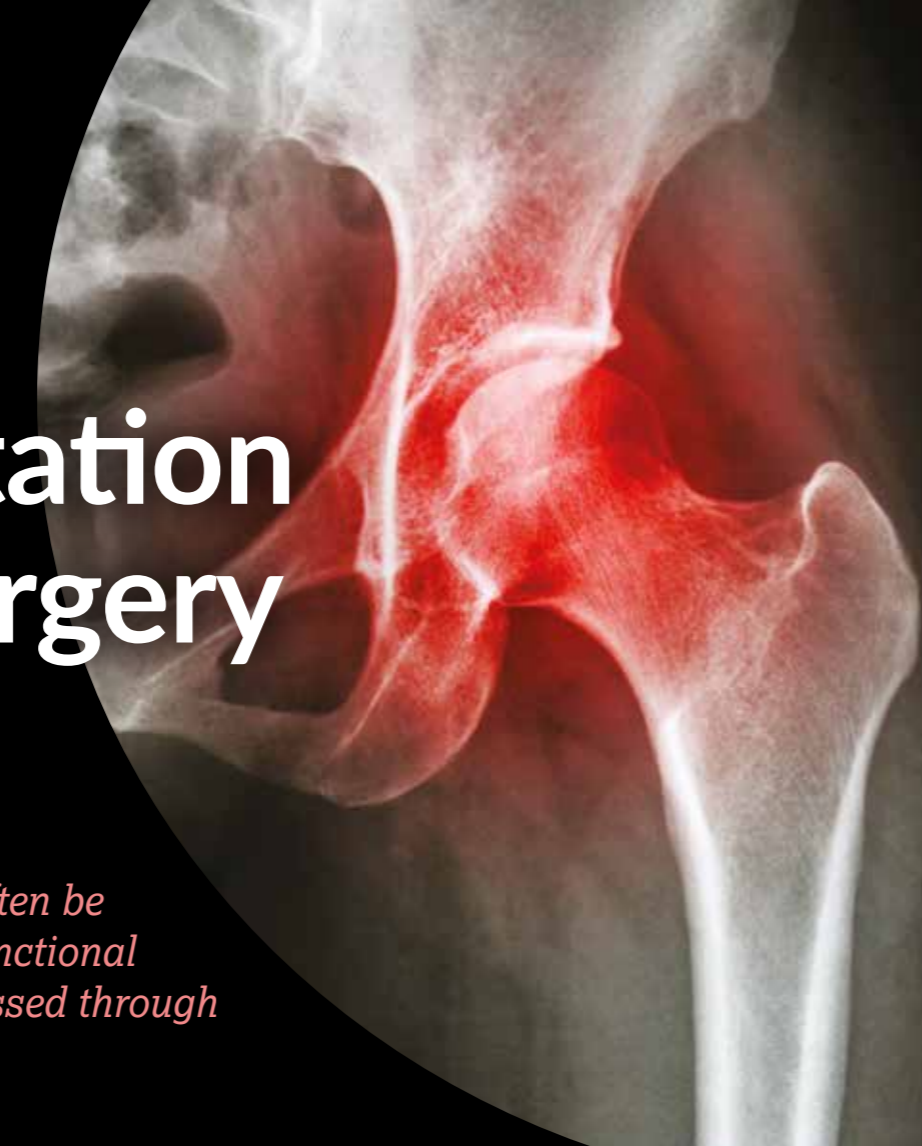


Exercise as medicine: Prehabilitation for hip surgery patients



“Mechanical problems can often be corrected through surgery; functional deficits will need to be addressed through the rehabilitation process”

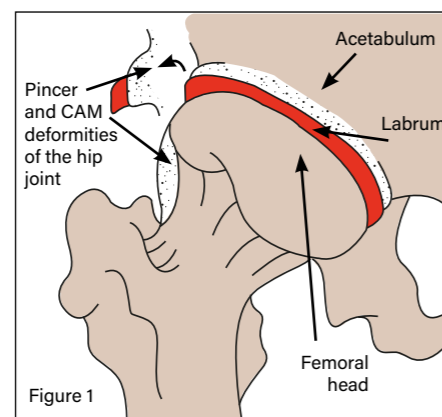
Louise Grant discusses how prehabilitation can help clients about to undergo hip surgery.

As a chartered physiotherapist, I have a specific interest in hip patients and prehabilitation generally. Prehabilitation means analysing an individual's posture, movement patterns, muscle control, biomechanics, core stability and functional capability before surgery and designing an appropriate programme of exercises with an aim to improve recovery in the rehabilitation process.

Over the last 20 years, there have been steady advances in the field of hip preservation surgery. Patients undergoing this type of operation can be of any age; however, subjects over the age of 50 have a higher risk of an unsuccessful outcome¹. There are many types of hip abnormalities, resulting in many types of different surgical techniques. In this brief introductory article, I will focus on approaches for patients undergoing hip arthroscopy for what is known as femoroacetabular impingement (FAI) before outlining what a fitness professional needs to be aware of if they are to be supportive of the patient in the prehabilitation process. FAI may be briefly described as an abnormal

abutment between the femoral neck and acetabular rim, causing a bony impingement (Figure 1).

CAM and pincer impingement



Why prehabilitation?

Despite the research base for prehabilitation in hip arthroscopy being limited at present, there is growing support for the intuitive concept that physically (and mentally) preparing a patient for surgery helps maximise functional outcomes.

Prehabilitation can also help identify patients who may not be compliant in the recovery process²⁻⁸.

Existing research also indicates that pre-operative therapy can improve hip pain and function during the early stages of recovery⁹, and that pre-operative muscle strength and post-operative strength (particularly with respect to hip flexion and internal rotation) leading to a diminished potential for complete rehabilitation¹⁰.

Surgical planning

As with any surgery, a thorough differential diagnostic testing approach, coupled with orthopaedic screening, a clinical examination and information from a patient's history, is essential in determining both the real cause of the patient's pain and its effective surgical resolution¹¹⁻¹⁴. Additionally, everyone involved needs to reach an understanding (pre-operatively) that, while mechanical problems can often be corrected through surgery, functional deficits will need to be addressed

through the rehabilitation process. Therefore, there are benefits to a team approach in this period, where all professionals involved in a patient's care are communicating effectively, with this dialogue following through to the recovery stage⁴.

Typical muscle weaknesses

Exercises that are highly appropriate for many FAI patients are those for strengthening the hip flexors, external rotators, hip adductors and abductors. These muscle groups have been reported to be weak in many patients¹⁵.

Neuromuscular control and movement patterns

Abnormal movement patterns and imbalances of lower limb muscles that have been observed in individuals with FAI, and hip pain generally, may additionally alter lumbo-pelvic-femoral motion, which can then lead to additional problems in other structures^{16,17,18}. For example, studies have demonstrated that, if the hamstrings are more dominant than the gluteus maximus during prone hip extension, then increased joint reaction force is generated through the anterior aspect of the hip joint¹⁹. There are also theories with respect to imbalance of the hip abductors and adductors (cross chain weakness) and the impairment of dynamic, lumbo-pelvic stability and the effects that this might also have. As a consequence, it is important to observe precisely how movements are being performed, which muscle(s) is (are) doing the job and how this in turn might affect the joints and soft tissues.

Posture and gait

Individuals with FAI may present with a sway back posture, resulting in the femoral head being pushed forward against the anterior structures of the hip²⁰. In this posture, the pelvis is tilted posteriorly and the line of gravity moves posteriorly to the hip joint, resulting in disuse atrophy of the gluteal muscles²¹ (Figure 2). Another posture type that is found in hip pain sufferers is the lordotic posture, displaying an anteriorly tilted pelvis and weak, lax abdominals. This places the hip joint in more relative flexion, which could contribute to hip impingement problems²². Ensuring an optimum position of the femoral head within the hip joint complex is vital in preserving normal hip function and minimising labral and cartilage compression²³. Some related research has suggested that walking in a sway back posture may result in increased forces through the anterior hip joint; while an active 'push-off' with the foot during gait coupled with the correction of hip and knee hyperextension has been shown to decrease hip joint forces^{24,25}.

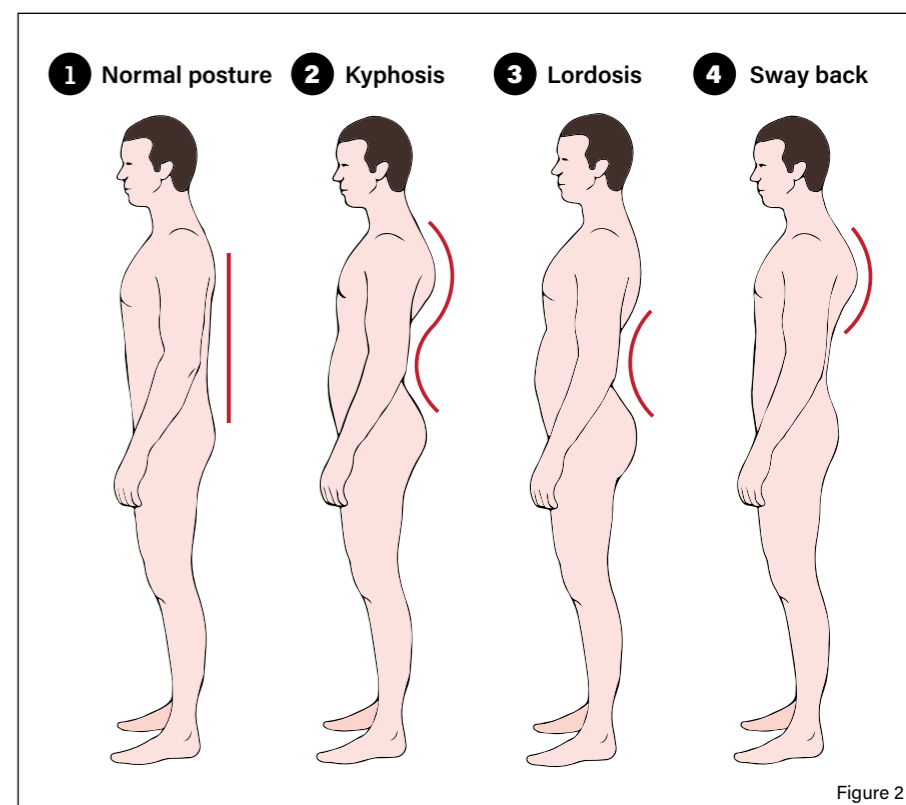


Figure 2

The HAPI study

The HAPI *Hip Arthroscopy Prehabilitation Intervention study: Does prehabilitation affect outcomes in patients undergoing hip arthroscopy for femoroacetabular impingement?* (ISRCTN 13779749) will shortly be published. The purpose of this randomised prospective comparative controlled pilot study was to determine whether specific exercises done by patients before hip arthroscopy for femoroacetabular impingement affect post-operative recovery. The study showed positive trends towards implementing appropriate exercises before surgery.



Pain and inflammation

Joint protection strategies can be taught, which may help in the reduction of pain in the pre-operative period. With specific patients, it is important to avoid end-range flexion and internal rotation. In individuals with structural instability, it is advised to limit end-range hip extension and external rotation. Intra-articular injured patients are advised to avoid all movements that aggravate pain and walking aids should be utilised if gait is painful⁶.

Muscle inhibition is thought to occur when swelling is present. Decreased gluteus maximus activation following hip joint effusion (swelling) may result in reduced strength, which may alter normal lower extremity biomechanics²⁶. Therefore, the use of pain and anti-inflammatory

modalities, activity modification and avoidance of pain-provoking exercises could be considered to reduce pain and inflammation and minimise the possible effects this has on muscle function. In our many years of experience at our hip clinic, 90% of our FAI patients have reported the clam exercise to be provocative in their symptoms; we therefore do not recommend this to them. To see a demonstration of the clam, visit our nhs.uk/oxparc/information/videos/clam.aspx

Additional factors to consider

Differential diagnostic tests should first have identified that the hip is the main driver of the pain. However, there may be compensatory effects on the lumbar spine and sacroiliac joints²⁷. Extra-articular problems may also

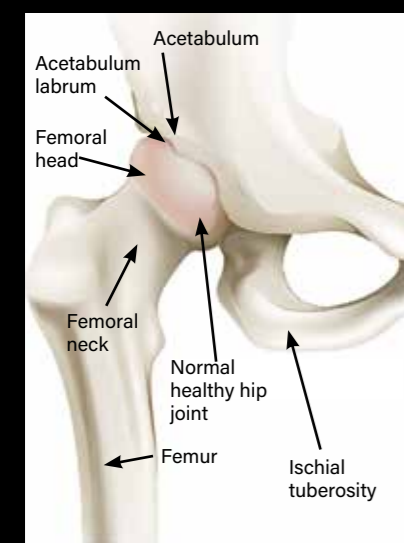
coexist that may need additional input, while specialised pre-operative care and post-operative planning is required in patients with hypermobility and any specific rheumatology disorders. General physical function and fitness needs to be considered, including how the patient will cope physically at home, possibly alone, in the post-operative period.

Expectations, education and mental preparation

A patient who pre-operatively understands the complexities of surgery and the part they need to play is better equipped for the recovery process. Expectations need to be discussed before surgery and self-management strategies put in place to address the patient both locally (the hip) and globally (the person).

In summary, there are many factors to consider when planning for hip preservation surgery. These include performing a thorough assessment, putting goals in place, being mindful of the elements discussed in this article and noting the big message – it is definitely not 'no pain, no gain' with these individuals! Putting the correct foundations in place during the pre-operative period aims to assist in a strong, structured plan for recovery and an optimum patient experience. **fp**

Essential anatomy



BIOGRAPHY
Louise Grant MSc (musculoskeletal medicine) is a chartered physiotherapist with a postgraduate certificate in health research. She is an affiliate member of the International Society for Hip Arthroscopy and joint practice principal at Physiocure. physiocure.org.uk



Key exercises and typical characteristics of a pre-operative exercise regime

1 Single leg calf raises



2 Single leg squats



3 Toe taps in table top



4 Bent knee fall-out in supine



5 Side lying hip abduction



6 Side lying hip adduction



7 Four point kneeling hip rocks



8 Kneeling hip flexor stretch



My session



Client goals

Sharon's goals are to lose a further 1.5 stones of body fat, build strength through her upper and lower body and improve her cardiovascular fitness. Simultaneously, an important goal for Sharon, which I can certainly relate to as a new mum, is to regain a sense of self, including confidence in her physical appearance.

Considerations

Sharon is already nine months' postpartum, so the majority of healing has taken place; however, as she is still breastfeeding, it is important for me to consider that her body will still be producing the hormone relaxin, meaning her joint stability will be compromised. Breastfeeding can also mean that her breasts may be enlarged and uncomfortable at times, so positions that require Sharon to lie prone must be adapted. As Sharon has been practising pelvic floor work, we will be able to resume a fairly intense level of cardio training; however, as she has not participated in much exercise since giving birth, we must build this up slowly.

Exercise and breastfeeding

A study published in 2002 by the American Academy of Pediatrics suggested that moderate- to high-intensity exercise does not negatively affect breast milk supply. A 1997 study by Gregory *et al* found that, when exercising to a high intensity, the content of the mother's milk may be affected slightly; however, this change is purely short term, will be replenished within 90 minutes and has no harmful effects for the baby.

Rationale

As Sharon has three children and often cannot make it to the gym, some of our sessions take place at Sharon's home. We use a resistance band and light dumbbells ranging from 2kg to 4kg to progress exercises. However, the majority of work will be bodyweight based. Cardio will

be placed throughout the session in intervals, meaning we continuously raise Sharon's heart rate throughout the session. Interval training may also help Sharon to burn more calories during and after the workout and also build cardiovascular endurance. In order to aid Sharon's weight-loss goal, we will also work on a whole-body resistance programme, aiming to increase Sharon's muscle mass to help raise her metabolism. **fp**

Session in brief – We perform three sets of each exercise.

Warm-up: Our warm-up includes mobility exercises through all joints, three minutes of moderate step-ups as a pulse raiser and stretches across all the major muscle groups.

Cardio: We use interval training of 30 seconds' work to 15 seconds' rest, with three reps of each exercise. Each set includes spotty dogs, quick step-ups and burpees (with progressions).

Resistance

Single leg lunges with push back x 10
By adding a single leg push back, Sharon will need to engage her core stabilisers, glutes, abdominals and back muscles to stay balanced in the single leg position.

Squats x 16 reps (each side)
We add a resistance band around the calves and travel the squats in order to increase the intensity of work for the glutes. I will also instruct Sharon to stand on the resistance band while performing a squat and bilaterally raise the band to extend the work through to her shoulders. In time, we will progress this exercise to a resistance band shoulder press. As we progress this exercise over time, we will add 4kg dumbbells in each hand.

Push-ups x 8
Push-ups are a compound exercise and work multiple muscles throughout the upper body. They can help to create lean muscle mass and will also improve Sharon's muscular endurance.

Tricep dips x 10
Tricep dips are effective yet easy to instruct, and increase strength and tone for the upper arms.

Upright row x 16
Focusing on working the trapezius, rhomboids, latissimus dorsi and deltoids, I will be instructing Sharon to use a resistance band to perform this exercise.

Deltoid tri-set x 10
This includes front raises, lateral raises and prone flyes, targeting anterior, medial and posterior deltoids. We use 2kg dumbbells for 10 reps of each and will progress to 3kg in time.

Bridge x 10
The bridge is a chain exercise that aims to engage glutes, hamstrings and the lower back. We will progress this exercise by adding a leg extension in the lifted position once Sharon has achieved this task.

Plank x 3
The plank in all its variations is an isometric exercise that is held for a period of time while contracting your abdominal muscles. The transverse abdominis, which is crucial to strengthen after pregnancy, is the deepest abdominal muscle and acts as a girdle for the lower body. After pregnancy, contraction of the transverse abdominis helps to close the abdominal separation from the inside. We start by holding this exercise for 20 seconds and increasing the time as Sharon builds strength.

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BIOGRAPHY

Shakira Akabusi has worked in the health and fitness industry for over five years, with three years' experience as a PT, and is qualified in ante- and postnatal exercise. Shakira is also a freelance journalist, writing health and fitness features for various publications including *Huffington Post*, *Baby Hampshire* and *Local Buzz* magazine. As founder of the STRONGLIKEMUM campaign, Shakira has amassed a following on social media for her creative mum and baby at-home workout ideas. stronglikemum.com
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