UK PHYSIOTHERAPY HIP NETWORK

REHABILITATION FOLLOWING HIP ARTHROSCOPY FOR FEMORO-ACETABULAR IMPINGEMENT SYNDROME

Topic covered by this guidance

This guidance covers the post-operative physiotherapy management of adults (over age 16) with Femoro- Acetabular Impingement (FAI) syndrome following hip arthroscopy.

The target audience is physiotherapists working within the UK NHS.

Goals

To support NHS physiotherapists in providing:

- Appropriate advice and physiotherapy treatment for patients following arthroscopic FAI syndrome surgery.
- Timely referral to to secondary care or other specialist services
- Suggestions on a range of options for service delivery for FAI syndrome patients

How can I manage a person with FAIS post to hip arthroscopy?

Consider the following in the patients post-operative management

Review

- The type and extent of surgery will determine the post-operative restrictions, progression of therapy and review points.
- Recent studies have recommended a four phased, goal based rehabilitation process incorporating joint protection, restoration of range with control, strength, and dynamic control/ endurance [1,2]. However establishing time points for review can assist in progressing goals, identifying the need for orthopaedic review and signposting to other services.
- The use of formal outcome measures can provide objective information on progress.
- Post-operative exercises should be started in hospital and reviewed within 2 weeks of discharge[1,2].

Advice and information:

- Post-operative information summarising joint protection, activities to avoid or modify and the importance of the home exercise programme is emphasised in the available research.
- The need for walking aids, weight bearing and movement restrictions, analgesia, use of continuous passive movement, ice or compression will vary according to individual surgical protocols.
- Systematic reviews and international guidelines suggest that education is key to a good post-operative outcome[3-9].

Post-operative exercises

- There are two randomized controlled trials[1,2] showing benefit from a post operative programme based on the Takla-O'Donnell (ToP) protocol compared to normal care at 14 weeks. Patients in both the control and experimental groups had the same education, advice on joint care and walking aids
- The ToP protocol is a progressive, semi structured programme aimed at strengthening the deep hip rotators muscles and improving active joint stabilisation. Progression of exercise is based on achieving control and endurance goals. The protocol is reproduced in appendix 1 with the kind permission of the authors.

Progression

- A phased based approach to progress rehabilitation is recommended by most systematic reviews, and was used in an RCT reporting improved outcomes at 14 weeks postoperatively when compared to usual care[1]. The four phases are based on achievement of goals and usually described as:
    - Phase 1 –**Protection** of the the surgical repair and joint
    - Phase 2- Restoration of **joint range with control**, normal gait and building strength after phase 1 goals are achieved
    - Phase 3 – Restoration of **strength** and endurance after phase 2 goals are achieved
    - Phase 4 – Return to full **dynamic** activity and sport after phase 3 goals are achieved
- One RCT showing improvement in an adapted ToP exercise protocol also incorporates manual therapy at each postoperative session including trigger point massage and lumbar spine mobilisations if indicated[2].

Outcomes

Use of a validated measure is recommended to establish a baseline on which to base goal progression, measure final outcome, and signpost the need for orthopaedic review or referral to other services.

A variety of hip specific, musculoskeletal specific and general activity outcome measures are incorporated with objective physical measures in the literature and clinical practice. Hip specific outcome measures include the International Hip Outcome Score (iHOT 12 and iHOT 33), the Hip disability and Osteoarthritis Outcome Score (HOOS), the Copenhagen Hip and Groin Outcome Score (HAGOS) and the Non-Arthritic Hip Score (NAHS). Musculoskeletal outcome measures include the Lower Extremity Functional Scale (LEFS), Single Assessment Numeric Evaluation (SANE), the Global Rating Of Change (GROC), Musculo-Skeletal Health Questionnaire (MSK-HQ) and Patient-acceptable Symptom State (PASS). Generic measures of health included the widely used EQ-5D-5L.

A consensus paper in 2020 which included physiotherapists amongst the review panel, recommended HAGOS and iHOT as the most appropriate patient reported outcome measures in FAI syndrome[10]. In addition, the iHOT 12 is used to measure surgical outcomes on the UK Non-Arthroplasty Hip Register

Service delivery suggestions

- Two RCT's showing benefit from a structured, progressive rehabilitation programme describe a total of 7 postoperative fortnightly physiotherapy sessions and a home exercise programme[1,2].

- In one study the physiotherapy and home exercise sessions were supplemented by unsupervised attendance at a pool and gym, funded through the study[1].
- Regular face to face attendance is recommended as progression through rehabilitation is based on achievement of goals including restoration of muscle strength, range of movement and control which would need to be assessed by the physiotherapist. Telephone or video consultation could be considered for interim reviews.
- Group attendance could also be considered, particularly as rehabilitation progresses to return to sport activity.
- Information including exercise programmes can be delivered via leaflet, on line or through social media

Basis for recommendation

There is a lack of well designed trials on physiotherapy following hip arthroscopy for FAI syndrome. Following a literature search to identify levels 1-3 evidence, a panel of 5 clinicians reviewed two level 1 randomised control studies. These both include supplements with well described exercise protocols and information on progression of treatment.

A small RCT (30 participants) by Bennell et al[1] showed a significant improvement in iHOT-33 score and sports subscale of the HOS at 14 weeks postoperatively following a semi structured progressive rehabilitation programme compared with self directed rehabilitation however these benefits were not sustained at 24 weeks. The intervention consisted of one physiotherapy session pre-operatively, one in-patient session, followed by supervised exercise and manual therapy sessions every 2 weeks until 12 weeks postoperatively, supplemented by a home, gym and pool based exercise programme.

The second RCT by Müller-Torrente et al[2] included 90 participants. The postop programme was again based on the ToP protocol with similar frequency of physiotherapy to the Bennell study. The control group carried out a nonspecific stretching and strengthening postoperative programme whereas the exercise in the intervention group focused on stabilisation and proprioception in addition to stretching and strengthening. The experimental group showed greater improvement in pain, modified Harris hip score, range of movement and impingement tests at 14 weeks postoperatively.

There are six systematic reviews[3-8] on postoperative rehabilitation, however these tend to be based on low evidence studies such as case studies of local protocols or surgical RCT's which include a description of the study postop rehabilitation programme. Although the protocols are heterogenous, they tend to emphasise the importance of education and a phased, goal based approach to rehabilitation.

References

1. Bennell KL, Spiers L, Takla A, O'Donnell J, Kasza J, Hunter DJ, Hinman RS. Efficacy of adding a physiotherapy rehabilitation programme to arthroscopic management of femoroacetabular impingement syndrome: a randomised controlled trial (FAIR). *BMJ Open*. 2017 Jun 23;7(6):e014658. doi: 10.1136/bmjopen-2016-014658. PMID: 28645960; PMCID: PMC5623417.

2. Müller-Torrente A, Puig-Torregrosa J, Montero-Navarro S, Sanz-Reig J, Morera-Balaguer J, Más-Martínez J, Sánchez-Mas J, Botella-Rico JM. Benefits of a Specific and Supervised Rehabilitation Program in Femoroacetabular Impingement Patients Undergoing Hip

Arthroscopy: A Randomized Control Trial. *J Clin Med.* 2021 Jul 15;10(14):3125. doi: 10.3390/jcm10143125. PMID: 34300291; PMCID: PMC8307353.

3. Bistolfi A, Guidotti C, Aprato A, Sabatini L, Artiaco S, Massè A, Ferracini R. Rehabilitation Protocol After Hip Arthroscopy: A 2015-2020 Systematic Review. *Am J Phys Med Rehabil*. 2021 Oct 1;100(10):958-965. doi: 10.1097/PHM.0000000000001677. PMID: 33394594.

4. Grzybowski JS, Malloy P, Stegemann C, Bush-Joseph C, Harris JD, Nho SJ. Rehabilitation Following Hip Arthroscopy - A Systematic Review. *Front Surg*. 2015 May 26;2:21. doi: 10.3389/fsurg.2015.00021. PMID: 26075208; PMCID: PMC4443726.

5. Ankem HK, Yelton MJ, Lall AC, Bendersky AM, Rosinsky PJ, Maldonado DR, Shapira J, Meghpara MB, Domb BG. Structured physical therapy protocols following hip arthroscopy and their effect on patient-reported outcomes-a systematic review of the literature. *J Hip Preserv Surg.* 2020 Dec 18;7(3):357-377. doi: 10.1093/jhps/hnaa042. PMID: 33948193; PMCID: PMC8081410.

6. Holling MJ, Miller ST, Geeslin AG. Rehabilitation and Return to Sport After Arthroscopic Treatment of Femoroacetabular Impingement: A Review of the Recent Literature and Discussion of Advanced Rehabilitation Techniques for Athletes. *Arthrosc Sports Med Rehabil.* 2022 Jan 28;4(1):e125-e132. doi: 10.1016/j.asmr.2021.11.003. PMID: 35141544; PMCID: PMC8811526.

7. Cheatham SW, Enseki KR, Kolber MJ. Postoperative Rehabilitation After Hip Arthroscopy: A Search for the Evidence. *J Sport Rehabil*. 2015 Nov;24(4):413-8. doi: 10.1123/JSR.2014-0208a. PMID: 26633589.

8. Reiman MP, Boyd J, Ingel N, Reichert A, Westhoven M, Peters S. There Is Limited and Inconsistent Reporting of Postoperative Rehabilitation for Femoroacetabular Impingement Syndrome: A Scoping Review of 169 Studies. *J Orthop Sports Phys Ther*. 2020 May;50(5):252-258. doi: 10.2519/jospt.2020.9189. Epub 2020 Apr 9. PMID: 32272028.

9. Takla A, O'Donnell J, Voight, et al. The 2019 International Society of Hip Preservation (ISHA) physiotherapy agreement on assessment and treatment of femoroacetabular impingement syndrome (FAIS): an international consensus statement. *J Hip Preserv Surg*. 2021 Mar 19;7(4):631-642. doi: 10.1093/jhps/hnaa043

10. Impellizzeri FM, Jones DM, Griffin D, et al. Patient-Reported outcome measures for hip-related pain: a review of the available evidence and a consensus statement from the International Hip-related pain research network, Zurich 2018. *Br J Sports Med* 2020:bjsports-2019-101456.

Additional information

- Heerey J, Risberg MA, Magnus J, Moksnes H, Ødegaard T, Crossley K, Kemp JL. Impairment-Based Rehabilitation Following Hip Arthroscopy: Postoperative Protocol for the HIP ARThroscopy International Randomized Controlled Trial. *J Orthop Sports Phys Ther*. 2018 Apr;48(4):336-342. doi: 10.2519/jospt.2018.8002. PMID: 29607764.

- Tijssen M, van Cingel RE, Staal JB, Teerenstra S, de Visser E, Nijhuis-van der Sanden MW. Physical therapy aimed at self-management versus usual care physical therapy after hip arthroscopy for femoroacetabular impingement: study protocol for a randomized controlled trial. *Trials*. 2016 Feb 17;17:91. doi: 10.1186/s13063-016-1222-7. PMID: 26883504; PMCID: PMC4756499.

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APPENDIX 1

Rehabilitation following hip arthroscopy for FAI. Physiotherapy protocol
Takla-O'Donnell Protocol (ToP)

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4 phases of treatment

1. Pre-operative education and advice
2. Protect healing tissues and maximise mobility (Day 1 – Week 2)
3. Local stabilisation and maintenance of fitness (Week 2 – 6)
4. Resumption of loading, development of skilled movement and prevention of further injury (Week 6-12)

Treatment phase 1 – Pre-operative education and advice

Phase 1 goals:

1. Educate regarding anatomy of the hip and FAI concepts – Cam, Pincer or Combined impingement
2. Educate patient regarding "do's" and "don'ts" following procedure
3. Teach deep hip rotators (DHR) retraining in prone – quadratus femoris (QF), oburator internus and the gemelli
4. Teach use of crutches

Phase 1 interventions:

Treatment strategy/intervention	*Rationale/Evidence*
DHR retraining in prone– minimum of one minute per hour for seven days prior to surgery	The deep hip rotators ("rotator cuff" of the hip) provide dynamic hip stability
Fit crutches and ensure independent and comfortable use	

Treatment phase 2 – Protect healing tissue and improve mobility (Day 1 – Week2)

Phase 2 goals:

1. Protect healing tissue
2. Minimise pain and inflammation
3. Maximise pain-free range of motion within surgical restrictions
4. Progress DHR control to maximise stability

Phase 2 precautions:

- Avoid hip flexion past 90 degrees for four weeks
- Minimise exercise volume and intensity in those with micro fracture
- Avoid all rotary activity for 4 weeks in those with ligamentum teres tear
- No physical work/manual handling.
- Avoid squatting, lifting and twisting
- Minimise car travel – knees together when getting in and out of car
- Minimum of one week off work unless instructed otherwise by surgeon

Phase 2 interventions:

Treatment strategy/intervention	*Rationale/Evidence*
Ice – 20 minutes every 2 hours for 4 days post-operatively	
Medication – NSAID and analgesia as instructed by surgeon	
Crutches to improve comfort and normalise gait pattern	
Progress DHR retraining from prone to sitting, lying and standing	
Gentle ROM/stretching within surgical restrictions	Those with FAI have been found to have restrictions in hip IR and Fl ROM

Phase 2 Indicators for progression to next phase

- No complaints of pain with phase 2 exercises and activity
- Appropriate activation of DHR in prone

Treatment phase 3 – Local stabilisation and maintenance of fitness (Week 2-6)

Phase 3 goals:

1. Normalise gait
2. Return to normal activities of daily living within surgical restrictions
3. Minimise compensatory muscle recruitment patterns and progress DHR retraining
4. Restore ROM within surgical restrictions
5. Maintain fitness

Phase 3 precautions:

- Avoid bridging position due to potential to aggravate pain/inflammation

Phase 3 interventions:

Treatment strategy/intervention	*Rationale/Evidence*
Progress to DHR retraining in 4-point kneeling, ensuring correct activation and minimising compensatory patterns	
Wean off crutches and focus on correct muscle activation patterns in gait	
Cycling on an upright stationary bike, avoiding hip flexion past 90 degrees, 15 minutes per day at moderate speed and intensity	
Cross trainer for 15 minutes per day at moderate speed and intensity	
Soft tissue work to promote joint range of motion and assist with pain relief	Common pattern areas of inappropriate recruitment muscles include adductors, TFL and gluteus medius
Pain-free gentle muscle stretching to quadriceps, calves and psoas (the latter in Thomas test position only)	
Anterior hip stretch 5 minutes daily (leg over edge of bed)	

Phase 3 indicators for progression:

- Appropriate activation of DHR in 4-point-kneeling

Treatment phase 4 – Resumption of loading, development of skilled movement and prevention of further injury (Week 6-12)

Phase 4 goals:

1. Progress DHR retraining to dynamic positions
2. Restore full pain-free ROM past 90 degrees flexion
3. Improve balance, proprioception and neuromuscular control
4. Restore global muscular strength and endurance
5. Restore cardiovascular fitness

Phase 4 precautions:

- Avoid full squats, lunges, skipping, Pilates and yoga

Phase 4 interventions:

Treatment strategy/intervention	*Rationale/Evidence*
Increase DHR loading with resistance band in 4-point kneeling then in weight-bearing	
Continue stretches	
Dry needling to treat adductors and TFL as required	
Single leg balance exercises	
Theraband with gluteal loading	
Leg extension/hamstring curl exercises	
Quarter squats with focus on correct technique	
Walking 30 minutes every second day	
Deep water running	
Increase volume on stationary bike, cross trainer and stepper	

NOTES

- **Patient education** is an essential component of the program. The education component covers information about FAI, advice about joint protection and return to physical activity/sport. Patient information handouts are provided.
- **Gait aid prescription** should ensure safe and independent ambulation post-operatively to protect the joint and allow healing. Progression off gait aid will depend on pain and quality of gait pattern
- **Manual therapy techniques** include: sustained stretches, and/or soft tissue techniques.
- **Stationary cycling** will be incorporated into the program at the first physiotherapy visit (Week 2 post-surgery) by asking the patients to cycle for up to 15 minutes at a moderate level of intensity ("somewhat hard" or level 13 on the Borg Rating Scale of Perceived Exertion)
- **Home exercises** include: deep hip rotator retraining, muscle stretches, strengthening, functional neuromuscular control (incorporating balance, proprioception and gait drills) and lumbopelvic control.

Home exercises are to be performed daily

The Home Exercise Program must include DHR retraining (TOP). Generally include only 4 other exercises unless there is a strong clinical indication and a compliant patient. The starting level chosen depends upon the individual and all exercises should be progressed through the program.

The Home Exercise Program will change during the course of the 12 weeks of physiotherapy, and exercise selection will depend upon the surgical procedure carried out during the hip arthroscopy.

Mandatory home exercise - pre-operative to 2 weeks post-surgery

1. DHR strengthening/retraining.

Mandatory home exercise Week 2 to Week 12:

1. DHR strengthening/retraining.
2. Anterior hip stretch over edge of bed
3. Stationary cycling

Additional home exercises Week 6 to Week 12:

4. Up to three strengthening exercises
5. Up to three lower limb muscle stretches
6. Balance/proprioception
7. One lumbopelvic control exercise.

The home exercises must be checked and discussed at every visit. Check technique and progress the exercises as needed. Work with the patient to maximise adherence to the programme. Check the log book and sign off to indicate that this has been discussed. If the patient is not compliant, then discuss barriers/ obstacle and problem solve with the patient.

Dosage (unless otherwise specified):

Strengthening – Recommended dose is 3 sets of 10 repetitions with a 3 second hold. Progress the load/repetitions/difficulty according to the manual.

The resistance needs to be such that the patient is working at a high intensity of their one repetition maximum. This can be judged by asking the patient to use the modified Rating Perceived Exertion Scale (RPE) as shown below to rate their overall effort during the exercise. The patient should be working at an intensity that they would rate as 5 to 8 on the RPE Scale. Resistance and difficulty of the exercises need to be progressed to ensure strength gains are achieved. Each patient will be given a copy of the RPE scale so that they can ensure that they are working at an appropriate intensity.

Modified Rating Perceived Exertion Scale

(Day et al J Strength Conditioning Res 2004)

Rating	Descriptor
0	Rest
1	Very, Very Easy
2	Easy
3	Moderate
4	Somewhat Hard
5	Hard
6	-
7	Very Hard
8	-
9	-
10	Maximal

Stretching – Recommended dose is 2 minutes total for each stretch, comprised of two or more repetitions with 20-60 sec hold times. Often times it is more comfortable for the patient if the holding times are shorter.

Functional neuromuscular balance/gait drills - Choose the most challenging exercises the patient can achieve safely and choose functional drills that relate to the patient's problems as determined by the assessment.

Recommended dose is 2 different exercises each for 4 x 30 seconds (4 minutes total). Safety is important and should be emphasised to the patient. The drills can be changed from week to week to reflect the assessment findings and goals of treatment. The gains in strength and range that are achieved with treatment should then be applied in these functional drills.

Therefore, choose drills that reinforce and complement the other treatments employed. For example, hip abductor strengthening exercises can be followed by standing eccentric control of the hip abductors etc.

Exercises Deep Hip Rotator retraining ("TOP")

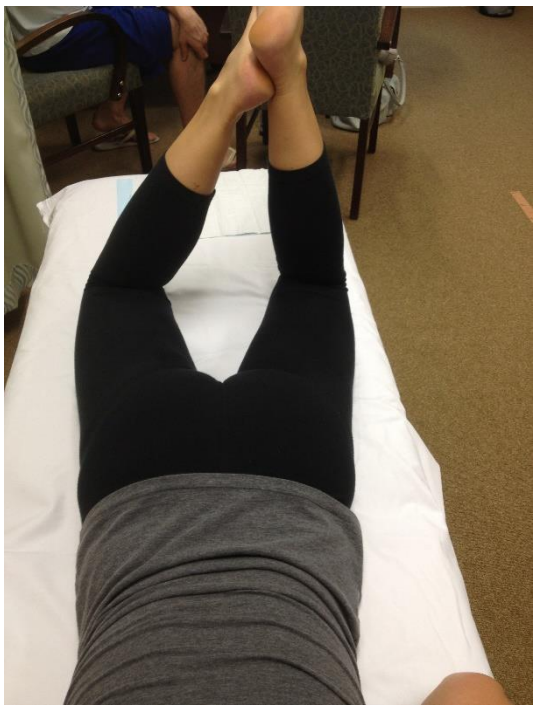
Stage 1 – Quadratus Femoris in prone

Starting position

Lie on your stomach with your knees approximately 20cm apart.

Bend your knees to 90 degrees.

Place the sole of the foot on your non-operated leg against the inner surface of your ankle on your operated side.

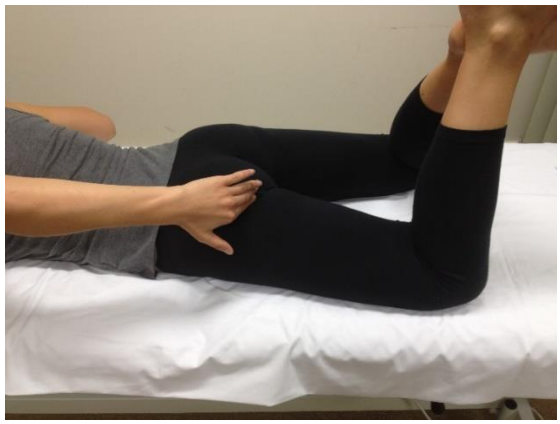


Exercise

Keeping your thigh on bed, press the ankle on your operated side against the sole of the other foot.

The muscles in the buttock will tense, but do not allow your leg to twist.

You may place your fingers on to check you are contracting the correct muscles- place your fingers on the bony part of your bottom (ischial tuberosity) then move your fingers 2cm out and 2cm up.



Hold for 3 seconds then relax for 2 seconds (approx. 12 repetitions in a minute)

Dosage

1 minute

4 times a day

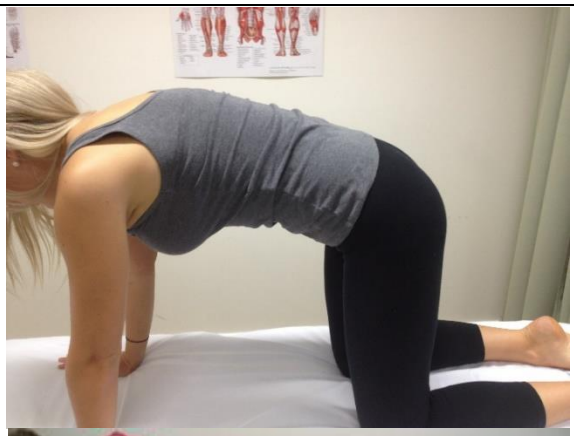
Stage 2- Quadratus femoris in 4-point kneeling

Starting position Kneel on all fours with back in a neutral position Exercise Contract QF as in stage 1 Hold for 3 seconds then relax for 2 seconds Dosage 1 minute 4 times a day	

Stage 3-Quadratus femoris in in 4-point-kneeling with external rotation

Starting position Kneel on all fours with back in a neutral position The operated leg should be parallel to the opposite side, in a relaxed position Exercise Contract QF as in stage 1 then gently rotate the foot on the operated leg inwards. Slowly return to the start position Repeat 5 times, rest for 3 seconds Continue for 1 minute Dosage 1 minute 4 times a day	

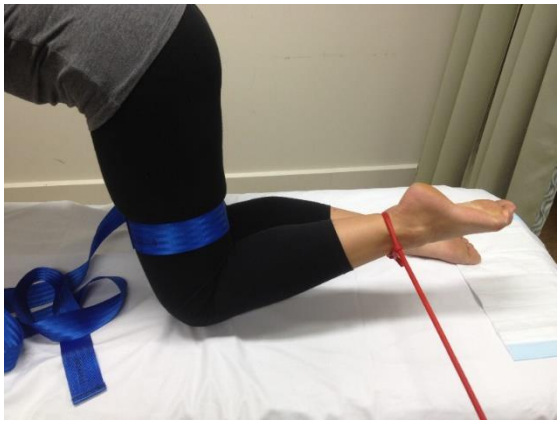
Stage 4-Quadratus femoris in in 4-point-kneeling with internal rotation

Starting position Kneel on all fours with back in a neutral position The operated leg should be parallel to the opposite side, in a relaxed position Exercise Contract QF as in stage 1 then gently rotate the foot on the operated leg outwards. Slowly return to the start position Repeat 5 times, rest for 3 seconds Continue for 1 minute Dosage 1 minute 4 times a day	 

Stage 5- Quadratus femoris in 4-point-kneeling with external rotation and resistance band

Starting position Kneel on all fours with back in a neutral position The operated leg should be parallel to the opposite side, with resistance band around your ankle on your operated side Exercise Contract QF as in stage 1. Twist your leg to take your foot on the operated side inwards against the resistance of the band. Slowly return to the start position. Rest for 3 seconds Repeat Continue for 1 minute Dosage 1 minute 4 times a day	 

Stage 6- Quadratus femoris in 4-point-kneeling

Starting position Kneel on all fours with back in a neutral position The operated leg should be parallel to the opposite side, with resistance band around your ankle on your operated side and a traction belt or resistance band around both thighs as shown Exercise Keep the knee on the bed. Tighten the muscles on the outside of your thigh by pushing the operated side against the belt- as if pushing your knees apart At the same time contract QF as in stage 1. Steadily twist your leg to take your foot inwards against the resistance of the band. Slowly return to start position Rest for 3 seconds Repeat Continue for 1 minute Dosage 1 minute 4 times a day	

Stage 7

Starting position Arabesque Exercise Maintain a stable pelvis. Contract QF as in stage 1. Balance on one leg as the other raises back and your chest leans forward. Take arms to the side Hold position for 3 seconds. Return to start position. Relax Repeat Dosage Aim for 26 in a row	

4-point knee internal/external rotation

Starting position Kneel on all fours with minimal load through the affected knee. Exercise Actively twist foot outwards (internal rotation) then inwards across the top of the other leg