Pilates and Hip Replacement

Maria Bela de Andrade Soares

April 6th of 2016
Course Location: The Pilates Clinic
Wimbledon, London - UK
Abstract
This paper is about the use of Pilates to assist the recovery process of a client underwent hip replacement surgery. This case report is based on a 46 year-old woman who has suffered with one leg longer than the other since her early 20’s. This has resulted in damage to the cartilage (osteoarthritis) around her left hip joint. This structural issue provoked discomfort and severe pain forcing her body to compensate maladaptively, thus resulting in muscular imbalances and functional problems particularly in her knees and shoulders. Eventually she required a hip replacement and as part of her post-operative care her doctor recommended Pilates. This has aided her recovery by providing optimal alignment of the body, use of the stabilizers to control imbalances, maintenance of the range of motion of the hip and strengthening of surrounding tissue as well as the core muscles.
Table of Contents

Abstract .........................................................................................1

Table of Contents ........................................................................2

Anatomy of the Hip Joint..............................................................3

Case Study....................................................................................5

Conditioning Programme............................................................7

Bibliography................................................................................11
Anatomy of the Hip Joint

The hip joint is a very important synovial articulation in the human body. Its main function is to stabilize and support the weight of the body as well as to enable mobilisation. Therefore, its range of motion is compromised by the need for stabilisation. The hip is a ball and socket joint where the head of the femur articulate with the acetabulum of the pelvic bone which is illustrated in figure 1.

Figure 1

Function of the hip joint

The movement in the hip joint occurs around different axis and it includes flexion, extension, abduction, adduction, rotation and circumduction. The muscles and its respective functions are listed in table 1.

Table 1

<table>
<thead>
<tr>
<th>Function</th>
<th>Muscles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexion</td>
<td>Iliopsoas, rectus femoris, Sartorius, tensor fascia latae, pectineus, adductor longu and brevis and gracilis.</td>
</tr>
<tr>
<td>Extension</td>
<td>Hamstring group, gluteus maximus and adductor magnus.</td>
</tr>
<tr>
<td>Abduction</td>
<td>Gluteus medius, gluteus minimums, tensor fasciae latae, Sartorius, upper ranges of the iliopsoas and piriformis.</td>
</tr>
<tr>
<td>Adduction</td>
<td>Adductor longus, adductor brevis, adductor magnus, gracilis, and pectineus.</td>
</tr>
<tr>
<td>Internal rotation</td>
<td>Gluteus medius, gluteus minimus, tensor fasciae latae, periformis, semitendinosus and semimembranosus.</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>External rotation</td>
<td>Gluteus maximus, posterior fibers of gluteus medius, Sartorius, biceps femoris and deep rotators.</td>
</tr>
</tbody>
</table>

**Common pathology of the hip joint**

Osteoarthritis: Is the abnormal wear and tear of the cartilage forming the articular surface. Severe osteoarthritis lead to bone-on-bone articulation thus resulting in pain and stiffness as illustrated in Figure 2.

**Figure 2**

Avascular necrosis: occurs when the blood supply to the head of femur is inadequate leading to bone death.

Fracture of the Neck of Femur: Is when the top part of the femur becomes broken usually due to trauma. This causes pain on weight bearing and the leg is often shortened and externally rotated.

Bone Tumors: Occur when cell divide abnormally forming a mass or lump of tissue inside of the bones. This tumor sometimes needs to be removed so the displacement of healthy tissue for abnormal ones can be control.

**Hip Replacement statistics**

The number of hip replacements has increased considerably. This surgery is one of the most commons inpatient procedures realised in the past decade.

The commonest cause for hip replacement is osteoarthritis. According to Centres for Diseases Control and Prevention Statistics, Osteoarthritis affects 13.9% of adults ages 25 and up, and 33.6% of those 65 and up in the USA.
Case Study

Suria is a 46 year-old woman, mum of 4 children and a very active person. She does cycling, running and plays tennis as often as her routine allows. She has been facing issues with her left hip since the age of 20 years. Being a sports person allowed her to keep her body active for over twenty years despite the pain she experienced around the hip. She avoided surgery for a long period while the discomfort worsened and with it her posture as a result of her poor muscle recruitment, unlevelled body alignment and maladaptation. This eventually became unbearable to her affecting her lifestyle in many different levels.

Her left hip developed osteoarthritis and the weight bearing to her opposite side provoked over used and excessive pressure of her right knee causing pain on it. The compensation of her body due the bone-on-bone articulation on her left hip, caused discomfort on her lower back and her right elbow ended up with tennis elbow.

Suria went through the hip replacement 6 months ago. Her recovery was quite impressive due her premorbid active lifestyle and her dedication to Pilates sessions twice weekly week.

When she came to the studio she was complaining about lower back pain and the most common symptom related to hip surgery; the feeling of having one leg longer than the other. This unlevelled pelvis would result in dangerous compensations on her spine so we started focusing our sessions on alignment, increasing strength and gradual increase in range of motion of her hip. We also focused on stretching and increasing awareness of her new situation. The low impact exercises in Pilates is one more positive aspect of the method, as well as the ability to use supported positions during the sessions.

Stabilizing Suria’s pelvis was important so she would be able to deal with her new left hip prosthesis. This stability was build by strengthening her pelvic floor muscles and core muscles.

Due to her four pregnancies, four natural deliveries, the hip replacement and the starting of her menopause, the importance of strengthening her pelvic floor muscles increased significantly during this stage of her life. Exercises of the pelvic floor muscles were suggested in order to improve the awareness of this area surrounded by the deep hip muscles, adductor muscles, gluteus muscles and lower abdominal
muscles. The pelvic floor is stabilized when its muscles get contracted before the abdominal muscles exercises happen. To understand more about the pelvic floor, it is important to know that it is located at the lowest part of the trunk and is attached to the bone of the pelvis. It is arranged in two main layers: a superficial layer called perineum and a deep layer called the pelvic diaphragm. Also important to know which sensations it brings when it is activated. For that we used the example of the pelvic floor muscles under pressure during daily activities like coughing, raising the voice, laughing, blocking the breath before lifting a heavy object or even when blowing a candle flame. The responses to the activation of the pelvic floor could be diverse but the aim was to get the feeling that the pelvic floor region would contract strongly in on itself during these activates. This motion is related to muscles that have strong tone and must be synchronized with abdominal muscles recruitment. The precision on the localization and understanding how to distinguishing between the pelvic floor muscles and the adjacent muscles around it, is fundamental to build the awareness needed in Suria’s case. A conditioning programme using the BASI Block System was used in it length and order to work the body as a whole based upon the ten Pilates principles, which are; awareness, balance, breath, concentration, centre, control, efficiency, flow, precision and harmony. The classes started with the Fundamental Warm Up and followed the BASI System which is: Foot Work, Abdominal Work, Hip Work, Spinal Articulation, Stretches, Full Body integration 1, Arm Work, Full Body Integration 2, Leg Work, Lateral Flexion/Rotation, and Back Extension. However the full body integration 2 was not used during the first 20 sessions.
Conditioning Programme

Starting the class
We would start the class standing and doing 2x the Roll Down exercise. At the start of the class with Suria is in a standing position to build up her awareness towards the alignment of her body and to start connecting with her breath. The Roll Down exercise is a positive way to scan the body helping Suria to centre and access how is her posture and how the muscles would respond to this flexion motion of her body. She has noticed that her range of motion on this exercise has decreased after the surgery and it may have happen due to the lack of flexibility of her hamstrings, probably for being not using her body as much as she used to right after it.

Fundamental Warm up
This would involve Pelvic Curl, Spine Twist Supine, Chest Lift and Chest Lift with rotation. This warm up sequence of mat exercises is an important way of starting to engage the muscles around Suria's hip, allowing her spine to be mobile and her core to be awaken identifying it's connections with her pelvic floor. The Pelvic Curl promotes the pelvic lumbar stabilization and encourages the proper engagement and control of her hamstring and core muscles. The Spine Twist Supine is ideal to stabilize the level of her pelvis activating her oblique muscles. Chest Lift and Chest Lift with Rotation are movements that engage the core muscles.

Foot Work at the Reformer
This involves; Parallel Heels, Parallel Toes, V Position Toes, Open V Heels, Open V Toes, Calf Raises, Prances, Prehensile, Single Leg Heel, Single Leg Toes. This series of exercises is designed to improve the understanding of Suria’s body alignment starting from her feet, knee and hip levels. Strengthening her quadriceps, hamstrings and ankle flexors/extensors is important to get the stabilization around her hips. Practicing the single Leg Heel and Toes gives the opportunity to work individually the strength and alignment of each leg. After so many years of unlevelled pelvis and hip out of alignment, Suria’s avoided to put weight on her left leg and was always trying to compensate it using the right leg instead. This habit lead her body to have a weaker left leg that got benefits out of this foot work serie specially during the single leg heel and toes.
Abdominal Work at the Reformer
This involves; Short Box Series; Round Back, Flat Back, Tilt and Twist. This series of exercises is to strengthen Suria’s abdominal muscles and keep the stabilization of her pelvis. The Flat Back exercise is going to recruit her ability to co-contract her core and back extensors muscles, keeping the spine aligned. The Tilt exercise is going to emphasise the stretch on one of her lateral sides (abdominal oblique, quadratus lumborum and latissimus dorsi). The Twist is going to strengthen the core with oblique emphasis. Suria had the tendency of recruiting more her hip flexors while doing this series. Understanding how to release those muscles a bit and engage more of the core muscles was a fundamental skill that she could use in her daily activities as well, such as climbing stairs, tying shoes, sitting and getting up from a chair. During the Tilt, she felt towards her right side an intense stretch around her left hip and continuity of the practice she noticed that this discomfort was easing of and it was actually beneficial for the fascia surrounding the muscles around the joint.

Hip Work at the Cadillac
This involves; Single Leg Supine; Frog, Circles (Down, Up), Hip Extension, Bicycle. These exercises were chosen to observe hip disassociation, stability of the pelvis, deviation or any separation. Suria needed to strengthen the hip extensors as well as the adductors muscles. Her body needed to improve it’s the balance, maximizing hip disassociation and coordination around the hip area while keeping a pelvic and lumbar stabilization. This serie of exercises was challenging for her due the difference of strengthen on each leg and the instability of her pelvis. The use of the thoracic breathing helped with concentration, centre and control of her movements. Suria struggled with pelvis alignment and balance. This exercise guided her to a better understand of the bad habit of compensating and using poor muscles recruitment. Her ability of executing this series improved considerably after the first 10 first sessions.

Spinal Articulation at the Wunda Chair
This involves doing the pelvic Curl. We aime to create articulation of the spine, releasing some of the tension of Suria’s spine and strengthening her hamstrings and
core connections. This exercise add some more challenging for her hamstrings and core activation which is what we needed to improve her pelvic lumbar stabilization.

**Stretches at the Reformer**
This involved the standing lunge. Suria hip area was thigh and needed movement of stretch and releasing the tension around it. Keeping Suria back extensors engaged while doing this exercise accentuated the stretch of her hip flexors. Her hamstring on the right side wore tighter probable of years of compensations towards that side.

**Full Body Integration at the Reformer**
This involved knee stretch group-scooter. We aimed to Control of her pelvic lumbar stabilization, improvement on hip disassociation and engagement of the core muscles. This exercise work the sides individually and in Suria’s case it is very beneficial while giving the body the supported position needed. Suria left leg was much weaker than the right and because of it the stabilization of her pelvis was compromised and the whole spine responded to it with deviations and compensations. The activation of the pelvic floor and deep lower core muscles was really important at this stage.

**Arm Work at Wunda Chair**
This involved doing the triceps prone exercise. We aimed to Stabilize Suria spine by activating the co-contraction of back extensors and core muscles while maintaining her scapula stable. This exercise helped with the activation of her hip extensors, using the core to protect her lower back and engaging the back extensors to maintain the posture through out the exercise.

**Leg Work at the Wunda Chair**
This involved doing leg press while standing. We aimed to Work with the balance and control of Suria’s body while standing in one leg and strengthening the hamstrings. At first Suria needed the help of the wall to be standing in one leg but after few sessions she built up the strengthen and control needed for this exercise. Avoid leaning forward was later her balance when the wall wasn’t needed anymore.
Lateral Flexion/Rotation at the Wunda Chair
This involved a side stretch. We aimed to achieve pelvic stability while stretching the side muscles of her body. The stretch on her left side was more intense then on the right. Her left side oblique wore also weaker then the right side. This was noticed because she at first wasn’t able to bring her spine back up again without rotating her torso to help the movement. This exercise was also good to bring the awareness toward the stability of her pelvis and her natural habit of bending over the lumbar while doing lateral flexion.

Back Extension at the Wonder Chair
This involved the Swan basic exercise. We aimed to achieve engagement of Suria’s back extensors muscles while recruiting the abdominal muscles. Suria benefits doing back extension due her tendency of a slight accentuated kyphosis. This brought her a good feeling of opening of shoulders and chest while keeping the core engaged and hip extensors activated.

Conclusion

During Suria’s Pilates sessions we first focus on the recruitment of the pelvic floor and core muscles and after that the classes were followed to build a better alignment of her limbs and spine, specially stretching and strengthening the muscles around her hip joint.

The combination of the Pilates principles and the BASI Block System gave Suria the opportunity to not only recover from the hip replacement surgery but also to improve her understanding of her body mechanics, alignments and a better way to recruit her muscles while moving.

Suria’s recovery was relatively short and her ability to perform movements in all ranges of motions was surprisingly good and resembled a healthy hip joint. She has not only been able to mobilise pain free and in good range of movement but also has been free of lower back pain since her pilates sessions.

The number of hip replacements is increasing and patients are having these operations at younger ages. This case study supports pilates as an effective post-operation rehabilitation program for younger people with an active pre morbid state.
Bibliography

Book


Websites


Articles
