Total Knee Replacement
Bachelor Thesis

Head of the Bachelor's Thesis:  
Mgr. Ilona Kucerova

Author:  
Vikrant Godara
**Abstract:**

**Title:** Total knee replacement

**Aim:** the aim of this thesis is to a clinical study of a patient who had underwent the total knee replacement and to give her suitable rehabilitation. This is the final thesis for the bachelor degree in physiotherapy.

The anatomy of the joints, muscles, ligaments, cartilages of the knee joint are described with their functions. Also, the movements and kinesiology of the knee are discussed in details. All these followed by the osteoarthritis like what it is, what causes it and so-on. Total knee replacement are also described in detail with the procedures that should be done before and after operation and the care that should be taken by the patient after the operation. At the end of the theoretical part, the ways of rehabilitation are being listed. In the case study, the initial examinations, short term plan, long term plan, day to day therapy and their effects are shown with the final examination and the therapeutic effect. The different approaches were used in the therapies to get the full function of the knee. The patient got better but needs more therapies. A total of 8 therapies were done with the patient.

**Key words:** anatomy of knee, osteoarthritis. Total knee replacement, rehabilitation plan.
DECLARATION

I declare that this bachelor thesis is an individual work done by me from 21/01/2019 till 01/02/2019 in Nemocnice Kladno. The information which I have used in this thesis is from the literature which I have put at the end of this thesis. I also declare that no invasive methods were used during this. And it was informed by me, that I am a student.

Vikrant Godara
I would love to thank my supervisor Mgr. Ilona Kucerova for her precious time. The advices which she have given was great and very helpful. I don’t know Czech language and English was not known by the patient so she was the one, who stood with me in everything. It was a nice experience with the patient as well as she was co-operating and helping me in every aspect. I did my thesis in Nemocnice Kladno and same like every time it was really helpful. I feel very lucky because each and every teacher in my faculty are always ready for support. Last but not the least, the love from the family is always awesome feeling.
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1. **Introduction:**

   My patient was with total knee replacement. It was due to osteoarthritis which is also known as wear and tear arthritis. It is a degenerative joint disease which causes degeneration of cartilage. The articulating surfaces are replaced by prosthesis of plastic and metal in the joint. This kind of surgery needs rehabilitation and day to day therapies for several days. This thesis include theoretical part and case study. In the theoretical part the movements, kinesiology and the anatomy of the knee joint are present. While in the case study, the initial and final examination are done with day to day therapies.
2. General Part

**Image 1 knee bones**

2.1 Anatomy of the knee joint:

Knee joint is a hinge type of synovial joint with the longest joint in the whole body. Upper end of femur, patella and lower part of femur makes the knee. According to the anatomy, the knee joint consists of muscles, ligaments, fibrocartilaginous menisci, ligaments and synovial membrane. Also, the articulations which are patellofemoral and tibiofemoral. The joint is mainly stable because of the muscles which are working nearby the joint, connectors for tibia and femur which are ligaments and tendons. Cartilages also plays a vital role in decreasing the pressure on the joint and make the movement free and without any friction. The movements in this joint are mainly extension and flexion but according to new studies it is proven that it also have slight rotations in both directions that is external and internal rotations. (1,2,13,17,20,21)

2.1.1 Joint capsule:

Synovial membrane and fibrous membrane is what the capsule consists of. The fatty deposits separates them anteriorly and posteriorly. The tibia, femur and patella are stabilized at their correct positions by the fibrous membrane. However, the viscous material is being
secreted by the synovial membrane which is known as synovial fluid. Which acts as a shock absorber, lubricant and conductor for nutrients. The synovial fluid is very important and is in limited quantity as you can say that it is just few centimeter. (2,11)

2.1.2 Ligaments:

Anterior cruciate ligaments: The origin for this ligament is on the medial and lateral aspect of the tibial plateau. While, the insertion is on the lateral femoral condyle. Tibial nerve and geniculate artery are functioning here. There are two bundles in it which are named as follows: anteromedial and posterolateral bundles. The rotations, if it is excessive in lateral and tibial medial are being prevented by this ligament. The tibial translation also being resisted by this and stresses which are given by valgus and varus.

Posterior cruciate ligament: The origin for this ligament is on the lateral aspect of the medial femoral condyle. While, the insertion is on the posterior intercondylar fossa.

It is the largest interarticular ligament as it is double in thickness of the anterior cruciate ligament and more than double in the strength. The size of this ligament is vital for
the stability. It is opposite to the forces which want to push the tibia posteriorly. Rotations for sure are controlled in the knee by this.

Lateral collateral ligament: The origin for this ligament is on the lateral femoral epicondyle. While, the insertion is on the head of fibula. It is on the outer side of the knee and easy to recognize as it is road like. The excessiveness in the medial displacement of tibia on femur is being prevented. It is more flexible than the medial collateral ligament which is why it is less susceptible to injury. It taut, when the extension is present in the knee. However, this ligament loosens up when the knee goes in flexion as the distance between the ends of the ligaments gets lower. If the person is mediolateral stable than one can say that there is no rupture in this ligament.

Medial collateral ligament: The origin for this ligament is on the medial epicondyle of femur. While, the insertion is on the medial surface of tibia. The forces which are willing to push the knee in medial direction are being resisted. Otherwise, there will be deformity which will be valgus. It is less flexible than the lateral collateral ligament which is why it is more susceptible to injury. It taut, when the extension is present in the knee. However, this ligament loosens up when the knee goes in flexion as the distance between the ends of the ligaments gets lower. If the person is mediolateral stable than one can say that there is no rupture in this ligament. (2,7,17)

2.1.3 Menisci:

It is present in both humans and animals. In humans one can find it in wrist, knee, acromioclavicular, temporomandibular and sternoclavicular joints. Knee’s cartilage, semilunar cartilage also know as meniscus. It can be lateral or medial meniscus. It can be found in the joint space or one can say between two or more bones. It helps as a shock absorber in our daily living or in professional cases also such as running. It is found between ends of femur and tibia. From the bottom they are flat whereas concave on the top articulating with tibia. The age is a major factor in this, as the flow of the blood decreases with age and by that its very hard to heal. The flow of the blood is from peripheral to the central. The thing which menisci does, is to have the load at a wider area by which the condyles of the tibia and femur can meet at any point mainly during flexion and extension. The lateral meniscus is different than medial one. Because medial is c-shaped, larger, not flexible and have
stronger boundation with capsular structures while lateral  is 0-shaped. Highly mobile forward and backward movement can be seen in lateral which is missing in medial as it moves a little. (2,7,17)

2.1.4 Bursae:

Fluid filled structure which exist between the bone and tendon or skin and tendon is known as bursae. Inflammation of bursae is called as bursitis. Bursae helps in decrease in friction between the moving structures which are adjacent. In knee it mostly happens in the medial side just below the joint or over kneecap. Suprapatellar, prepatellar, superficial and deep infrapatellar bursae are the bursae which are available around the knee. Bursitis can be because of infection, overuse or trauma. May be sometimes, It will be not known. (2,15,17)

2.1.5 Blood supply to the knee:

The middle, inferior and lateral genicular arteries with superior medial and lateral has taken the hold to supply the blood to the knee. (2,16)

2.1.6 Muscles of the knee: (2,8,10,15)

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Image 3 muscles of the knee
Adductor Brevis
- Anterior surface of inferior pubic ramus
- Pectineal line and superior part of medial lip of linea aspera
- Adducts and flexes the thigh, and helps to laterally rotate the thigh
- Obturator Nerve (L2, L3, L4)

Adductor Longus
- Anterior surface of body of pubis
- Middle third of linea aspera
- Adducts and flexes the thigh, and helps to laterally rotate the hip joint
- Obturator Nerve (L2, L3, L4)

Adductor Magnus
- Inferior pubic ramus, ischial ramus, and inferolateral area of ischial tuberosity
- Gluteal tuberosity of femur, medial lip of linea aspera, medial supracondylar ridge, adductor tubercle
- Powerful thigh adductor, superior horizontal fibers also help flex the thigh, while vertical fibers help extend the thigh
- Obturator Nerve, vertical hamstring portion innervated by tibial nerve (L2, L3, L4)

Gracilis
- Inferior margin of pubic symphysis, inferior ramus, inferior ramus of pubis, adjacent ramus of ischium
- Medial surface of tibial shaft
- Flexes the knee, adducts the thigh, and helps to medially rotate the tibia on the femur
- Obturator Nerve (L2, L3, L4)

Sartorius
- ASIS
- Superior aspect of the medial surface of the tibial shaft near the tibial tuberosity
- Flexes and laterally rotates the hip joint and flexes the knee
- Femoral Nerve (L2, L3, L4)
Tensor Fascia Latae

ASIS, Outer lip of anterior iliac crest, fasica lata
Iliotibial band
Helps stabilize and steady the hip and knee joints by putting tension on the iliotibial band of fascia
Superior Gluteal Nerve (L4, L5, S1)

Rectus Femoris

Superior 2/3 of anterior and lateral surfaces of femur, lateral intermuscular septum of thigh
Lateral border of patella and forms deep portion of quadriceps tendon
Extends the knee
Muscular Branches of Femoral Nerve (L2, L3, L4)

Vastus Medialis

Inferior intertrochanteric line, spiral line, medial lip of linea aspera, superior supracondylar ridge or femur, medial intermuscular septum
Lateral base and border of patella and forms lateral patellar retinaculum and lateral side of quadriceps femoris tendon
Extends the knee
Muscular Branches of Femoral Nerve (L2, L3, L4)

Vastus Intermedius

Superior 2/3 of anterior and lateral surfaces of femur, lateral intermuscular septum of thigh
Lateral border of patella and forms deep portion of quadriceps tendon
Extends the Knee
Muscular Branches of Femoral Nerve (L2, L3, L4)

Vastus Lateralis

Superior intertrochanteric line, anterior and inferior greater trochanter, superior portion of lateral lip of linea aspera, lateral gluteal tuberosity of femur.
Lateral base and border of patella and forms lateral patellar retinaculum and lateral portion of quadriceps femoris tendon
Extends the knee
Muscular Branches of Femoral Nerve (L2, L3, L4)

**Hamstrings: Biceps Femoris Long Head**
- Posterior portion of ischial tuberosity (shares tendon with semitendinosus)
- Primarily fibular head, LCL and lateral tibial condyle
- Flexes the knee, and also rotates the tibia laterally, long head also extends the hip joint

Tibial Nerve (L5, S1, S2)

**Hamstrings: Biceps Femoris Short Head**
- Lateral lip of linea aspera, lateral supradynlar ridge of femur, lateral intermuscular septum of thigh
- Primary fibular head, LCL and lateral tibial condyle
- Flexes the knee, and also rotates the tibia laterally
- Common Peroneal Nerve (L5, S1, S2)

**Hamstrings: Semimembranosus**
- Superior lateral ischial tuberosity
- Posterior medial tibial condyle
- Extends the thigh, flexes the knee, and also rotates the tibia medially, especially when the knee is flexed

Tibial Nerve (L5, S1, S2)

**Hamstrings: Semitendinosus**
- Superior medial posterior ischial tiberosity (shares tendon with biceps femoris)
- Superior medial tibial shaft
- Extends the thigh and flexes the knee, also rotates the tibia medially, especially when the knee is flexed

Tibial Nerve

**Popliteus**
- lateral epicondyle of the femur
- soleal line of the tibia
- Unlocks knee joint; knee joint stabilization

Tibial nerve
Gastrocnemius
lateral head originates from the lateral condyle of the femur, while the medial head originates from the medial condyle of the femur.

tendo calcaneus (achilles tendon) into mid-posterior calcaneus
plantar flexes foot, flexes knee
Tibial Nerve

2.2 Kinesiology

Movements in the knee joint:
I have already written before in this thesis that flexion and extension are the main movements but there is a slight rotation in both sides but this happens when the knee is bent because when the knee is extended it gets blocked due to rotation medially of condyles of femur on tibial plateau. The cruciate ligaments takes control of rotation when the knee is in flexion. If one will compare the rotations then it is visible that medial is less than the lateral one. The range of motion which are physiological are:

- Extension: 0 degree
- Flexion: 120 degree with the hip extended and 140 with the hip flexed
- Lateral rotation: 30 degree
- Medial rotation: 5 degree with the knee extended and 10 degree with flexed knee.

Unwinding of cruciate ligaments while lateral rotation and twisting of cruciate ligaments while medial rotation. Tibial collateral ligaments are responsible for the limitation in lateral rotation. Thigh muscles gets relaxed when the knee is locked but while unlocking the contraction can be seen in popliteus muscle which makes the femur rotates on tibial plateau by 5 degree. Maltracking of patella is because of more tightness in the iliotibial band. Tilt in the patella can be because of force components which are by lateral and medial quadriceps. Pulling of patella in the lateral direction is because of vastus lateralis whereas there is a muscle which opposes it. That muscle is known as vastus medialis. (3,15)
2.3 Biomechanics of knee

Forces at tibiofemoral joint: During walking, medial tibial plateau is the one which bears most number of load as it is thrice thicker and 60 percent bigger than the lateral plateau. Load of 50 percent gets absorbed by meniscus as it is for spreading the load and forces at a wider area, to have minimal stress on the joint. There is difference on the load in the knee joint depending on what kind of activity you are doing with it. Like while walking 3 times of load and 4 times of load while walking upstairs. In the swing phase, the lateral plateau has least amount of weight on it.

Forces at the patellofemoral joint: During weight bearing there is an increase in the compression of patellofemoral joint. It is because, when there will be increase in flexion, there will be increase in the compressive component of forces which are working on the joint. If the knee is bulking against gravity, then we we can say that there is not enough tension on quadriceps because when the flexion is increasing, the amount of tension should be higher. Compressive force is half of weight of body during walking but it can increase upto 3 times while climbing on stairs. (3,15)

2.4 Osteoarthritis:

Image 4 Osteoarthritis

VERITAS health
When the cushioning is no longer available between two joints or cartilages. This makes the bones rub with each other. It is a degenerative joint disease which also known as wear and tear arthritis. This can cause swelling, pain, stiffness,warmness around the joint, crackly sound, less range of motion and bone spurs. It is a kind of disease which usually happens to the people who are over 45 but sometimes sometimes it happens in younger age also. And in women it is more as compared to men. The reasons for this can be:

Age, weight, genetic mutations, inherited abnormalities in the shape of the bones, repetitive injuries,muscles around the knee are weak, metabolic disorder.

The diagnosis for this can be done by Magnetic resonance imaging, X-ray, Blood test, physical exam, medical history, family history.

Treatment: weight loss, exercises for stretching and strengthening the muscles around the knee to make it more stable and flexible, pain relievers and anti-inflammatory drugs, injections for corticosteroids, physical therapies like acupuncture, occupational therapy, surgery.

Types of surgeries for treatment of osteoarthritis: osteotomy, arthroscopy and arthroplasty. (4,5,12,14,18,23)

2.5 Knee Replacement:

Image 5 total knee replacement

This is also known as arthroplasty which is a kind of surgery to replace the damaged part of the bones at the bottom or on top. In this, plastic or metal parts are used to put it at the bottom or on top of bones. This can be done in case of, breakdown of adjacent bones, cartilages, synovial
membrane, excessive synovial fluid. Most of the times osteoarthritis is the main cause of knee replacement.

This surgery is done, to get rid of pain, disability of knee, limitation in movements, unable to do normal activities such as walking, running, walking on stairs. But before surgery there are some other ways which should be prescribed like:

Anti-inflammatory medications, Glucosamine and chondroitin sulfate, Pain medications, Limiting painful activities, Assistive devices for walking, Physical therapy, Cortisone injections into the knee joint, Visco supplementation injections, Weight loss for obese people.

Risks:

Bleeding, Infection, Blood clots in the legs or lungs, Loosening or wearing out of the prosthesis, Fracture, Continued pain or stiffness. It may happen that the joint will not work the same as it was working before so in that case, one have to repeat the surgery. Numbness can also be seen in the whole or a part of limb.

Before the operation:

Firstly the doctor will explain you the whole procedure and will ask you to sign consent for giving the permission to the doctor for the operation. The blood pressure will be checked before the operation and an anamnesis will be taken whose main role is to focus on medical history and be aware of the complications which can occur because of past. All the medications which patient is taking will be asked and about the pregnancy also. No food before the operation (atleast 8 hours before the operation). The therapist will instruct all the exercise which patient have to do after operation.

After the procedure:

In the observation room till blood pressure, pulse rate and breathing gets normal. In the knee joint its necessary to move the joint. So the therapist will start with it. The surgical area should be clean and dry. Pain killer medicine will be given if the patient needs it but
only in normal dosage because taking it more can increase the chances of bleeding. A walker or cane will be given as an assistive device. (5,9,19,22)

2.6 After the total knee replacement the treatment by physiotherapy should include:

Lengthening of shorted muscles, strengthening of weak muscles, soft tissue techniques for the treatment of scar, mobilization of joints which are affected but not in knee joint, post isometric relaxation for tense muscles, active and passive movements, electric stimulation if needed, cryotherapy to reduce swelling, biolamp and sensomotoric exercises for stability. Exercises to improve active daily living. (6,8,12)
3 Case study

3.1 Methodology

The clinical practice was held from 21/01/2019 till 1/02/2019 at Nemocnice Kladno, Czech Republic. I have seen the patient for the first time on 28/01/2019. The patient is a female born in 1951 with the operation after total knee replacement in the right knee.

The diagnostic and methods which were used:

Aspection, postural examination, palpation of pelvis, stereotype of breathing, gait analysis, anthropometric measurement, movement stereotype, neurological and joint play examination, muscle length and strength test, muscle tone and range of motion in the joints.

Therapeutic methods: soft tissue techniques, isotonic and isometric exercises for strengthening, stretching exercises, post isometric relaxation technique.

Used tools: measuring tape, overball, gymball, measuring tape.
3.2 Anamnesis (medical history)

3.2.1 Status presents:

Objective:

Examined person: H.K

Gender: Female

Medical Code: Z509

Year of birth: 1951

Height: 155cm

Weight: 67Kg

BMI: 23.5kg/m²

Crutches: Forearm crutches

Subjective:

She is feeling pain around the right knee. It’s a little bit swollen also.

3.2.2 History Anamnesis:

The patient was suffering from arthritis in the right knee and it was so painful that the patient was not able to walk. Total knee replacement surgery was required.

3.2.3 Injury Anamnesis:

No injury anamnesis.
3.2.4 Surgery Anamnesis:

3.2.5 Medical Anamnesis:
Now she is taking pills for hypothyroidism.

3.2.6 Family Anamnesis:
No serious problems in the family and relatives.

3.2.7 Social Anamnesis:
She lives in a flat, on the 1st floor without elevator. She is using 24 stairs to go to her floor.

3.2.8 Occupational Anamnesis:
The patient is taking care of the home. And enjoying her hobbies.

3.2.8 Allergy Anamnesis:
None

3.2.9 Hobbies:
Gardening, cycling (800,000km/year)

3.2.10 Abuse:
None, once a day coffee

3.2.11 Rehabilitation indications:
Doctor indicated to educate and improve the patients gait, soft tissue technique around the scar of the right knee, stretching and strengthening f the surrounding muscles. Relaxation of hypertonic muscles with the help of post isometric relaxation. Moreover, mobilization of restricted joints in the lower extremity.
3.3 Initial Kinesiology examination:

3.3.1 Observation:

Image 6 initial kinesiological examination viewed from anterior side

- No redness

- Stiches were 15 cm long.

- Slight swelling around the knee and lateral and posterior part of lower thigh
Image 7 initial kinesiological examination viewed from the lateral side

-Bruises on right leg on the postero-lateral part of the thigh nearly 10cm cranially from knee joint and the bruises are of 10-12cm.
3.3.2 Postural examination (static):

Image 8 initial kinesiological examination from anterior aspect
3.3.3 Aspection -

Anterior view - • the base of support - normal

• the position of the feet - valgus on both sides

• the position and shape of the toes - valgus on both sides

• weight distribution - because of flat foot the weight is more medially.

• shape and position of the knee joints - varosis in left knee

• configuration of m. tibialis anterior - normal

• contour of the calf muscles - normal

• shape of the thigh muscles - hypertrophy on the right side.

• position of the pelvis - right is higher than the left side.

• symmetry of the muscle tone of abdominal muscles - symmetrical

• position of the navel - neutral

• symmetry of thoracobrachial triangles - symmetrical

• position and symmetry of the chest - symmetrical

• position of the sternum - normal

• position of the collarbones and superclavicular holes - normal

• position of the shoulder girdle - left shoulder is elevated than the right one.
• position of the upper limbs - normal

• position of the head - normal

**Posterior view** -

• the base of support - normal

• shape and contours of the heels - quadratic on both sides

• shape and position of the ankle joints - valgus on both sides

• shape and thickness of the Achilles tendon - more medially on both sides

• contour of the calf muscles - normal

• shape and position of the knee joints - varosis in left knee

• popliteal line - normal

• contour of the thigh muscles - hypertrophy on right side than the left one

• subgluteal line - symmetrical

• gluteal muscles - symmetrical

• symmetry of thoracobrechial triangles - symmetrical

• position of pelvis - right is higher than the left side.

• paravertebral muscles - hypertrophy on right side than the left side.
• curvature of the spine in the frontal plane- straight

• position of the scapula- left is in abduction and inferior angle is externally rotated.

• position of the shoulder girdle- left shoulder is elevated than the right one.

• position of the upper limb- normal

• position and contour of the nuchal muscles- symmetrical

• position of the head- normal

**Lateral view-**

• weight distribution- normal

• shape and position of the ankle joints- same on both sides

• shape and contour of the shin- normal and symmetrical

• position of the knee joints- on the right side it is semiflexed than the left side.

• contour of the thigh muscles- hypertrophy on right side than the left side.

• position of the pelvis- right is higher than the left side.

• position and curvature of the L, L/Th and Th spine- normal lordotic curve in lumbar spine and kyphotic curve in the thoracic spine.
• shape of the abdominal muscles- protruding of the stomach.

• position of the shoulder girdle- protracted on left side

• position and curvature of the Th/C and C spine- lordotic curve in cervical spine.

• position of the head- protraction.

Conclusion- The patient’s left shoulder is elevated than the right one. Protraction in the head and left shoulder girdle. The left scapula is in abduction and inferior angle is externally rotated. Hypertrophy of right paravertebral muscles. Protruding of the stomach. Pelvis is tilted towards the right side. Hypertone in the muscles of the right thigh. Semiflexed right knee. Valgus feets, toes and ankle on both sides with the varosis in left knee. Achilles tendons on both sides are more medially with quadratic heels on both sides.

3.3.4 Palpation of pelvis:

- SIAS: right is higher than the left side.

- SIPS: right is higher than the left side.

- Iliac Crest: right is higher than the left side.

- Pelvis is tilted towards the right side.

3.3.5 Assessment of stereotype (pattern) of breathing:

- In standing position the patient use the upper chest to breathe.

- In sitting position the patient use the upper chest to breathe.

- In lying position the patient uses the lower chest and little part of abdominals.
3.3.6 Gait analysis:

The patient is using 3 point French crutches.

- width of the base of support- normal

- position of the feet- valgosity on both sides

- walking rhythm- non periodic

- walking speed- slow

- stride length- short on right side

- movement of the foot- heel strike, flat foot, heel off, toe off on both sides

- axial position of the lower limb- flatfoot on both sides, varosity on left knee

- movement and position of the knee and hip- limited extension in right hip and knee.

- position and movements of the pelvis- anterior tilt

- movement of center of gravity- unstable

- position and movements of the trunk- forward bending of trunk

- activity of abdomen muscles- less activity

- position of spine- forward bending of the whole spine

- activity of back muscles- less activity
• position of shoulders- elevated on both sides

• position and movements of the head- protraction

• movements of the upper extremity- she was using crutches

• stability of walking- unstable.

### 3.3.7 Anthropometric Measurements

<table>
<thead>
<tr>
<th>Lower Extremities:</th>
<th>Right</th>
<th>Left</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomical Length</td>
<td>80cm</td>
<td>80cm</td>
</tr>
<tr>
<td>Functional Length</td>
<td>83cm</td>
<td>83cm</td>
</tr>
<tr>
<td>Thigh length:</td>
<td>44.5cm</td>
<td>43.5cm</td>
</tr>
<tr>
<td>Middle leg length:</td>
<td>41cm</td>
<td>41cm</td>
</tr>
<tr>
<td>Foot length:</td>
<td>26cm</td>
<td>25cm</td>
</tr>
<tr>
<td>Thigh circumference</td>
<td>53cm</td>
<td>47cm</td>
</tr>
<tr>
<td>Knee circumference</td>
<td>45cm</td>
<td>41cm</td>
</tr>
<tr>
<td>Calf circumference</td>
<td>38cm</td>
<td>37cm</td>
</tr>
<tr>
<td>Ankle circumference</td>
<td>31cm</td>
<td>31cm</td>
</tr>
<tr>
<td>Foot circumference</td>
<td>25cm</td>
<td>25cm</td>
</tr>
</tbody>
</table>

**Table 1- Initial anthropometric measurement**

### 3.3.8 Movement stereotype:-

<table>
<thead>
<tr>
<th>Left</th>
<th>Hip abduction</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.Rectus femoris</td>
<td>1.Rectus femoris</td>
<td></td>
</tr>
<tr>
<td>2.Abdominal muscles</td>
<td>2.Abdominal muscles</td>
<td></td>
</tr>
<tr>
<td>3.Quadratus lumborum</td>
<td>3.Quadratus lumborum</td>
<td></td>
</tr>
<tr>
<td>4.Iliopsoas</td>
<td>4.Iliopsoas</td>
<td></td>
</tr>
<tr>
<td>5.Tensor fasciae latae</td>
<td>5.Tensor fasciae latae</td>
<td></td>
</tr>
<tr>
<td>Left</td>
<td>Hip extension</td>
<td>Right</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>---------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>1. Gluteus maximus ipsilaterally</td>
<td></td>
<td>1. Paravertebral muscles in th/l area contralaterally</td>
</tr>
<tr>
<td>2. Ischiocrural muscles ipsilaterally</td>
<td></td>
<td>2. Paravertebral muscles in th/l area ipsilaterally</td>
</tr>
<tr>
<td>3. Paravertebral muscles in lumbar area contralaterally</td>
<td></td>
<td>3. Ischiocrural muscles ipsilaterally</td>
</tr>
<tr>
<td>4. Paravertebral muscles in lumbar area ipsilaterally</td>
<td></td>
<td>4. Gluteus maximus ipsilaterally</td>
</tr>
<tr>
<td>5. Paravertebral muscles in th/l area contralaterally</td>
<td></td>
<td>5. Paravertebral muscles in lumbar area contralaterally</td>
</tr>
<tr>
<td>6. Paravertebral muscles in th/l area ipsilaterally</td>
<td></td>
<td>6. Paravertebral muscles in lumbar area ipsilaterally</td>
</tr>
<tr>
<td>7. Shoulder girdle muscles contralaterally</td>
<td></td>
<td>7. Shoulder girdle muscles contralaterally</td>
</tr>
</tbody>
</table>

**Table 2 - Initial movement stereotype**

**3.3.9 Neurological examination:**

**Deep tendon reflexes:**

**Upper extremity**

- biceps(C5)- Right- normal, left- normal
- supinator jerk (C6)- Right- normal, left- normal
- triceps reflex (C7) - Right- normal, left- normal
- finger jerk (C8) – Right- normal, left- normal

**Lower extremity**

- Achilles tendon(L 5 – S 2)- Right- normal, left- normal
- medioplantar reflex (L 5 – S 2)- Right- normal, left- normal
Pyramidal signs:

**upper extremity**
- Juster´s sign: Right- negative, left- negative
- Trömner´s sign: Right- negative, left- negative
- Hoffmann´s sign: Right- negative, left- negative
- Mingazzini: Right- negative, left- negative
- Dufour: Right- negative, left- negative
- Barré: Right- negative, left- negative
- Retardation: Right- negative, left- negative

**Lower extremity**
- Babinski´s sign: Right- negative, left- negative
- Chaddock´s sign: Right- negative, left- negative
- Oppenheim´s sign: Right- negative, left- negative
- Rossolimo´s sign: Right- negative, left- negative
- Mingazzini: right- negative, left- negative
- Barré: Right- negative, left- negative
- Retardation: Right- negative, left- negative

**Cerebellar examination:**
- Finger—nose test: Right- negative
- Heel-knee-shin test: Right- negative

**Sensation examination:**

**Superficial-**
- Tactile: Right- normal, left- normal
- Termic: Right- normal, left- normal
- Algic: Right- normal, left- normal

**Deep sensation-**
- Position sense: Right- negative, left- negative
- Movement sense: Right- negative, left- negative
- Stereognosis: Right- negative, left- negative
- Graphesthesia: Right- negative, left- negative
- Two-point movement: Right- negative, left- negative
3.3.10 Joint play examination-

IF1 - no restriction on both

IP2 - no restriction on both sides

MTP - no restriction on both sides

Lisfrank joint - no restriction on both sides

Chopart joint - no restriction on both sides

Talus - no restriction on both sides

Os navicular - no restriction on both sides

Calcaneus - no restriction on both sides

Talocrural joint - no restriction on both sides

Tibiofibular joint – no restriction on both sides

Tibiofemoral joint – slight limitation in anterior and posterior direction on both legs.

Patellofemoral joint - limitation in cranial and caudal direction on both sides

SI joint - no restriction on both sides

Conclusion- patient have slight limitation in tibiofemoral and patellofemoral joint. Otherwise, all the other joints are with no restriction.
3.3.11 Muscle strength test according to janda-

<table>
<thead>
<tr>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-</td>
<td>Hip adductors</td>
</tr>
<tr>
<td>3-</td>
<td>Hip abductors</td>
</tr>
<tr>
<td>4-</td>
<td>Gluteus maximus</td>
</tr>
<tr>
<td>5</td>
<td>Hamstrings</td>
</tr>
<tr>
<td>5</td>
<td>Quadriceps</td>
</tr>
<tr>
<td>5</td>
<td>Gastrocnemius</td>
</tr>
<tr>
<td>5</td>
<td>Soleus</td>
</tr>
</tbody>
</table>

Table 3- Initial examination for muscle strength according to janda

3.3.12 Muscle length test-

<table>
<thead>
<tr>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Hamstrings(Kendall)</td>
</tr>
<tr>
<td>Grade-0</td>
<td>Hip adductors(Janda)</td>
</tr>
<tr>
<td>Grade-0</td>
<td>Gastrocnemius(Janda)</td>
</tr>
<tr>
<td>Grade-0</td>
<td>Soleus(Janda)</td>
</tr>
<tr>
<td>Normal</td>
<td>Rectus femoris(Kendall)</td>
</tr>
<tr>
<td>Normal</td>
<td>Tensor fasciae latae(Kendall)</td>
</tr>
</tbody>
</table>

Table 4- Initial length test according to Janda and Kendall

3.3.13 Muscle tone-

- Hip adductors- hyperton in right leg
- Hip abductors- slight hyperton in right leg because of swelling around the knee
- Gluteal maximus- normal
- Hamstrings- slight hyperton in right leg because of swelling around the knee
- Quadriceps- slight hypertrophy in right leg because of swelling around the knee
- Gastrocnemius- normal
- Soleus- normal
3.3.14 **Range of motion (by Janda)** -

<table>
<thead>
<tr>
<th>Active</th>
<th>Passive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Left</strong></td>
<td><strong>Right</strong></td>
</tr>
<tr>
<td><strong>Hip joint</strong></td>
<td>S-20-0-110</td>
</tr>
<tr>
<td></td>
<td>F-40-0-30</td>
</tr>
<tr>
<td></td>
<td>R-45-0-30</td>
</tr>
<tr>
<td><strong>Ankle joint</strong></td>
<td>S-15-0-40</td>
</tr>
</tbody>
</table>

**Table 5- Initial range of motion in lower extremity**

3.3.15 **Initial examination’s conclusion** -

The patient’s left shoulder is elevated than the right one. Protraction in the head and left shoulder girdle. The left scapula is in abduction and inferior angle is externally rotated. Hypertrophy of right paravertebral muscles. Protruding of the stomach. Pelvis is tilted towards the right side. Hypertone in the muscles of the right thigh. Semiflexed right knee. Valgus feets, toes and ankle on both sides with the varosis in left knee. Achilles tendons on both sides are more medially with quadratic heels on both sides. The patient use the upper chest to breathe while standing and sitting but while standing uses the lower chest and little part of abdominals. The patient have slow, non periodic and unstable gait with short strides on right side and flatfoot on both sides. Limited extension in right hip and knee. Forward bending of whole spine with anterior tilt in pelvis and less activity of abdominals. The circumference around the thigh and knee is more on the right side. Patient have slight limitation in tibiofemoral and patellofemoral joint. Otherwise, all the other joints are with no restriction. Deep tendon reflexes are normal with the pyramidal signs negative in both the upper and lower extremity. And sensations are also physiological. However, the hip abduction and hip extension movement stereotype on the right lower extremity are not physiological. Hamstrings and quadriceps on the right leg are weak. While, hip abductors, adductors and gluteus maximus are weak on both the sides. Moreover, shortness of hamstrings, rectus femoris and tensor...
fasciae latae. At last, less range of motion in the right knee with the hypertone of the muscles around the right knee.

3.4 Short and long term plan with goals-

Goals of short-term plan:
- decrease pain
- increase ROM in extension and flexion of the right knee
- increase in strength of the weakened muscles in the lower extremity
- decrease tension of muscles in the lower extremity
- improvement in correct balance
- bring the stability
- scar movement

Short-term plan:
- increase in range of motion by active and passive movements of the lower extremity
- instruction for correct using of crutches
- strengthening of weak muscles in the lower extremity
- lengthening of shortened muscles in the lower extremity
- soft tissue technique with hands as well as from soft ball
- training for balance

Goals of long-term plan:
- to be able to walk without crutches
- correct posture of walking and breathing
- let the patient get adapt to the new knee
- making the muscles more stronger in the lower extremity

Long-term plan:
- self strengthening exercises for the lower extremity
- training for gait
- self sufficient in active daily living
- more exercises for lengthening and strengthening of the muscles in lower extremity
3.5 Day to day therapy-

3.5.1 Therapy number 1

Date: 28/1/2019

Subjective:

Patient feels slight pain in her right knee. But she looks in nice mood and want to do something related to her knee.

Objective:

The initial examination was performed. Patient looks a little bit tired after the initial examination

Therefore, we were not able to perform any further examinations.

Aim of today's therapy unit-

Our first priority was to decrease pain. Scar therapy so as to reduce the stiffness around the scar. And to increase the range of motion with some stretching of the shorted muscles. Strengthening of weak muscles. Educate the patient about sitting, walking with crutches.

Proposal of therapy-

Soft tissue techniques, exercises to increase range of motion, post isometric relaxation with stretching to lengthen the shortened muscles, exercises to strengthen the weak muscles, cryotherapy, education of walking with crutches, motomed.

Description of therapy-

Started from her room, taught about walking with crutches with the 3 point gait pattern of crutches, firstly crutches then operated leg and at last non operated leg. And while walking instructing her to make the back straight and to use the flexion in the operated leg more. It was almost 20 steps of walking from her room to the therapist room.

Soft tissue technique for the scar in cranial-caudal and leteral medial direction with hands. And after that with soft ball around the scar.

Active assisted flexion in the right knee in supine position. 10 times.

In supine position, by taking the overball under the right knee and then to press it for isometric contraction for strengthening quadriceps femoris in the operated knee. 10 times.

In supine position, putting the overball between both knees and pressing it for isometric contraction for strengthening of hip adductors. 10 times.
In supine position with the knee slightly flexed, putting the theraband around both knee and then to stretch it and back to normal position. 10 times.

In supine position, putting the overball under the ankle and then flex the knee and try to take the overball close to her body in cranial direction. 10 times.

Dorsiflexion and plantarflexion of the ankles and then in circular directions. 10 times each motion.

Post isometric relaxation with stretching for rectus femoris and triceps surae.

Using the stairs, while going up healthy leg, unhealthy leg and then cutches. While coming down, both crutches, unhealthy leg and then healthy leg. She was able to climb 14 stairs but with flexion in the spine and less function of the operated knee.

After going to her room, cryotherapy on the operated knee. It was nearly 15cm long and 10cm wide. Then motomed for 30 minutes with 55 degree flexion.

Effect of therapy-

The patient is feeling less pain. Increase in passive range of motion in flexion of knee by 5 degree. The scar on the operated knee is less restricted in all directions. Rectus femoris and triceps surae are more relaxed. She is able to walk with 3 point crutches.

Self-therapy-

The same exercises with the overball. 10 times each exercise.

3.5.2 Therapy number 2

Date: 28/1/2019

Subjective:

Patient feels less pain in her right knee than last session. She looks in nice mood.

Objective:

the scar looks almost the same. The circumference around the knee is also the same.

Aim of today's therapy unit-

Decrease pain. Scar therapy so as to reduce the stiffness around the scar. stretching for rectus femoris, hip abductors, hip adductors and triceps surae. Strengthening of weak muscles. Re-Educate the patient about walking with crutches.

Proposal of therapy-

Soft tissue techniques, exercises to increase range of motion, post isometric relaxation with stretching for rectus femoris, hip abductors, hip adductors and triceps surae.
Exercises to strengthen the weak muscles, cryotherapy, education of walking with crutches, motomed, bridging.

**Description of therapy**-

- Soft tissue technique for the scar in cranial-caudal and lateral medial direction with hands. And after that with soft ball around the scar.
- Active assisted flexion in the right knee in supine position. 10 times.
- In supine position, by taking the overball under the right knee and then to press it for isometric contraction for strengthening quadriceps femoris in the operated knee. 10 times.
- In supine position, putting the overball between both knees and pressing it for isometric contraction for strengthening of hip adductors. 10 times.
- In supine position with the knee slightly flexed, putting the theraband around both knee and then to stretch it and back to normal position. 10 times.
- In supine position, putting the overball under the ankle and then flex the knee and try to take the overball close to her body in cranial direction. 10 times.
- Dorsiflexion and plantarflexion of the ankles and then in circular directions. 10 times each motion.
- Post isometric relaxation with stretching for rectus femoris, hip abductors, hip adductors and triceps surae.
- Using the stairs, while going up healthy leg, unhealthy leg and then cutches. While coming down, both crutches, unhealthy leg and then healthy leg. She was able to climb 14 stairs but with flexion in the spine and less function of the operated knee.
- Bridging with gymball, by lifting up the pelvis then to hold it for few seconds and relax.
- After going to her room, cryotherapy on the operated knee. It was nearly 15cm long and 10cm wide. Then motomed for 30 minutes with 65 degree flexion.

**Effect of therapy**-

- Increase in active and passive range of motion in flexion of knee by 5 degree and now the extension in the knee is 5 degree. The scar on the operated knee is still restricted but less than last session in all directions.
Self-therapy-

The same exercises with the overball and bridging with gymball. 10 times each exercise.

3.5.3 Therapy number 3

Date: 29/1/2019

Subjective:

Patient looks confident. Doesn’t even talk about the pain. Slept properly last night.

Objective:

increase in passive range of motion in flexion by 10 degree and extension by 5 degree of the operated leg. But active range of motion remains the same.

Aim of today's therapy unit-

Scar therapy so as to reduce the stiffness around the scar. Stretching of adductors and hamstrings. And strengthening of quadriceps, hip flexors and gluteus maximus. Mobilization of patello-femoral joint.

Proposal of therapy-


Description of therapy-

Soft tissue technique for the scar in cranial- caudal and lateral medial direction with hands. And after that with soft ball around the scar.

Active assisted flexion in the right knee in supine position. 10 times.

In supine position, by taking the overball under the right knee and then to press it for isometric contraction for strengthening quadriceps femoris in the operated knee. 10 times.

In supine position, putting the overball between both knees and pressing it for isometric contraction for strengthening of hip adductors. 10 times.

In supine position with the knee slightly flexed, putting the theraband around both knee and then to stretch it and back to normal position. 10 times.

In supine position, putting the overball under the ankle and then flex the knee and try to take the overball close to her body in cranial direction. 10 times.
In prone position, extension in right hip with flexed knee. 10 times.
Dorsiflexion and plantarflexion of the ankles and then in circular directions. 10 times each motion.
Post isometric relaxation with stretching for hip adductors, rectus femoris and biceps femoris.
Using the stairs, while going up healthy leg, unhealthy leg and then cutches. While coming down, both crutches, unhealthy leg and then healthy leg. She was able to climb 14 stairs but with flexion in the spine and less function of the operated knee.
Bridging with gymball, by lifting up the pelvis then to hold it for few seconds and relax.
In supine position, with extended knee. Mobilization of right patello-femoral joint in cranial and caudal direction.
After going to her room, cryotherapy on the operated knee. It was nearly 15cm long and 10cm wide. Then motomed for 30 minutes with 70 degree flexion.

Effect of therapy-
The patient can passively flex her right knee 70 degree passively with extension of 0 degree passively. Active range of motion is 45 degree in flexion and 5 degree in extension in right knee. The relaxation of hip adductors, rectus femoris and biceps femoris. There is a slight release in right patello-femoral joint in cranial and caudal direction.

Self-therapy-
The same exercises with the overball and bridging with gymball. 10 times each exercise.

3.5.4 Therapy number 4
Date: 29/1/2019

Subjective:
Patient looks confident. Doesn’t even talk about the pain. Slept properly last night.

Objective:
The range of motion in the right knee remains the same as in last session.
Aim of today's therapy unit-
Scar therapy so as to reduce the stiffness around the scar. Stretching of adductors and hamstrings. And strengthening of quadriceps, hip flexors and gluteus maximus. Mobilization of patello-femoral joint and mobilization of fibular head.

Proposal of therapy-

Description of therapy-
Soft tissue technique for the scar in cranial-caudal and lateral medial direction with hands. And after that with soft ball around the scar.
Active assisted flexion in the right knee in supine position. 10 times.
In supine position, by taking the overball under the right knee and then to press it for isometric contraction for strengthening quadriceps femoris in the operated knee. 10 times.
In supine position, putting the overball between both knees and pressing it for isometric contraction for strengthening of hip adductors. 10 times.
In supine position with the knee slightly flexed, putting the theraband around both knee and then to stretch it and back to normal position. 10 times.
In supine position, putting the overball under the ankle and then flex the knee and try to take the overball close to her body in cranial direction. 10 times.
In prone position, extension in right hip with flexed knee. 10 times.
Dorsiflexion and plantarflexion of the ankles and then in circular directions. 10 times each motion.
Post isometric relaxation with stretching for hip adductors, rectus femoris and biceps femoris.
Using the stairs, while going up healthy leg, unhealthy leg and then cutches. While coming down, both crutches, unhealthy leg and then healthy leg. She was able to climb 28 stairs but with flexion in the spine and less function of the operated knee.
Bridging with gymball, by lifting up the pelvis then to hold it for few seconds and relax.
In supine position, with extended knee. Mobilization of right patello-femoral joint in cranial and caudal direction.

In supine position, with knee flexed. Mobilization of head of fibula in anterior and posterior direction in right leg.

Self exercise, in sitting position, by extending the right knee and giving resistance by the other leg. By crossing the left foot on the right ankle.

After going to her room, cryotherapy on the operated knee. It was nearly 15cm long and 10cm wide. Then motomed for 30 minutes with 70 degree flexion.

Effect of therapy-

The patient can flex her right knee 70 degree passively with extension of 0 degree passively. The relaxation of hip adductors, rectus femoris and biceps femoris. There is a slight release in right patello-femoral joint in cranial and caudal direction. Slight release in the head of fibula in anterior and posterior direction.

Self-therapy-

The same exercises with the overball and bridging with gymball. 10 times each exercise. Self exercise, in sitting position, by extending the right knee and giving resistance by the other leg. By crossing the left foot on the right ankle.

3.5.5 Therapy number 5

Date: 30/1/2019

Subjective:

The bruises increased on the right lower extremity. Starting from posterior lower half of thigh till the knee posteriorly. The swelling also increased.
**Image 9 during day to day therapy from posterior side**

**Objective:**

Decrease in range of motion of right knee in flexion by 20 degree and take up to 25 degree and extension is 10 degree. Due to increase in bruices, lympho tape is being used to decrease edema on the posterior lower thigh till knee on the right lower extremity.

**Examination:**

- Spine sign test is negative.
- In the pelvis examination, pelvis is tilted towards right side.
- In the dynamic spine examination- in anteflexion- the lumbar area seems to be flat.

**Aim of today's therapy unit:**

- Decrease edema, Scar therapy so as to reduce the stiffness around the scar. Stretching of hip adductors, rectus femoris and hamstrings. And strengthening of quadriceps, hip flexors and gluteus maximus. Mobilization of patello-femoral joint and mobilization of fibular head.

**Proposal of therapy:**

- Opening of lymphatic nodes in the region of inguinal canal, soft tissue techniques, analytic exercises for strengthening of quadriceps, gluteal maximus. Post isometric relaxation with stretching for hip adductors, rectus femoris and biceps femoris. Cryotherapy, training of walking with crutches on flat surfaces and on the stairs, motomed. Mobilization of patello-femoral joint and mobilization of fibular head.
Description of therapy-

Slow superficial massage in cranial direction starting from posterior knee towards postero-medial side. And then opening the nodes by soft touches in the region of inguinal canal.

Soft tissue technique for the scar in cranial-caudal and lateral medial direction with hands. And after that with soft ball around the scar.

Active assisted flexion in the right knee in supine position. 10 times.

In supine position, by taking the overball under the right knee and then to press it for isometric contraction for strengthening quadriceps femoris in the operated knee. 10 times.

In supine position, putting the overball between both knees and pressing it for isometric contraction for strengthening of hip adductors. 10 times.

In supine position with the knee slightly flexed, putting the theraband around both knee and then to stretch it and back to normal position. 10 times.

In supine position, putting the overball under the ankle and then flex the knee and try to take the overball close to her body in cranial direction. 10 times.

In prone position, extension in right hip with flexed knee. 10 times.

Dorsiflexion and plantarflexion of the ankles and then in circular directions. 10 times each motion.

Post isometric relaxation with stretching for hip adductors, rectus femoris and biceps femoris.

Using the stairs, while going up healthy leg, unhealthy leg and then cutches. While coming down, both crutches, unhealthy leg and then healthy leg. She was able to climb 28 stairs but with flexion in the spine and less function of the operated knee.

Bridging with gymball, by lifting up the pelvis then to hold it for few seconds and relax.

In supine position, with extended knee. Mobilization of right patello-femoral joint in cranial and caudal direction.

In supine position, with knee flexed. Mobilization of head of fibula in anterior and posterior direction in right leg.

Self exercise, in sitting position, by extending the right knee and giving resistance by the other leg. By crossing the left foot on the right ankle.
After going to her room, cryotherapy on the operated knee. It was nearly 15cm long and 10cm wide. Then motomed for 30 minutes with 65 degree flexion.

**Effect of therapy-**

The patient can flex her right knee 60 degree passively with extension of 0 degree passively. The relaxation of hip adductors, rectus femoris and biceps femoris. There is a slight release in right patello-femoral joint in cranial and caudal direction. Slight release in the head of fibula in anterior and posterior direction.

**Self-therapy-**

The same exercises with the overball and bridging with gymball. 10 times each exercise. Self exercise, in sitting position, by extending the right knee and giving resistance by the other leg. By crossing the left foot on the right ankle.

**3.5.6 Therapy number 6**

Date: 30/1/2019

**Subjective:**

The bruises increased on the right lower extremity. Starting from posterior lower half of thigh till the knee posteriorly. The swelling also increased.

**Objective:**

Range of motion is the same as in last session. The circumference around the thigh and around the knee is the same.

**Aim of today's therapy unit-**

Decrease edema, Scar therapy so as to reduce the stiffness around the scar. Stretching of hip adductors, rectus femoris and hamstrings. And strengthening of quadriceps, hip flexors and gluteus maximus. Mobilization of patello-femoral joint and mobilization of fibular head.

**Proposal of therapy-**

Opening of lymphatic nodes in the region of inguinal canal, soft tissue techniques, analytic exercises for strengthening of quadriceps, gluteal maximus. Post isometric relaxation with stretching for hip adductors, rectus femoris and biceps femoris. Cryotherapy, training of walking with crutches on flat surfaces and on the stairs, motomed. Mobilization of patello-femoral joint and mobilization of fibular head.
Description of therapy-

Slow superficial massage in cranial direction starting from posterior knee towards postero-medial side. And then opening the nodes by soft touches in the region of inguinal canal.

Soft tissue technique for the scar in cranial-caudal and lateral medial direction with hands. And after that with soft ball around the scar.

Active assisted flexion in the right knee in supine position. 10 times.

In supine position, by taking the overball under the right knee and then to press it for isometric contraction for strengthening quadriceps femoris in the operated knee. 10 times.

In supine position, putting the overball between both knees and pressing it for isometric contraction for strengthening of hip adductors. 10 times.

In supine position with the knee slightly flexed, putting the theraband around both knee and then to stretch it and back to normal position. 10 times.

In supine position, putting the overball under the ankle and then flex the knee and try to take the overball close to her body in cranial direction. 10 times.

In prone position, extension in right hip with flexed knee. 10 times.

Dorsifleion and plantarflexion of the ankles and then in circular directions. 10 times each motion.

Post isometric relaxation with stretching for hip adductors, rectus femoris and biceps femoris.

Using the stairs, while going up healthy leg, unhealthy leg and then cutches. While coming down, both crutches, unhealthy leg and then healthy leg. She was able to climb 28 stairs but with flexion in the spine and less function of the operated knee.

Bridging with gymball, by lifting up the pelvis then to hold it for few seconds and relax.

In supine position, with extended knee. Mobilization of right patello-femoral joint in cranial and caudal direction.

In supine position, with knee flexed. Mobilization of head of fibula in anterior and posterior direction in right leg.

Self exercise, in sitting position, by extending the right knee and giving resistance by the other leg. By crossing the left foot on the right ankle.
After going to her room, cryotherapy on the operated knee. It was nearly 15cm long and 10cm wide. Then motomed for 30 minutes with 65 degree flexion.

**Effect of therapy**

The patient can flex her right knee 60 degree passively with extension of 0 degree passively. The relaxation of hip adductors, rectus femoris and biceps femoris. There is a slight release in right patello-femoral joint in cranial and caudal direction. Slight release in the head of fibula in anterior and posterior direction.

**Self-therapy**

The same exercises with the overball and bridging with gymball. 10 times each exercise. Self exercise, in sitting position, by extending the right knee and giving resistance by the other leg. By crossing the left foot on the right ankle.

**3.5.7 Therapy number 7**

Date: 31/1/2019

**Subjective:**

The patient slept well with no pain and now also looks fresh. Patient feels more stable and is tending to improve the gait.

**Objective:**

The passive range of motion in the right knee is 60 degree and extension 0 degree. The patient is using 2 point crutches. The bruises looks the same.

**Examination**

Two-joint muscles is shortened according to janda.

**Aim of today's therapy unit**

Decrease edema, Scar therapy so as to reduce the stiffness around the scar. Post isometric relaxation with stretching of hip adductors, two-joint muscles and hamstrings. And strengthening of quadriceps, hip flexors and gluteus maximus. Mobilization of patello-femoral joint and mobilization of fibular head.

**Proposal of therapy**

Opening of lymphatic nodes in the region of inguinal canal, soft tissue techniques, analytic exercises for strengthening of quadriceps, gluteal maximus. Post isometric relaxation with stretching for hip adductors, two-joint muscles and hamstrings. Cryotherapy,
training of walking with crutches on flat surfaces and on the stairs, motomed. Mobilization of patello-femoral joint and mobilization of fibular head.

**Description of therapy**

- Slow superficial massage in cranial direction starting from posterior knee towards postero-medial side. And then opening the nodes by soft touches in the region of inguinal canal.
- Soft tissue technique for the scar in cranial-caudal and lateral medial direction with hands. And after that with soft ball around the scar.
- Active assisted flexion in the right knee in supine position. 10 times.
- In supine position, by taking the overball under the right knee and then to press it for isometric contraction for strengthening quadriceps femoris in the operated knee. 10 times.
- In supine position, putting the overball between both knees and pressing it for isometric contraction for strengthening of hip adductors. 10 times.
- In supine position with the knee slightly flexed, putting the theraband around both knee and then to stretch it and back to normal position. 10 times.
- In supine position, putting the overball under the ankle and then flex the knee and try to take the overball close to her body in cranial direction. 10 times.
- In prone position, extension in right hip with flexed knee. 10 times.
- Dorsiflexion and plantarflexion of the ankles and then in circular directions. 10 times each motion.
- Post isometric relaxation with stretching for hip adductors, two-joint muscles and hamstrings.
- Using the stairs, while going up healthy leg, unhealthy leg and then cutches. While coming down, both crutches, unhealthy leg and then healthy leg. She was able to climb 56 stairs but with flexion in the spine and less function of the operated knee.
- Bridging with gymball, by lifting up the pelvis then to hold it for few seconds and relax.
- In supine position, with extended knee. Mobilization of right patello-femoral joint in cranial and caudal direction.
- In supine position, with knee flexed. Mobilization of head of fibula in anterior and posterior direction in right leg.
Self exercise, in sitting position, by extending the right knee and giving resistance by the other leg. By crossing the left foot on the right ankle.

After going to her room, cryotherapy on the operated knee for 20 minutes. It was nearly 15cm long and 10cm wide. Then motomed for 30 minutes with 75 degree flexion.

**Effect of therapy**-

The patient can climb 56 stairs easily. And can flex her right knee 65 degree passively with extension of 0 degree passively. While active range of motion in right knee is 30 degree in flexion and 5 degree in extension. The relaxation of hip adductors, two-joint muscles and hamstrings. There is a slight release in right patello-femoral joint in cranial and caudal direction. Slight release in the head of fibula in anterior and posterior direction.

**Self-therapy**-

The same exercises with the overball and bridging with gymball. 10 times each exercise.

Self exercise, in sitting position, by extending the right knee and giving resistance by the other leg. By crossing the left foot on the right ankle. 10 times.

Self exercise, in supine position, on the side of the treatment table with the treated leg lying on side out of treatment table. Then to raise the leg a little, hold and relax. 10 times.

**3.5.8 Therapy number 8**

Date: 31/1/2019

**Subjective:**

The patient slept well with no pain and now also looks fresh. Patient feels more stable and is tending to improve the gait. Coming straight after the food.

**Objective:**

The passive range of motion in the right knee is 65 degree and extension 0 degree. The patient is using 2 point crutches. The bruises are slightly less.

**Aim of today's therapy unit**-

Decrease edema, Scar therapy so as to reduce the stiffness around the scar. Post isometric relaxation with stretching of for rectus femoris, hip abductors, hip adductors and triceps surae. And strengthening of quadriceps, hip flexors and gluteus maximus. Mobilization of patello-femoral joint and mobilization of fibular head.
Proposal of therapy-

Opening of lymphatic nodes in the region of inguinal canal, soft tissue techniques, analytic exercises for strengthening of quadriceps, gluteal maximus. Post isometric relaxation with stretching for for rectus femoris, hip abductors, hip adductors and triceps surae. Cryotherapy, training of walking with crutches on flat surfaces and on the stairs, motomed. Mobilization of patello-femoral joint and mobilization of fibular head.

Description of therapy-

Slow superficial massage in cranial direction starting from posterior knee towards postero- medial side. And then opening the nodes by soft touches in the region of inguinal canal.

Soft tissue technique for the scar in cranial- caudal and lateral medial direction with hands. And after that with soft ball around the scar.

Active assisted flexion in the right knee in supine position. 10 times.

In supine position, by taking the overball under the right knee and then to press it for isometric contraction for strengthening quadriceps femoris in the operated knee. 10 times.

In supine position, putting the overball between both knees and pressing it for isometric contraction for strengthening of hip adductors. 10 times.

In supine position with the knee slightly flexed, putting the theraband around both knee and then to stretch it and back to normal position. 10 times.

In supine position, putting the overball under the ankle and then flex the knee and try to take the overball close to her body in cranial direction. 10 times.

In prone position, extension in right hip with flexed knee. 10 times.

Dorsifleion and plantarflexion of the ankles and then in circular directions. 10 times each motion.

Post isometric relaxation with stretching for hip adductors, two-joint muscles and hamstrings.

Using the stairs, while going up healthy leg, unhealthy leg and then cutches. While coming down, both crutches, unhealthy leg and then healthy leg. She was able to climb 56 stairs but with flexion in the spine and less function of the operated knee.

Bridging with gymball, by lifting up the pelvis then to hold it for few seconds and relax.
In supine position, with extended knee. Mobilization of right patello-femoral joint in cranial and caudal direction.

In supine position, with knee flexed. Mobilization of head of fibula in anterior and posterior direction in right leg.

Self exercise, in sitting position, by extending the right knee and giving resistance by the other leg. By crossing the left foot on the right ankle.

After going to her room, cryotherapy on the operated knee for 20 minutes. It was nearly 15cm long and 10cm wide. Then motomed for 30 minutes with 75 degree flexion.

**Effect of therapy-**

The patient can climb 56 stairs easily. And can flex her right knee 65 degree passively with extension of 0 degree passively. While active range of motion in right knee is 30 degree in flexion and 5 degree in extension. The relaxation of for rectus femoris, hip abductors, hip adductors and triceps surae.

**Self-therapy-**

The same exercises with the overball and bridging with gymball. 10 times each exercise.

Self exercise, in sitting position, by extending the right knee and giving resistance by the other leg. By crossing the left foot on the right ankle.10 times.

Self exercise, in supine position, on the side of the treatment table with the treated leg lying on side out of treatment table. Then to raise the leg a little, hold and relax. 10 times.
3.6 Final kinesiological examination-

3.6.1 Observation:

- No redness

- Slight swelling around the knee and lateral and posterior part of lower thigh

- Bruises on right leg on the posterior lower part of the thigh till the knee joint. Covered with lympho tape.

- Stiches were 15 cm long.

3.6.2 Postural examination (static):

Aspection-

Anterior view-  • the base of support- normal

  • the position of the feet- valgus on both sides

  • the position and shape of the toes- valgus on both sides

  • weight distribution- because of flat foot the weight is more medially.

  • shape and position of the knee joints- varosis in left knee

  • configuration of m. tibialis anterior- normal

  • contour of the calf muscles- normal

  • shape of the thigh muscles- hypertrophy on the right side.

  • position of the pelvis- right is higher than the left side.
• symmetry of the muscle tone of abdominal muscles- symmetrical

• position of the navel- neutral

• symmetry of thoracobrachial triangles- symmetrical

• position and symmetry of the chest- symmetrical

• position of the sternum- normal

• position of the collarbones and superclavicular holes- normal

• position of the shoulder girdle- left shoulder is elevated than the right one.

• position of the upper limbs- normal

• position of the head- normal

**Posterior view**- • the base of support- normal

• shape and contours of the heels- quadratic on both sides

• shape and position of the ankle joints- valgus on both sides

• shape and thickness of the Achilles tendon- more medially on both sides

• contour of the calf muscles- normal

• shape and position of the knee joints- varosis in left knee

• popliteal line- normal
• contour of the thigh muscles- hypertrophy on right side than the left one

• subgluteal line- symmetrical

• gluteal muscles- symmetrical

• symmetry of thoracobrachial triangles- symmetrical

• position of pelvis- right is higher than the left side.

• paravertebral muscles-hypertrophy on right side than the left side.

• curvature of the spine in the frontal plane- straight

• position of the scapula- left is in abduction and inferior angle is externally rotated.

• position of the shoulder girdle- left shoulder is elevated than the right one.

• position of the upper limb- normal

• position and contour of the nuchal muscles- symmetrical

• position of the head- normal
Lateral view - • weight distribution- normal

• shape and position of the ankle joints- same on both sides

• shape and contour of the shin- normal and symmetrical

• position of the knee joints- on the right side it is semiflexed than the left side.

• contour of the thigh muscles- hypertrophy on right side than the left side.

• position of the pelvis- right is higher than the left side.

• position and curvature of the L, L/Th and Th spine- normal lordotic curve in lumbar spine and kyphotic curve in the thoracic spine.

• shape of the abdominal muscles- protruding of the stomach.

• position of the shoulder girdle- protracted on left side

• position and curvature of the Th/C and C spine- lordotic curve in cervical spine.

• position of the head- protraction.

Conclusion- The patient’s left shoulder is elevated than the right one. Protraction in the head and left shoulder girdle. The left scapula is in abduction and inferior angle is externally rotated. Hypertrophy of right paravertebral muscles. Protruding of the stomach. Pelvis is tilted towards the right side. Hypertone in the muscles of the right thigh. Semiflexed right knee. Valgus feets, toes and ankle on both sides with the varosis in left knee. Achilles tendons on both sides are more medially with quadratic heels on both sides.
3.6.3 **Palpation of pelvis:** SIAS: right is higher than the left side.
   - SIPS: right is higher than the left side.
   - Iliac Crest: right is higher than the left side.
   - Pelvis is tilted towards the right side.

3.6.4 **Assessment of stereotype (pattern) of breathing:**
   - In standing position the patient use the upper chest to breathe.
   - In sitting position the patient use the upper chest to breathe.
   - In lying position the patient uses the lower chest and little part of abdominals.

3.6.5 **Gait analysis:**
   The patient is using 3 point French crutches.
   
   - width of the base of support- normal
   - position of the feet- valgosity on both sides
   - walking rhythm- non periodic
   - walking speed- slow
   - stride length- short on right side
   - movement of the foot- heel strike, flat foot, heel off, toe off on both sides
   - axial position of the lower limb- flatfoot on both sides, varosity on left knee
   - movement and position of the knee and hip- limited extension in right hip and knee.
   - position and movements of the pelvis- anterior tilt
• movement of center of gravity- unstable

• position and movements of the trunk- forward bending of trunk

• activity of abdomen muscles- less activity

• position of spine- forward bending of the whole spine

• activity of back muscles- less activity

• position of shoulders- elevated on both sides

• position and movements of the head- protraction

• movements of the upper extremity- she was using crutches

• stability of walking- unstable.

### 3.6.6 Anthropometric Measurements-

<table>
<thead>
<tr>
<th>Lower Extremities:</th>
<th>Right</th>
<th>Left</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomical Length</td>
<td>80cm</td>
<td>80cm</td>
</tr>
<tr>
<td>Functional Length</td>
<td>83cm</td>
<td>83cm</td>
</tr>
<tr>
<td>Thigh length:</td>
<td>44.5cm</td>
<td>43.5cm</td>
</tr>
<tr>
<td>Middle leg length:</td>
<td>41cm</td>
<td>41cm</td>
</tr>
<tr>
<td>Foot length:</td>
<td>26cm</td>
<td>25cm</td>
</tr>
<tr>
<td>Thigh circumference</td>
<td>53cm</td>
<td>47cm</td>
</tr>
<tr>
<td>Knee circumference</td>
<td>45cm</td>
<td>41cm</td>
</tr>
<tr>
<td>Calf circumference</td>
<td>38cm</td>
<td>37cm</td>
</tr>
<tr>
<td>Ankle circumference</td>
<td>31cm</td>
<td>31cm</td>
</tr>
<tr>
<td>Foot circumference</td>
<td>25cm</td>
<td>25cm</td>
</tr>
</tbody>
</table>

**Table 6- Final anthropometric measurement**
3.6.7 **Movement stereotype**:

<table>
<thead>
<tr>
<th>Left</th>
<th>Hip abduction</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Rectus femoris</td>
<td></td>
<td>1. Rectus femoris</td>
</tr>
<tr>
<td>2. Abdominal muscles</td>
<td></td>
<td>2. Abdominal muscles</td>
</tr>
<tr>
<td>3. Quadratus lumborum</td>
<td></td>
<td>3. Quadratus lumborum</td>
</tr>
<tr>
<td>4. Iliopsoas</td>
<td></td>
<td>4. Iliopsoas</td>
</tr>
<tr>
<td>5. Tensor fasciae latae</td>
<td></td>
<td>5. Tensor fasciae latae</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Left</th>
<th>Hip extension</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gluteus maximus ipsilaterally</td>
<td></td>
<td>1. Paravertebral muscles in th/l area contralaterally</td>
</tr>
<tr>
<td>2. Ischiocrural muscles ipsilaterally</td>
<td></td>
<td>2. Paravertebral muscles in th/l area ipsilaterally</td>
</tr>
<tr>
<td>3. Paravertebral muscles in lumbar area contralaterally</td>
<td></td>
<td>3. Ischiocrural muscles ipsilaterally</td>
</tr>
<tr>
<td>4. Paravertebral muscles in lumbar area ipsilaterally</td>
<td></td>
<td>4. Gluteus maximus ipsilaterally</td>
</tr>
<tr>
<td>5. Paravertebral muscles in th/l area contralaterally</td>
<td></td>
<td>5. Paravertebral muscles in lumbar area contralaterally</td>
</tr>
<tr>
<td>6. Paravertebral muscles in th/l area ipsilaterally</td>
<td></td>
<td>6. Paravertebral muscles in lumbar area ipsilaterally</td>
</tr>
<tr>
<td>7. Shoulder girdle muscles contalaterally</td>
<td></td>
<td>7. Shoulder girdle muscles contalaterally</td>
</tr>
</tbody>
</table>

**Table 7- Final movement stereotype**
3.6.8 Neurological examination:

Deep tendon reflexes:

- **Upper extremity**
  - biceps (C5) - Right normal, left normal
  - supinator jerk (C6) - Right normal, left normal
  - triceps reflex (C7) - Right normal, left normal
  - finger jerk (C8) – Right normal, left normal

- **Lower extremity**
  - Achilles tendon (L 5 – S 2) - Right normal, left normal
  - medioplantar reflex (L 5 – S 2) - Right normal, left normal

Pyramidal signs:

- **Upper extremity**
  - Juster’s sign - Right negative, left negative
  - Trömmer’s sign - Right negative, left negative
  - Hoffmann’s sign - Right negative, left negative
  - Mingazzini - Right negative, left negative
  - Dufour - Right negative, left negative
  - Barré - Right negative, left negative
  - Retardation - Right negative, left negative

- **Lower extremity**
  - Babinski’s sign - Right negative, left negative
  - Chaddock’s sign - Right negative, left negative
  - Oppenheim’s sign - Right negative, left negative
  - Rossolimo’s sign - Right negative, left negative
  - Mingazzini - right negative, left negative
  - Barré - Right negative, left negative
  - Retardation - Right negative, left negative

Cerebellar examination:

- finger – nose test - Right negative
- heel-knee-shin test - Right negative
Sensation examination:

Superficial-
- Tactile- Right- normal, left- normal
- Termic- Right- normal, left- normal
- Algic- Right- normal, left- normal

Deep sensation-
- Position sense- Right- negative, left- negative
- Movement sense- Right- negative, left- negative
- Stereognosis- Right- negative, left- negative
- Graphestesia- Right- negative, left- negative
- Two-point movement- Right- negative, left- negative

3.6.9 Joint play examination-
- IF1 - no restriction on both
- IP2 - no restriction on both sides
- MTP - no restriction on both sides
- Lisfrank joint - no restriction on both sides
- Chopart joint - no restriction on both sides
- Talus - no restriction on both sides
- Os navicular - no restriction on both sides
- Calcaneus - no restriction on both sides
- Talocrural joint - no restriction on both sides
- Tibiofibular joint – no restriction on both sides
- Tibiofemoral joint – slight limitation in anterior and posterior direction on both legs.
- Patellofemoral joint - limitation in cranial and caudal direction on left side.
- SI joint - no restriction on both sides

Conclusion- patient have slight limitation in tibiofemoral and patellofemoral joint. Otherwise, all the other joints are with no restriction.
3.6.10 **Muscle strength test according to janda**

<table>
<thead>
<tr>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Hip adductors</td>
</tr>
<tr>
<td>3-</td>
<td>Hip abductors</td>
</tr>
<tr>
<td>4-</td>
<td>Gluteus maximus</td>
</tr>
<tr>
<td>5</td>
<td>Hamstrings</td>
</tr>
<tr>
<td>5</td>
<td>Quadriceps</td>
</tr>
<tr>
<td>5</td>
<td>Gastrocnemius</td>
</tr>
<tr>
<td>5</td>
<td>Soleus</td>
</tr>
</tbody>
</table>

**Table 8- Final examination for muscle strength according to janda**

3.6.11 **Muscle length test**

<table>
<thead>
<tr>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Hamstrings(Kendall)</td>
</tr>
<tr>
<td>Grade-0</td>
<td>Hip adductors(Janda)</td>
</tr>
<tr>
<td>Grade-0</td>
<td>Gastrocnemius(Janda)</td>
</tr>
<tr>
<td>Grade-0</td>
<td>Soleus(Janda)</td>
</tr>
<tr>
<td>Normal</td>
<td>Rectus femoris(Kendall)</td>
</tr>
<tr>
<td>Normal</td>
<td>Tensor fasciae latae(Kendall)</td>
</tr>
</tbody>
</table>

**Table 9- Final length test according to Janda and Kendall**

3.6.12 **Muscle tone**

- Hip adductors- hypertone in right leg
- Hip abductors- slight hypertone in right leg because of swelling around the knee
- Gluteal maximus- normal
- Hamstrings- slight hypertone in right leg because of swelling around the knee
- Quadriceps- slight hypertrophy in right leg because of swelling around the knee
- Gastrocnemius- normal
- Soleus- normal
### Range of motion

<table>
<thead>
<tr>
<th>Joint</th>
<th>Active Left</th>
<th>Active Right</th>
<th>Passive Left</th>
<th>Passive Right</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hip joint</strong></td>
<td>S-20-0-110</td>
<td>S-20-0-110</td>
<td>S-25-0-115</td>
<td>S-30-0-115</td>
</tr>
<tr>
<td></td>
<td>F-40-0-30</td>
<td>F-30-0-20</td>
<td>F-45-0-35</td>
<td>F-40-0-25</td>
</tr>
<tr>
<td></td>
<td>R-45-0-30</td>
<td>R-25-0-10</td>
<td>R-50-0-35</td>
<td>R-30-0-15</td>
</tr>
<tr>
<td><strong>Knee joint</strong></td>
<td>S-5-0-120</td>
<td>S-5-10-30</td>
<td>S-10-0-125</td>
<td>S-0-0-65</td>
</tr>
<tr>
<td><strong>Ankle joint</strong></td>
<td>S-15-0-40</td>
<td>S-10-0-40</td>
<td>S-20-0-45</td>
<td>S-25-0-45</td>
</tr>
</tbody>
</table>

**Table 10 - Final range of motion in lower extremity**
3.6.14 **Final examination conclusion** - The patient’s left shoulder is elevated than the right one. Protraction in the head and left shoulder girdle. The left scapula is in abduction and inferior angle is externally rotated. Hypertrophy of right paravertebral muscles. Protruding of the stomach. Pelvis is tilted towards the right side. Hypertone in the muscles of the right thigh. Slightly flexed right knee. Valgus feets, toes and ankle on both sides with the varosis in left knee. Achilles tendons on both sides are more medially with quadratic heels on both sides. The patient use the upper chest to breathe while standing and sitting but while standing uses the lower chest and little part of abdominals. The patient have slow, non periodic and unstable gait with short strides on right side and flatfoot on both sides. Limited extension in right hip and knee. Forward bending of whole spine with anterior tilt in pelvis and less activity of abdominals. The circumference around the thigh and knee is more on the right side. Patient have slight limitation in tibiofemoral joint on both sides and patellofemoral joint on left side. Otherwise, all the other joints are with no restriction. Deep tendon reflexes are normal with the pyramidal signs negative in both the upper and lower extremity. And sensations are also physiological. However, the hip abduction and hip extension movement stereotype on the right lower extremity are not physiological. Hamstrings and quadriceps on the right leg are weak. While, hip abductors, adductors and gluteus maximus are weak on both the sides. Moreover, shortness of hamstrings, rectus femoris and tensor fasciae latae. At last, less range of motion in the right knee with the hypertone of the muscles around the right knee.

3.7 **Therapeutic effect** - After the therapy for one week, there is an improvement in range of motion hip flexion and dorsiflexion of hip by 5 degree. increase in range of motion in hip abduction as well by 15 degree. but a drop in the range of motion of knee flexion by 10 degree. otherwise, all the other movements are the same as in starting. Now, no more restriction in right patellofemoral joint. No change in other joints. The circumference of the lower extremities are the same. But, in strength test of hip abductor, patient manages to strengthen it from grade 3 to grade 4 according to janda.
4. **Conclusion:** It was really good to work in such a kind of hospital where I had seen patients with different diagnosis. This practice was of 2 weeks and I felt that it was less because in the hospital I was dealing with real patients not with books. In 2 weeks I have seen inpatient as well as outpatient. The supervisor had given me full space to prepare my own rehabilitation plan according to the need of the patient and work on it. By this, I was able to put my theoretical knowledge in use and also learnt how to deal with patients and understand their situation. These two weeks have shown me the difference in rehabilitation in India and Czech Republic. I surely want to join more of such kinds.
5. References:


6. Supplements:

6.1 List of tables

Table 1 - Initial anthropometric measurement

Table 2 - Initial movement stereotype

Table 3 - Initial examination for muscle strength according to janda

Table 4 - Initial length test according to Janda and Kendall

Table 5 - Initial range of motion in lower extremity

Table 6 - Final anthropometric measurement

Table 7 - Final movement stereotype

Table 8 - Final examination for muscle strength according to janda

Table 9 - Final length test according to Janda and Kendall

Table 10 - Final range of motion in lower extremity
Application for Approval by UK FTVS Ethics Committee

of a research project, thesis, dissertation or seminar work involving human subjects

The title of a project: Case study of a patient after total knee replace surgery.

Project form: Bachelor thesis

Period of realization of the project: January 2019 – February 2019

Applicant: Vikrant Godara, Physiotherapy department.

Main researcher: Vikrant Godara

Workplace: Nemocnice Kladno

Supervisor: Mgr. Kucerova Ilona

Project description: My project is about a patient after a total knee replacement on the right side. He was treated at the kladno hospital.

Characteristics of participants in the research: Initial kinesiological examination and therapy with my supervisor according to the instructions and according to the hospital protocol and the recommended therapy. Exercises for limited range of motion of the knee strengthening muscle techniques mobilization for restricted joints relax therapy for hypertonic muscles, soft tissue techniques stretching techniques and gait training and correcting the patient’s walking and posture then evaluation of the therapy progress at the end of the therapy.

Ensuring safety within the research: No invasive methods with the patient are used. Risks of therapy and methods will not be higher than the commonly anticipated risks for this type of therapy. The physical presence of the responsible supervision Mgr. Kucerova Ilona.

Ethical aspects of the research: The patient is an adult and is non-vulnerable. All the information gathered during the research won’t be anyhow disclosed and will only be used for the Bachelor thesis. No photos nor videos will be taken during the examination to assure the patient maximum anonymity. The gained data will be processed and safely retained in an anonymised form and published in a bachelor thesis, possibly also in journals, monographs, and presented at conferences, possibly also used in further research at UK FTVS. After the anonymization the personal data will be deleted. I shall ensure to the maximum extent possible that the research data will not be misused.

Informed Consent: attached

It is the duty of all participants of the research team to protect life, health, dignity, integrity, the right to self-determination, privacy and protection of the personal data of all research subjects, and to undertake all possible precautions. Responsibility for the protection of all research subjects lies on the researcher(s) and not on the research subjects themselves, even if they gave their consent to participation in the research. All participants of the research team must take into consideration ethical, legal and regulatory norms and standards of research involving human subjects applicable not only in the Czech Republic but also internationally.

I confirm that this project description corresponds to the plan of the project and, in case of any change, especially of the methods used in the project, I will inform the UK FTVS Ethics Committee, which may require a re-submission of the application form.

In Prague 06.02.2019

Applicant’s signature: Vikrant Godara

The Committee: Chair:

Members:

doc. PhD. Irene Parry Martinková, Ph.D.
doc. PhD. Pavel Slepicka, DrSc.
doc. MUDr. Jan Heller, CSc.
PhDr. Pavel Hrásky, Ph.D.
Mgr. Eva Prokesová, Ph.D.
MUDr. Simona Majorová

The research project was approved by UK FTVS Ethics Committee under the registration number: 06.02.2019

Date of approval: 06.02.2019

UK FTVS Ethics Committee reviewed the submitted research project and found no contradictions with valid principles, regulations and international guidelines for carrying out research involving human subjects.

The applicant has met the necessary requirements for receiving approval of UK FTVS Ethics Committee.

Signature of the Chair of UK FTVS Ethics Committee

UNIVERZITA KARLOVA
Fakulta sportu
José Martího 31, 162 52, Praha 6

Stamp of UK FTVS
INFORMOVANÝ SOUHLAS

Vážená paní, vážený pane,

v souladu se Všeobecnou deklarací lidských práv, zákonem č. 101/2000 Sb., o ochraně osobních údajů a o změně některých zákonů, ve znění pozdějších předpisů, Helsinskou deklarací, přijatou 18. Světovým zdravotnickým shromažďováním v roce 1964 ve znění pozdějších změn (Fortaleza, Brazílie, 2013) a dalšími obecně závaznými právními předpisy Vás žádám o souhlas s prezentováním a uveřejněním výsledků vyšetření a průběhu terapie prováděné v rámci praxe na ................................................, kde Vás příslušně kvalifikovaná osoba seznámila s Vaším vyšetřením a následnou terapií. Výsledky Vašeho vyšetření a průběh Vaší terapie bude publikován v rámci bakalářské práce na UK FTVS, s názvem .........................................................

Získané údaje, fotodokumentace, průběh a výsledky terapie budou uveřejněny v bakalářské práci v anonymizované podobě. Osobní data nebude uvedena a budou uchovávána v anonymní podobě. V maximální možné míře zabezpečím, aby získaná data nebyla zneužita.

Jméno a příjmení řešítele .............................................. Podpis:..............................................

Jméno a příjmení osoby, která provedla poučení............................ Podpis:..............................................

Prohlašuji a svým níže uvedeným vlastnoručním podpisem potvrzuji, že dobrovolně souhlasím s prezentováním a uveřejněním výsledků vyšetření a průběhu terapie ve výše uvedené bakalářské práci, a že mi osoba, která provedla poučení, osobně vše podrobně vysvětlila, a že jsem měl(a) možnost si řádně a v dostatečném čase zbavit všechny relevantní informace, zeptať se na vše podstatné a že jsem dostal(a) jasně a srozumitelně odpovědi na své dotazy. Byl(a) jsem poučen(a) o právu odmítnout prezentování a uveřejnění výsledků vyšetření a průběhu terapie v bakalářské práci nebo svůj souhlas kdykoli odvolat bez represí, a to písemně zasláním Etiční komisí UK FTVS, která bude následně informovat řešitele.

Místo, datum ..................................................

Jméno a příjmení pacienta ........................................... Podpis pacienta:...........................................

Jméno a příjmení zákonného zástupce ..................................

Vztah zákonného zástupce k pacientovi .................................. Podpis: ..............................................