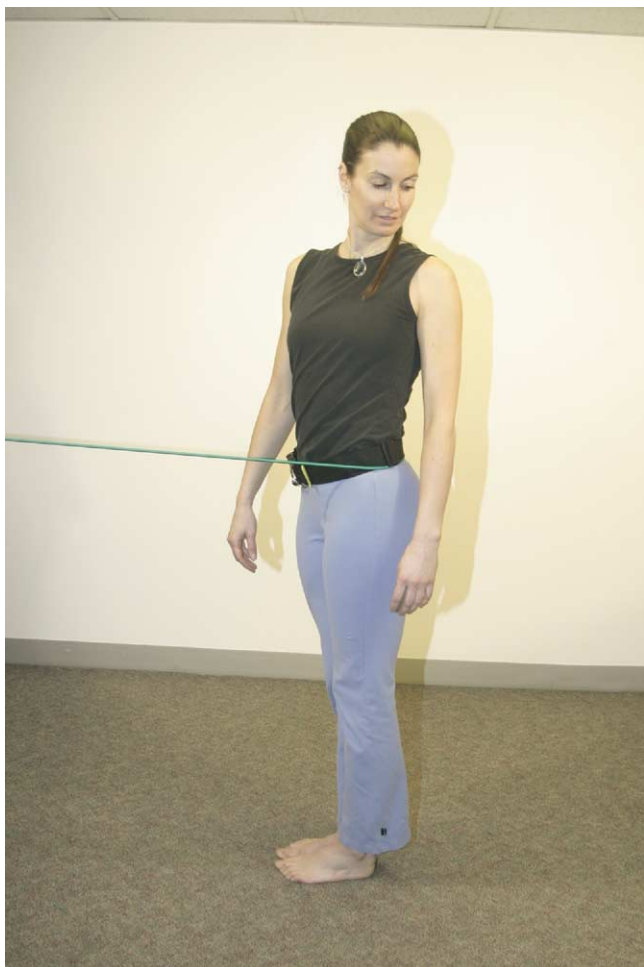


Figure 8 Double-leg cord rotations. (Color version of figure is available online.)



Figure 9 Dyna Disc: single-leg stance. (Color version of figure is available online.)

hip flexion and for protection in the case of a fall. Swelling and pain are controlled through the use of ice and NSAIDs.

Early ROM is initiated the day of surgery using the same methods as mentioned for a labral repair. As with labral repairs, weight bearing is limited to foot-flat weight bearing (20 lb) for 4 weeks, and aquatic walking can be initiated on postoperative day 1.

Initial strengthening is very similar to guidelines described for labral repairs. Strengthening should focus on the gluteus medius and core stabilizers while avoiding femoral acetabular impingement.

Advanced strengthening and proprioceptive exercise are progressed gradually from weeks 6 to 12. Emphasis is placed on rotational and lateral movements throughout this stage. Extra care should be taken to avoid impingement of the joint and inflammation of the iliopsoas.

Cardiovascular fitness is achieved through use of a stationary bike with resistance at week 5; the elliptical machine and stairclimber are added at week 7. Sport-specific training is initiated between weeks 13 and 17. Any deficits in ROM, strength, power, and agility should be addressed before returning to competition.

Microfracture

The rehabilitation program after microfracture for treatment of chondral defects is crucial to optimal recovery after surgery.¹³⁻¹⁵ Rehabilitation is designed to promote the ideal physical environment in which newly recruited mesenchy-



Figure 10 Advanced bridging. (Color version of figure is available online.)



Figure 11 Side supports. (Color version of figure is available online.)

mal stem cells from the marrow can differentiate into the appropriate articular cartilage-like cell lines.¹³ The size and anatomic location of the chondral lesion will determine the specific progression of rehabilitation.¹³⁻¹⁵

Postoperatively, flexion ROM is limited to 90° to protect the joint from postoperative impingement. A brace is used to



Figure 12 Single-leg cord rotations. (Color version of figure is available online.)



Figure 13 Side stepping. (Color version of figure is available online.)

aid in protecting the joint for 10 days. Swelling and pain are controlled through the use of ice and NSAIDs.

Early ROM is initiated the day of surgery using the same methods as mentioned for a labral repair. The CPM is used 8 to 12 hours per day for 6 to 8 weeks. Passive ROM should focus on all planes of motion, progressing flexion after 10 days.

Weight bearing is limited to foot-flat weight bearing (20 lb) for 6 to 8 weeks. As with the previously mentioned procedures, early ambulation in the chest deep water is important to maintaining gait symmetry in an unweighted environment.

The guidelines for initial strengthening are very similar to those described for labral repairs. During the first 6 to 8 weeks, strengthening should focus on the gluteus medius and core stabilizers while avoiding compressive or sheering forces at the microfracture site.

Advanced strengthening and proprioceptive exercise should be progressed slowly once the patient is full weight bearing. Impact activities should be added cautiously while the hip is monitored for swelling or pain.

Stationary biking with resistance is restricted until week 7 to avoid chondral stress during cardiovascular exercise. The elliptical machine and stairclimber are allowed at week 13.



Figure 14 Skaters. (Color version of figure is available online.)

The use of an upper body ergometer can be initiated immediately to maintain cardiovascular fitness. Sport-specific training is initiated between weeks 17 and 20. All high-impact activities such as running should be discussed with the physician before initiation.

Capsule Repair (Plication/Capsulorrhaphy)

The focus of rehabilitation after a capsular procedure is to protect the integrity of the repair after surgery. Exercise progression must limit capsule stress throughout the rehabilitation program. Motion restrictions are determined by the location of the repair (anterior versus posterior).

After an anterior capsule repair, extension and external rotation are limited to neutral for 3 weeks, followed by 3 weeks of gentle motion. At 4 weeks, it is believed that in the hip the cicatrix is formed and will not be subject to significant elongation.¹⁶⁻¹⁹ Foot wraps are used to maintain neutral hip rotation while the patient is in bed and out of the CPM for 3 weeks. Flexion ROM is limited to 90° to protect the joint from impingement for 10 days. A brace is used to aid in preventing capsule stress for 10 days. Swelling and pain are controlled through the use of ice and NSAIDs.



Figure 15 Single knee bends. (Color version of figure is available online.)

Early ROM is initiated on the day of surgery using the same methods as mentioned for a labral repair. The CPM is used 8 to 12 hours per day for 4 weeks. Passive ROM should initially focus on restoring internal rotation and flexion while avoiding extension and external rotation stresses.

Weight bearing is limited to foot-flat weight bearing (20



Figure 16 Single-leg windmills. (Color version of figure is available online.)



Figure 17 Side-to-side lateral agility. (Color version of figure is available online.)

lb) for 4 weeks, whereas aquatic walking in chest deep water can be initiated on the first postoperative day. To avoid capsule stretching, neutral rotation during ambulation is emphasized.

Initial strengthening is similar to guidelines described for labral repairs. During the first 5 weeks, strengthening should focus on the gluteus medius and core stabilizers while avoiding capsule stress. Advanced strengthening and proprioceptive exercise should be progressed at the sixth week. Care should be taken to avoid capsule stresses with rotational activities.

Cardiovascular fitness is achieved through the use of a stationary bike with resistance at week 3; the elliptical machine and stairclimber are added at week 9. Sport-specific training is initiated between weeks 13 and 17. Achieving a balance of joint stability and mobility is essential for a successful return to competition.

Summary

Rehabilitation after hip arthroscopy has not been well understood in the past. While surgical procedures continue to ad-

vance, athletes are already pushing the limits to return to competition as quickly as possible. As postoperative protocols evolve, it is essential to follow the basic guidelines of rehabilitation. Initially, soft-tissue healing constraints must be considered while focusing on controlling swelling and pain, restoring ROM, and preventing muscle atrophy. As physiological healing occurs, rehabilitation must address progressive lower-extremity strengthening, proprioceptive retraining, and sport-specific training.

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Appendix 1



Labral Repair

Dr. Marc Philippon
 Steve Stalzer, PT
 Michael Wahoff, PT

Patient Checklist	Initial Exercise	Week											
		1	2	3	4	5	6	7	9	13	17	21	25
Weightbearing: FFWB x 2 wks (Foot Flat = 20 lbs.)	Ankle pumps	●	●										
	Gluteal, quad, HS sets	●											
	Stationary biking with minimal resistance	●	●										
	Passive ROM (emphasize IR)	●	●										
	Supine passive heelslide	●	●										
	Supine hip roll IR	●	●										
	Quadriped rocking		●										
	Standing hip IR (stool)		●	●									
	T-abdominal isometrics	●	●										
	Hip abd/add isometrics		●										
	Uninvolved knee to chest		●	●									
	Piriformis stretch	●	●	●	●								
	Kneeling hip flexor stretch				●	●							
	Manual long axis distraction					●	●	●	●				
	Manual A/P mobs					●	●	●	●				
	Sidelying clams			●	●								
	Bent knee fall outs			●	●								
	DBL leg bridges w/tubing				●	●							
	3 way leg raises			●	●								
	Straight leg raises				●	●							
Double 1/3 knee bends				●	●								
Double leg cord rotations				●	●								
Advanced Exercises	1	2	3	4	5	6	7	9	13	17	21	25	
Dynadisc					●	●							
Advanced bridging (swiss ball, single leg)					●	●							
Side supports					●	●							
Single leg cord rotation					●	●							
Skaters/side stepping (Pilates or slideboard)					●	●							
Short lever hip flexion (seated)			●	●									
Single knee bends (lateral step downs)					●	●							
Single leg windmills						●	●						
Lunges						●	●						
Side to side lateral agility						●	●						
Fwd/Bkwd running with cord						●	●						
Aquatics	1	2	3	4	5	6	7	9	13	17	21	25	
Walking	●	●	●	●									
Aquajogging			●	●									
Swim with pole bouy			●	●									
Swimming with fins				●	●								
Bounding / plyometrics						●	●						
Cardiovascular Exercises	1	2	3	4	5	6	7	9	13	17	21	25	
Stationary biking with resistance			●	●	●	●	●	●	●	●	●	●	
Rowing, elliptical, stairclimber					●	●	●	●	●	●	●	●	
Running progression						●	●	●	●	●	●	●	
High Level Activities	1	2	3	4	5	6	7	9	13	17	21	25	
Initial agility drills							●	●	●	●	●	●	
Advanced agility drills								●	●	●	●	●	
Weights								●	●	●	●	●	
Golf								●	●	●	●	●	
Outdoor biking								●	●	●	●	●	
Running								●	●	●	●	●	
Hockey, football, soccer								●	●	●	●	●	
Time Lines: Week 1 (1-7 POD) Week 2 (8-14 POD) Week 3 (15-21 POD) Week 4 (22-28 POD)													

Appendix 2



Chondroplasty

Dr. Marc Philippon
Steve Stalzer, PT
Michael Wahoff, PT

Week

Patient Checklist	Initial Exercise	1	2	3	4	5	6	7	9	13	17	21	25
	Weightbearing: FFWB x 4 wks (Foot Flat = 20 lbs.) CPM: 4 wks Bledsoe Brace: 0 - 90° x 10 days ROM limits: Flex: 90° x 10 days Ext: No Limits Abd: No Limits ER: No Limits IR: No Limits Modalities: Massage, Active Release Technique, E-stim as needed starting week 3. Time Lines: Week 1 (1-7 POD) Week 2 (8-14 POD) Week 3 (15-21 POD) Week 4 (22-28 POD)	Ankle pumps	●	●									
Gluteal, quad, HS sets		●											
Stationary biking with minimal resistance		●	●	●	●								
Passive ROM (emphasize IR)		●	●	●	●								
Supine passive heelslide		●	●										
Supine hip roll IR		●	●										
Quadriped rocking			●	●									
Standing hip IR (stool)			●	●									
T-abdominal isometrics		●	●										
Hip abd/add isometrics		●	●										
Uninvolved knee to chest		●	●	●									
Piriformis stretch		●	●	●	●	●							
Kneeling hip flexor stretch					●	●							
Manual long axis distraction				●	●	●							
Manual A/P mobs				●	●	●							
Sidelying clams				●	●								
Bent knee fall outs				●	●								
Dbf leg bridges w/tubing					●	●							
3 way leg raises				●	●								
Straight leg raises					●	●							
Double 1/3 knee bends						●	●						
Double leg cord rotations						●	●						
Advanced Exercises		1	2	3	4	5	6	7	9	13	17	21	25
Dynadisc							●	●					
Advanced bridging (swiss ball, single leg)							●	●					
Side supports					●	●							
Single leg cord rotation							●	●					
Skaters/side stepping (Pilates or slideboard)							●	●					
Short lever hip flexion (seated)					●	●							
Single knee bends (lateral step downs)							●	●					
Single leg windmills								●	●				
Lunges								●	●				
Side to side lateral agility									●	●			
Fwd/Bkwd running with cord									●	●			
Aquatics	1	2	3	4	5	6	7	9	13	17	21	25	
Walking	●	●	●	●									
Aqua jogging			●	●	●								
Swim with pole bouy			●	●	●								
Swimming with fins					●	●	●	●					
Bounding / plyometrics								●	●				
Cardiovascular Exercises	1	2	3	4	5	6	7	9	13	17	21	25	
Stationary biking with resistance					●	●	●	●	●	●	●	●	
Rowing, elliptical, stairclimber							●	●	●	●	●	●	
Running progression									●	●	●	●	
High Level Activities	1	2	3	4	5	6	7	9	13	17	21	25	
Initial agility drills									●	●			
Advanced agility drills										●	●		
Weights											●	●	
Golf									●	●	●	●	
Outdoor biking									●	●	●	●	
Running										●	●	●	
Hockey, football, soccer											●	●	

Appendix 3



Labral Repair / Chondroplasty

Dr. Marc Philippon
 Steve Stalzer, PT
 Michael Wahoff, PT

Week

Patient Checklist	Initial Exercise	1	2	3	4	5	6	7	9	13	17	21	25
	Weightbearing: FFWB x 4 wks (Foot Flat = 20 lbs.)	Ankle pumps	●	●									
	Gluteal, quad, HS sets	●											
	Stationary biking with minimal resistance	●	●	●	●								
	Passive ROM (emphasize IR)	●	●	●	●								
	Supine passive heelslide	●	●										
	Supine hip roll IR	●	●										
	Quadruped rocking		●	●									
CPM: 4 wks	Standing hip IR (stool)		●	●									
	T-abdominal isometrics	●	●										
	Hip abd/add isometrics		●										
Bledsoe Brace: 0 - 90° x 10 days	Uninvolved knee to chest		●	●									
	Piriformis stretch	●	●	●	●	●							
	Kneeling hip flexor stretch				●	●							
	Manual long axis distraction					●	●	●	●				
	Manual A/P mobs					●	●	●	●				
	Sidelying clams			●	●								
	Bent knee fall outs			●	●								
ROM limits: Flex: 90° x 10 days	Dbl leg bridges w/tubing				●	●							
	3 way leg raises			●	●	●							
	Straight leg raises				●	●							
	Double 1/3 knee bends					●	●						
	Double leg cord rotations					●	●						
Ext: gentle x 3 wks	Advanced Exercises	1	2	3	4	5	6	7	9	13	17	21	25
	Dynadisc						●	●					
Abd: 25° x 3 wks	Advanced bridging (swiss ball, single leg)						●	●					
	Side supports					●	●						
ER: gentle x 3 wks	Single leg cord rotation							●	●				
	Skaters/side stepping (Pilates or slideboard)							●	●				
	Short lever hip flexion (seated)					●	●						
IR: No Limits	Single knee bends (lateral step downs)							●	●				
	Single leg windmills							●	●				
	Lunges							●	●				
	Side to side lateral agility								●	●			
	Fwd/Bkwd running with cord									●	●		
Modalities: Massage, Active Release Technique, E-stim as needed starting week 3.	Aquatics	1	2	3	4	5	6	7	9	13	17	21	25
	Walking	●	●	●	●								
	Aquajogging			●	●	●							
	Swim with pole bouy			●	●	●							
	Swimming with fins					●	●	●	●				
	Bounding / plyometrics								●	●			
	Cardiovascular Exercises	1	2	3	4	5	6	7	9	13	17	21	25
	Stationary biking with resistance					●	●	●	●	●	●	●	●
	Rowing, elliptical, stairclimber							●	●	●	●	●	●
	Running progression									●	●	●	●
Time Lines: Week 1 (1-7 POD) Week 2 (8-14 POD) Week 3 (15-21 POD) Week 4 (22-28 POD)	High Level Activities	1	2	3	4	5	6	7	9	13	17	21	25
	Initial agility drills									●	●		
	Advanced agility drills										●	●	
	Weights										●	●	●
	Golf									●	●	●	●
	Outdoor biking									●	●	●	●
	Running										●	●	●
	Hockey, football, soccer										●	●	●