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Bachelor Thesis

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Case Study of patient After Tear of Tendon of Pectoralis Major Muscle

Bachelor Thesis

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Abstracts

Title: Case Study of patient After right knee replacement.

Goals: The aim of this thesis is to discuss the rehabilitation of patient after replacing the right knee joint and a basic general outlook of the total knee replacement surgery.

Methods: Methods used in this study are all based on the literature given by the Faculty of Physical Education and Sport. Including post isometric relaxation, joint mobilisation, and soft tissue techniques according to Lewit, length and strength measurements according to Kendall.

Results: After 8 therapy sessions results of therapy were in strengthen week muscles, increasing ROM in the Knee joint and reduction of tonicity in hypertonic muscles.

Keywords: Hematoma, Quadriceps, Range of motion, knee joint, Osteoarthritis.

Abstrakt

Název: Případová studie pacienta Po náhradě pravého kolena.

Cíle: Cílem této diplomové práce je diskutovat o rehabilitaci pacienta po nahrazení pravého kolenního kloubu a základní obecné perspektivě totální náhrady kolenního kloubu.

Metody: Metody použité v této studii vycházejí z literatury Fakulty tělesné výchovy a sportu. Včetně post izometrické relaxace, kloubní mobilizace a technik měkkých tkání podle Lewita, měření délky a síly podle Kendalla.

Výsledky: Po 8 terapeutických sezeních byly výsledky terapie v posilování týdenních svalů, zvýšení ROM v kolenním kloubu a snížení tonicity v hypertonických svalech.

Klíčová slova: Hematom, Quadriceps, rozsah pohybu, kolenní kloub, osteoartritida.

Declaration

I would like to declare that my work has been written individually by me. All the information, examinations and therapeutic procedures were based on knowledge that I received during my study in the Faculty of Physical Education and Sport of Charles University in Prague and the literatures that are listed in this work.

I also declare that no invasive methods, were used during my practice and that the patient was fully aware of the procedures at any given time.

Fahad Alqazlan

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1. Introduction

This bachelor thesis was done at the rehabilitation department of Kladno general hospital in Kladno in the period from Wednesday the 6th of February 2019 until Friday the 15th of February 2019.

This case study was on a patient with the total right knee replacement. The thesis is divided into two parts. Theoretical part describing the definition, epidemiology, incidence, pathogenesis, classification, diagnosis, complications, pharmacotherapy, contraindications, and therapy. In the practical part, all the examinations procedure and therapies were done on the authors best knowledge and under the instructions of the supervisor: Mgr. Ilona Kučerova.

The goal of the therapy was primarily to restore the range of motion, relax hypertonic muscles and restore the strength of the muscles.

2. General information

2.1. Definition:

total knee replacement: A surgical procedure in which damaged parts of the knee joint are replaced with artificial parts.

The surgery is done by separating the muscles and ligaments around the knee to expose the inside of the joint. The ends of the thigh bone (femur) and the shin bone (tibia) are removed as is often the underside of the kneecap (patella). The artificial parts are then cemented into place.

The new knee typically has a metal shell on the end of the femur, a metal and trough on the tibia, and sometimes a plastic button in the kneecap.

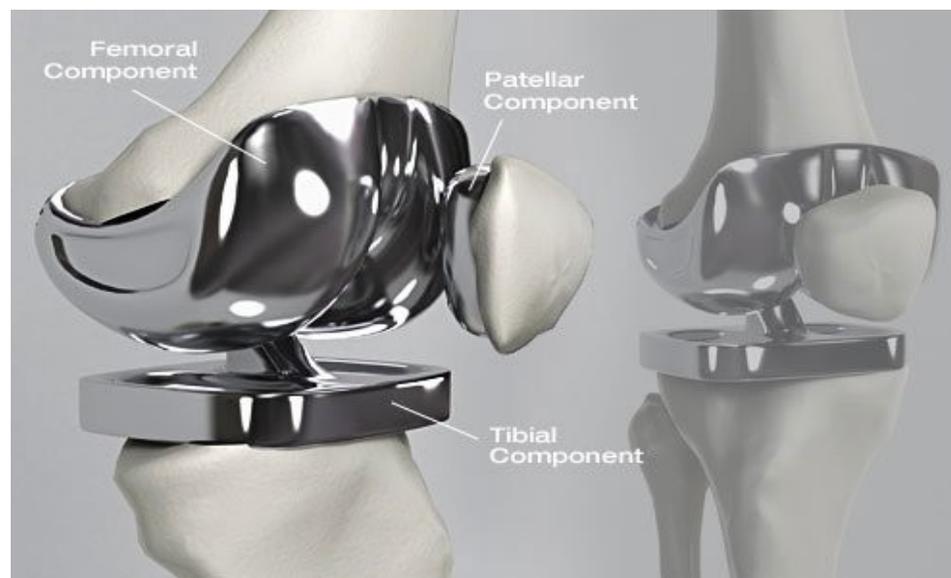


Figure 1 Example of the prosthesis in knee replacement surgery (1)

May be done on people, usually over 55, whose knees have been damaged by, trauma, or other destructive diseases of the joint resulting in severe limiting and significant stiffness, instability and deformity of the knee.

2.2. Epidemiology and incidence:

Total knee replacement is one of the most common surgical procedures, it has increased over the last 2-3 decades. With aging of the population and increased longevity.

Numbers vary by country which may be due to differences in socioeconomic status, health care delivery systems, patient preferences but Approximately 700,000 knee replacement procedures are performed annually in the US and in most cases, they are mobile.

Prevalence is higher among women than among men and increases with age, in 2008 63% of total knee replacements in the US were done on women.

Another fact for total knee replacement surgery is the increasing rate of recipients under 60, whilst initially designed as an operation for the >70 age bracket.

2.3. Etiology:

The most common reason for a total knee prosthesis is: Osteoarthritis.

Other risk factors include:

- Obesity.
- Previous knee injuries.
- Partial removal of a meniscus.
- Rheumatoid arthritis.
- Fractures.
- Genetic factors.
- Age.



Figure 2Anatomic of the knee joint (2)

2.4. Characteristics:

Pain is the main complaint of patients with degenerated knee joints. At first, pain is felt only after rest periods (this is also called ‘starting pain’) after a couple of minutes the pain slowly fades away. When the knee joint degeneration increases, the pain can also occur during rest periods and it can affect sleep at night. Individuals' can also complain of knee stiffness and crepitus. Due to pain and stiffness, function can decline and is manifested as reduced exercise tolerance, difficulty climbing stairs or slopes, reduced gait speed and increased risk of falls.

2.5. Pathogenesis:

Osteoarthritis (OA) of the knee affects the bones, the cartilage, and the synovium in the knee joint, as these functions break down, they no longer protect the bones of the knee joint, and bone damage occurs. OA of the knee can cause pain and stiffness; the symptoms worsen over time.

Stages:

OA of the knee takes several years to develop, and it progresses in stages. The condition can be hard to treat because symptoms may not appear until OA reaches an advanced stage.



Figure 3 Osteoarthritis stages at the knee joint (3)

Stage 1: Minor

Small lumps of bone called osteophytes may grow in the knee area, there may be slight damage to the cartilage.

There will be no apparent narrowing of the space between the bones to indicate that the cartilage is breaking down.

People with stage 1 OA are unlikely to feel pain or experience discomfort. The joint will appear normal on an X-ray.

Treatment:

- Medications can often relieve the pain.
- Performing certain exercises can help to build strength and mobility.

Stage 2: Mild

During this stage, a person may start to notice symptoms, and doctors can see some signs of wear.

X-rays and other scans of the knee joints will clearly show more osteophyte growth, and the cartilage will begin to thin, the space between the bones will still appear normal, but the area where the bones and the tissues meet will start to harden, when the tissues harden, this makes the bone thicker and denser. A thin layer of bone will also develop beneath the cartilage in the joints. The person may experience stiffness or joint pain. The area around the knee joint may start to feel particularly stiff and uncomfortable after a person has been sitting for extended periods. Though there may be some minor damage, the bones are not rubbing or scraping against each other. Synovial fluid is present, and it helps to reduce friction and support the movement of the knee.

Treatment:

- Taking pain relievers.
- Attending physical therapy sessions to build or maintain strength and flexibility.

- Wearing a knee brace designed to relieve pressure on the joints' surfaces.
- Wearing shoe inserts to relieve stress on the knee.

Stage 3: Moderate

The damage to the cartilage has progressed, the gap between the bones has narrowed, and X-rays will show cartilage loss. Pain and discomfort may occur while performing daily activities, such as running, walking, kneeling, and bending, there may be early signs of joint inflammation. As OA progresses, the cartilage will continue to thin and break down. The bones will respond by thickening and growing outward to form lumps, the tissue that lines the joint will become inflamed.

Treatment:

- Taking OTC pain relievers.
- Receiving injections of corticosteroids or hyaluronic acid

Stage 4: Severe

This is the most advanced stage of OA, and the symptoms are very visible. The space between the bones in the joint has continued to narrow, causing the cartilage to break down further. As a result, there is stiffness in the joint, constant inflammation, and less fluid around the joint. There is more friction in the joint and more significant pain and discomfort while moving. X-rays will show bone on bone, meaning that either the cartilage has completely worn away or there is very little left.

Treatment:

At this stage, the cartilage has either significantly diminished or disappeared completely. As a result, surgery often be the best option.

2.6. Classification:

There are 3 basic types of knee replacement prostheses:

Non-constrained:

This is the most common type of knee replacement prosthesis.

- The components of the prosthesis inserted into the knee are not linked to each other.
- The patient's ligaments and muscles provide the stability for the prosthesis.

Semi-constrained:

- This prosthesis provides some stability for the knee and does not rely entirely on the patient's ligaments and muscles to provide the stability.
- This type of prosthesis is used if the orthopedic surgeon needs to remove all the ligaments of the inner knee.

Constrained (also called hinged):

- The components of the prosthesis are linked or "hinged" together.
- This prosthesis is used when a patient's ligaments and muscles are not able to provide stability for the knee prosthesis.
- This prosthesis is more common in patients undergoing revision surgery.
- This type of device does not usually last as long as the other types of prostheses.

2.7. Diagnosis:

An evaluation with an orthopedic surgeon consists of several components:

- **A medical history.** The orthopedic surgeon will gather information about general health and ask about the extent of the knee pain and the ability of the patient to function.
- **A physical examination.** This will assess knee motion, stability, strength, and overall leg alignment.
- **X-rays.** These images help to determine the extent of damage and deformity in the knee.
- **Other tests.** Occasionally blood tests, or advanced imaging such as a magnetic resonance imaging (MRI) scan, may be needed to determine the condition of the bone and soft tissues of the knee.

2.8. Complications:

- Infection can result in the removal of the replacement joint and can even be life-threatening if it spreads throughout the body. Antibiotics are routinely given at the time of surgery to reduce the risk of infection.
- A prosthesis component can become loose or dislocate if it does not seal to the bone well or is misaligned.
- Legs may be slightly different lengths after surgery. In some cases, a shoe insert can remedy this problem.
- The new knee may be stiff. Some people develop scar tissue that hinders flexibility. This limited flexibility is more common in people who had limited flexibility before surgery.
- An allergic reaction to the prosthesis or bone cement can occur. In these cases, the bone cement and prosthesis must be removed.

- Damage can occur to the knee's patella (knee cap) and/or the soft tissue (muscles, ligaments and tendons) that support the joint between the patella and the femur.
- In rare cases, there is damage to surrounding arteries, veins, and/or nerves.

2.9. Pharmacotherapy:

The goal for pharmacotherapy after a total knee replacement is pain management and decrease pain and also to prevent inflammation and deep vein thrombosis. It is mostly anti-inflammatory drugs, analgesics and anticoagulants that is used. Blood clots is common after a total knee replacement, there for the use of anticoagulants is important. Infections is also another complication that can occur after this type of operation, therefor the use of antibiotics and NSAID'S (non-steroidal anti-inflammatory) drugs is used. NSAID'S is also helpful for pain and swellings.

It is important to be careful with the use of medication due to the risk of kidney problems and stomach bleeding.

2.10. Contraindications:

- Active sepsis (infection) is an **absolute** contraindication for total knee replacement
- If a prosthesis is inserted into an already infected knee almost guarantees an increase of the inflammation.
- Absent quadriceps femoris function.
- Obesity: these patients are more at risk for peri-operative anesthesia and vascular problems, intra-operative technical problems and post-operative prosthetic loosening.

2.11. Physiotherapy:

Patient should be undergoing therapy immediately after the operation.

Some useful physiotherapeutic procedures are:

- **Strengthen weaken muscles:** Muscles of all of the lower extremity are targeted, with emphasis on those inserted into the knee joint (quadriceps femoris especially). The goal is to get back the strength that is lost because of the operation, and to improve functionality and stability.
- **Post isometric relaxation:** This is a technique that is used for relaxing tense and painful muscles and is excellent after a major operation like total knee replacement.
- **Joint play mobilization:** The goal of joint play mobilization is to mobilize blocked joint so that they unblock and can move as free as possible.
- **Soft Tissue Techniques:** It's one of the most important post-operative therapy. For the patient, it is a great way for improving mobility and elasticity. We can work with all layers after an examination, including the fasciae's, the skin, and the subcutaneous layer.
- **Stretching exercises:** It's important for keeping the flexibility and the range of motion of the joints. Stretching increase the blood flow to the muscles and make them work more efficient, and it is also a good way to prevent other injuries.
- **Sensomotoric Training:** It's focused on coordination while keeping an upright posture, it includes reacting with fast sequenced movements to new, unexpected impulses. This will improve the deep stabilizing system and promote better balance. Better balance will result in less risk of falling and less risk of fractures.

Other assistive therapy procedures include:

- **Motor Splint Machine:** It's a machine that is used for controlled passive movements for the knee. This machine is often used every day in a post-operative care.

- **Cryotherapy:** It's used for decreasing the temperature in a localized area. Decreasing pain by reducing nerve conduction velocity. It also reduces the local inflammation because of vasoconstriction and slows down metabolism of the cells which reduces the need of nutrients and oxygen.
- **Biolamp:** It's used after a total knee replacement because of its regeneration effect on soft tissues, removing hematoma, healing effect on the scar and on the bones.

3. Special part

3.1. Methodology:

My bachelor thesis took place in Kladno general hospital in the period from Monday the 4th of February 2019 until Friday the 15th of February 2019. My work in Kladno was supervised by Mgr. Ilona Kučerová. The number of sessions with the patients were 8 sessions.

Therapy sessions were applied in the main therapy room. For examinations we used goniometer, measurements tape and plum line. For therapies, we used soft tissue techniques, joint play mobilization, stretching technique, strengthening technique, relaxation technique and general exercises.

The work has been approved by the Ethics Committee of the Faculty of Physical Education and Sport of Charles University.

3.2. Anamneses:

Examined person: E.T

Year: 1956

Gender: Female

Diagnosis: Total knee replacement of the right knee, osteoarthritis

Status presents:

Objectively

Height: 162cm

Weight: 96.5kg

BMI: 36,8

Age: 63

Assisted devises: Crutches after the operation

Subjectively

Present anamneses (diagnosis): She underwent an operation to replace her right knee on the 29th of January 2019 and on the 5th of February 2019 she was hospitalized in the rehabilitation department of Kladno general hospital.

Injuries\ past medical and surgical history: T.E had removed her tonsils when she was 13, she had appendectomy when she was 25, she had an abortion in the past and 10 years ago she got her gall bladder removed.

Pharmacological Anamnesis: Hypertension medication and pain killers during the night.

Allergic Anamnesis: None.

Abuses: None.

Diet: No specific diet.

Family Anamnesis: Her mother had cancer and diabetes and her father had cancer too.

Social Anamnesis: Living alone in a house.

Occupation Anamnesis: She used to be a chef in a primary school but she retired 11 years ago.

Sport\ physical activities: Walking.

Previous rehabilitation

Wasn't provided

Medical Documentation Statement

Wasn't provided

Rehabilitation indication (by supervisor):

- Increase Range of motion of the right knee.
- Relax high toned muscles.
- Stretch shorted muscles.
- Strengthening weaker muscles (mainly Quadriceps).
- Train the patient for stairs walking.
- Scar therapy.

3.3. Initial Kinesiological Examination

3.3.1. Postural Examination (*According to Kendall*):

All Postural Examinations were done while standing with crutches.

Posterior view	
The base of support	Narrow base of support, weight is more distributed on the left side.
The shape and position of the heels	Right heel is more ahead than the left heel.
Shape and position of the ankle joints	Symmetrical.
Shape and the thickness of Achilles tendon	Left is more wide.
Calf muscle	Right is noticeably in an atrophy especially on the medial side.
Knee Joints	Right knee in semi-flexion.
Popliteal line	Right is slightly higher.
Thigh muscles	Atrophy on the right.
Sub gluteal line	Symmetrical.
Gluteal muscles	Right in atrophy.
Pelvis	Right PSIS is higher
Thoracobrachial triangles	Symmetrical.
Cervical spine	Hyper kyphosis from C5-C7.
Thoracic spine	Hyper kyphosis in C-TH junction.
Lumbar spine	Lordosis.

Position of the scapula	Right in a bit of abduction of the inferior angle and is more prominent.
Position of the shoulder girdle	Right shoulder is higher.
Upper limbs	Symmetrical.
Position of the head	Physiological.
Trunk	Slightly shifted to the left.

Table 1 Posterior posture view

Anterior view	
Foot arches	Both feet have more contact of the lateral arch to the floor while the medial arch is in less contact, this is more prominent on the right foot.
The position and shape of toes	Both feet have the first toe in slight flexion.
Knee joints	Right is higher.
Thigh muscles	More volume on the left
Thoracobrachial triangles	Symmetrical.
Pelvis	Right ASIS is higher
Position of the shoulder girdle	Right shoulder is higher.
Position of the head	Physiological.
Upper limbs	Symmetrical.

Table 2 Anterior posture view

Lateral view	
Ankle joints	Symmetrical.
Calf muscles	Atrophy on the right.
Knee joints	Right in semi-flexion
Thigh muscles	Atrophy on the right.
Pelvis	Slight anterior tilt.
Curvature of the spine	Hyper kyphosis in the C-TH junction, lordosis in the lumbar spine.
Shoulder girdle	Right is higher.

Position of the head	Protracted.
Trunk	In Flexion.

Table 3 Lateral posture view

3.3.2. Gait

Patient walks with crutches without any troubles using Three-point gait pattern.

Width of base of support	Narrow base of support.
Walking rhythm	Periodic.
Walking speed	Slow.
Stride length	Asymmetrical, right leg cover more distance.
Movement of the foot	Excessive heel strike and the toes are always in flexion in both feet, right foot have less contact of the medial edge to the floor.
Position and movement of the knee and hip joints	Right knee has less flexion during the gait while the left knee seems physiological, the hip flexion of the right side is less than ideal and the stepping forward have more activation of the ipsilateral quadratus lumborum which make the hip in hyper elevation during the movement.
Position and movement of the pelvis	Right ilium spine is significantly higher when making a step forward with the right leg compared to the left ilium spine when making a step forward with the left leg.
Position and movement of the upper extremity	Upper extremities are moving the crutches ideally in the three-point gait pattern and they are symmetrical.

Position of the head	Protraction of the head with flexion due to the patient looking at the floor most of the time.
Stability of walking	Patient walks with the trunk leaning more forward.

Table 4 Gait

3.3.3. Pelvis palpation

Height and symmetry of Iliac Crest	Right Iliac crest is higher
Posterior Superior Iliac Spine	Right is higher
Anterior Superior Iliac Spine	Right is higher
Pelvic rotation/ torsion	Slightly tilted
Ante version (anterior tilt) or Retroversion (posterior tilt)	Slight ante version

Table 5 Pelvis palpation

3.3.4. Specific testing

Romberg test: Wasn't examined due to the patient can only stand with crutches.

Vele test: Wasn't examined due to the patient can only stand with crutches.

Trendelenburg test: Wasn't examined due to the patient can only stand with crutches.

3.3.5. Anthropometric Measurement

Lower extremity	Right	Left
Anatomical length	86.5 cm	86.5 cm

Functional length	89.5 cm	88.5 cm
Thigh circumference (15 cm above the knee cap)	54 cm	57 cm
Thigh circumference (10 cm above the knee cap)	53 cm	47 cm
Knee circumference	44.5 cm	41 cm
Calf circumference	35 cm	36 cm
Ankle circumference	22 cm	22 cm

Table 6 Anthropometric measurements

3.3.6. ROM Goniometer Measurements & End Feel. (Janda Approach & SFTR format)

Hip	Active		Passive	
	Left	Right	Left	Right
Extension & Flexion	45-0-90	30-0-95	50-0-100	40-0-120
Adduction & Abduction	15-0-35	15-0-20	20-0-45	20-0-30
External rotation & Internal rotation	40-0-20	30-0-25	50-0-30	40-0-35

Table 7 ROM of the hip

Knee	Active		Passive	
	Left	Right	Left	Right
Extension & Flexion	10-0-125	5-0-70	10-0-130	5-0-80

Table 8 ROM of the knee

Ankle	Active		Passive	
	Left	Right	Left	Right

Dorsiflexion & Plantar flexion	20-0-40	15-0-40	25-0-50	20-0-50
Eversion & Inversion	15-0-35	15-0-20	20-0-45	20-0-30

Table 9 ROM of the ankle

3.3.7. Muscle Length Test (Evaluation by Janda)

Grade 0 = No shortness.

Grade 1 = Slight shortness.

Grade 2 = Marked shortness.

Muscle	Right	Left
One joint hip flexors	Grade 0	Grade 0
Tow joint hip flexors	Grade 1	Grade 0
Hip adductors	Grade 2	Grade 2
Hamstrings	Grade 0 *	Grade 0 *
One joint planter flexors	Grade 1	Grade 0
Tow joint planter flexors	Grade 1	Grade 0

Table 10 Muscle length

* Knees aren't fully extended.

3.3.8. Manual Muscle Strength Test (Evaluation by Kendall)

- **Grade 0:** No Contraction of the muscle.
- **Grade 1:** Contraction of the muscle felt but no movement seen.
- **Grade 2:** Position in horizontal plane with gravity.
- **Grade 3:** Against gravity.
- **Grade 4:** Against gravity with moderate resistance given.

- **Grade 5:** Against gravity with maximum resistance given.

Muscle	Right	Left
Gluteus maximus	Grade 4	Grade 4+
Gluteus medius	Grade 4	Grade 5
Gluteus minimus	Grade 4	Grade 4+
Tensor fasciae latae	Grade 5	Grade 5
Iliopsoas	Grade 5	Grade 5
Sartorius	Grade 4	Grade 4+
Lateral rotators	Grade 4	Grade 5
Medial rotators	Grade 4	Grade 4+
Hip adductors	Grade 3	Grade 3
Biceps femoris	Grade 4	Grade 4+
Semitendinosus	Grade 3+	Grade 4
Semimembranosus	Grade 3+	Grade 4
Quadriceps femoris	Grade 3+	Grade 4
Ankle plantar flexors	Grade 5	Grade 5
Peroneus longus	Grade 4	Grade 4
Peroneus brevis	Grade 5	Grade 4
Tibialis anterior	Grade 4	Grade 5
Tibialis posterior	Grade 5	Grade 5

Table 11 Muscle strength

3.3.9. Muscle tone palpation

Muscle	Right	Left
Gluteus maximus	Normal tone	Normal tone
Gluteus medius	Normal tone	Normal tone
Gluteus minimus	Normal tone	Normal tone

Tensor fasciae latae	Hypertonic	Normal tone
Piriformis	Normal tone	Normal tone
Iliopsoas	Normal tone	Normal tone
Sartorius	Normal tone	Normal tone
Rectus femoris	Normal tone	Normal tone
Vastus medialis	Normal tone	Normal tone
Vastus lateralis	Hypotonic	Normal tone
Biceps femoris	Hypertonic	Hypertonic
Semitendinosus	Hypertonic	Hypertonic
Semimembranosus	Hypertonic	Hypertonic
Gastrocnemius	Hypotonic	Normal tone
Soleus	Normal tone	Normal tone
Hip adductors	Hypertonic + painful	Hypertonic
Tibialis anterior	Normal tone	Normal tone
Tibialis posterior	Normal tone	Normal tone

Table 12 Muscle tone

3.3.10. Joint Play Examination (Lewit Approach)

Examined joint	Right	Left
Patella	Restricted in the caudal direction	Not restricted but painful in the caudal direction
Tibiofemoral	Contraindicated	Not restricted
Fibula head	Restricted in both ventral and dorsal direction	Not restricted
Talocrural	Not restricted	Not restricted
Subtalar	Not restricted	Not restricted
Transverse tarsal	Not restricted	Not restricted
Tarsometatarsal	Not restricted	Not restricted
Metatarsophalangeal	Not restricted	Not restricted

Proximal interphalangeal	Not restricted	Not restricted
Distal interphalangeal	Not restricted	Not restricted

Table 13 Joint play

3.3.11. Basic Movement Pattern Examination (Janda Approach)

Movement	Right	Left
Hip extension	Hamstrings were activated first followed by contra lateral paravertebral muscles then ipsilateral paravertebral muscles and finally Gluteus maximus	Hamstrings were activated first followed by ipsilateral paravertebral muscles then contra lateral paravertebral muscles and finally Gluteus maximus
Hip abduction	Tensor mechanism (flexion and external rotation of the hip)	Physiological timing of muscle activation

Table 14 Stereotype

3.3.12. Soft tissue examination (according to lewit)

Hematoma: Is covering an intermediate area of the operated leg specifically in the ventral and medial tibia which is extremely painful for any touch, from the scale of 1-10 (10 being the most painful) patient said that she feels the pain at the level **8** if the skin affected by the hematoma on the tibia is being touched, there also a hematoma spot on the thigh just above the scar it's smaller and it's not painful if being touched.



Figure 4 Initial examination scar (4)

Scar: Is 22.5 cm at length, most of the metallic staples are still there, scar isn't painful if touched except for the caudal end, mobility of the scar is mostly good, stiffness is only present at the caudal end of the scar and from the 6th - 9th cm caudally from the cranial part of the scar, the scar doesn't seem to be healing very well due to freshly blood stain on the bandage dressing applied on the caudal end of the scar and the fact that most of the metallic staples are still there.

Skin: Restriction lateral to the right knee, skin below the knee joint to the right foot haven't been examined due to the pain of touching, other than that there is no restriction compared to the left lower extremity.

Sub skin: Restriction lateral to the right knee, sub skin below the knee joint to the right foot haven't been examined due to the pain of touching, other than that there is no restriction compared to the left lower extremity.

Facia: Facia below the knee joint to the right foot haven't been examined due to the pain of touching, other than that there is no restriction compared to the left lower extremity.

3.3.13. Neurological examination

Dermatome	Right	Left
L1	Normal sensation	Normal sensation
L2	Normal sensation	Normal sensation
L3	Normal sensation	Normal sensation
L4	Normal sensation	Normal sensation
L5	Haven't been examined due to the pain caused by the hematoma	Normal sensation
S1	Haven't been examined due to the pain caused by the hematoma	Normal sensation
S2	Haven't been examined due to the pain caused by the hematoma	Normal sensation

Table 15 dermatomes

3.3.14. Conclusion of the examination

Following my examinations, I conclude that the main complication is the significant lack of ROM of the right knee which is to be expected after 7 days of the knee replacement surgery, During the postural examination I observed the shifting of the trunk to the non-operated side also the pelvis is higher at the right side and the pelvis anterior tilt which is in my opinion all caused by the semi flexion of the right knee, The gait wasn't optimal due to the patient compensating the lack of hip flexion of the right leg with hyper-elevation of the hip also the patient walks while looking down to her feet which contribute to the body leaning forward during walking, The anthropometric measurements showed clearly the atrophy of the quadriceps muscles (by 3 cm) and the degree of swelling above the knee(6 cm) and on the knee joint(3 cm) of the right leg, Moving to the ROM examinations it's seen clearly the big difference between the left knee and the right knee in flexion which undoubtedly will be the main concern in the therapy and also the lack of ROM in hip ADD of both sides, The muscle length tests showed slight shortness of tow joint hip flexors and planter flexors on the right side while the shortness of hip adductors of both is the most noticeable, The manual muscle strength showed a marked weakness of the quadriceps and hamstrings muscles of

the right leg and of hip adductors on both sides, The tone of muscles of the lower extremities was physiological except the hypotonicity of Vastus laterals and the hypertonicity of Tensor fasciae latae on right leg and the hypertonicity of hamstrings and hip adductors on both sides, The patella and fibular head were restricted on the right leg otherwise there was no restriction on any other joint of both lower extremities, The hematoma of the right leg might be an obstacle in the way of the full effectiveness of the therapy of the upcoming 10 days unless it will reasonably heals in the future sessions also the scar isn't in a great condition in regards to the speed of healing.

3.4. Short-term and long term physiotherapy plans

Short term therapy plan:

- Increase ROM of the right knee in flexion and extension.
- Train walking up and down stairs with crutches.
- Improve gait pattern while walking to reduce the hip elevation on the right side while stepping forward and teach the patient to look forward while walking.
- Strengthen weakened muscles of the lower extremity mainly: quadriceps and hamstrings of the right leg and hip adductors of both sides.
- Relax hypertonic muscles with PIR technique including Tensor fasciae latae on right leg and hamstrings and hip adductors on both sides.
- Release the restriction of patella and fibula head joints in the right leg.
- Performing soft tissue therapy on the scar.
- Reduce the swelling around the right knee joint.
- Deep vein thrombosis prevention in both lower extremities

Long term plan:

- Improve the stability and balance of the posture and gait with sensorimotoric training.
- Introduce the patient to condition exercising to improve her endurance and overall health and wellbeing.
- Maintaining Gained ROM.

3.5. Therapy progress

Session 1

Date: 6 February 2019

Duration of therapy: 60 minutes.

Subjective: Patient complained from the pain caused by the hematoma and the Lack of ROM in the right knee.

Objective: Patient had an 80° flexion today morning on the Motor Splint Machine (MSM) for 30 minutes, Fresh blood stain observed on the bandage dressing applied on the caudal end of the scar, Pain level on the skin of the right leg if being touched today is 8 out of 10.

Goal of today's therapy unit

- Deep vein thrombosis prevention.
- Increase ROM of the right knee in flexion and extension.
- Reduce the swelling around the right knee joint.
- Strengthen right quadriceps muscles.

- Train walking up and down stairs with crutches.
- Correcting of gait.

Therapy applied

- Soft tissue technique using the foam ball on the swelling around the knee joint starting from the lateral borders of the caudal end of the scar going up to hip joint.
- Active movements of the ankles: dorsal/plantar flexion and rotations in both ankles for 10 repetitions in each movement.
- Isometric contraction of quadriceps with an over-ball under the right knee while the patient in supine position, the patient is instructed to press the knee down towards the treatment table for about 4-6 seconds, repeated 10 times.
- Increasing the ROM of the right knee flexion and extension and strengthen quadriceps and hamstrings by the patient laying supine and an over-ball placed under the right ankle, raising the knee from the treatment table slowly against gravity until the barrier is met then lowering the right leg slowly to the starting position, repeated 10 times with a small resting break for 30 seconds for every 3 repetitions during the resting break the patient had to put her right knee in semi flexion position due to the over-ball under the ankle being uncomfortable.
- Increasing the ROM of the right knee flexion by applying PIR with stretching (according to Lewit) for quadriceps in prone position, repeated 3 times.
- Increasing the ROM of the right knee extension by applying PIR with stretching (according to Lewit) for hamstrings in prone position, repeated 3 times.
- Train walking up and down stairs with close supervision and protection measures been taken.
- Gait exercising by walking with the patient at the beginning of the therapy session from her room walking through the corridor to the therapy room.

Self-therapy:

- Active movements of the ankles: dorsal/plantar flexion and rotations in both ankles for deep vein thrombosis prevention every 2 hours while in bed and for 10 repetitions in each movement.
- While patient laying supine in bed and a pillow placed under the right knee then the patient is instructed to press the knee down towards the bed for about 4-6 seconds, repeated 10 times 3 times a day.
- Cold pack at the temperature of approximately -6° C applied on the right knee joint for 20 minutes twice a day.

After the session and therapy evaluation:

Subjective: the patient is able to do all exercises without any fear, patient said she likes the soft tissue therapy with the foam ball, she expressed that the therapy was more demanding than she thought.

Objective: It was the first meeting with the patient so the majority of the time was spent to take the anamnesis and perform the initial examination. The patient had a good activation of muscles in the right leg although she felt a slight pain in the right knee joint when doing maximal flexion, also I observed an increase of the knee barrier at flexion while performing PIR with stretching to quadriceps by approximately 5° (judged by observation), the patient is able to walk on stairs with good gait but with slow steps.

Session 2

Date: 7 February 2019

Duration of therapy: 50 minutes.



Figure 5 Kinesio tape application on the second session (5)

Subjective: Patient said that her right leg was really painful yesterday that she had troubles sleeping.

Objective: Patient had an 85° flexion today morning on the Motor Splint Machine (MSM) for 30 minutes, kinesio tape was applied today morning by the doctor, Pain level on the skin of the right leg if being touched today is 8 out of 10.

Goal of today's therapy unit

- Deep vein thrombosis prevention.
- Increase ROM of the right knee in flexion and extension.
- Strengthen right quadriceps muscles.
- Reduce the swelling around the right knee joint.
- Train walking up and down stairs with crutches.

- Relax Hypertonic muscles of Tensor fasciae latae on right leg and hamstrings and hip adductors on both sides.
- Release the restriction of patella and fibula head joints in the right leg.
- Correcting of gait.

Therapy applied

- Soft tissue technique using the foam ball on the swelling around the right knee joint starting from the lateral borders of the knee joint going up to hip joint.
- Active movements of the ankles: dorsal/plantar flexion and rotations in both ankles for 10 repetitions in each movement.
- Isometric contraction of quadriceps with an over-ball under the right knee while the patient in supine position, the patient is instructed to press the knee down towards the treatment table for about 4-6 seconds, repeated 10 times.
- Increasing the ROM of the right knee flexion and extension and strengthen quadriceps and hamstrings by the patient laying supine and an over-ball placed under the right ankle, raising the knee from the treatment table slowly against gravity until the barrier is met then lowering the right leg slowly to the starting position, repeated 10 times with a small resting break for 30 seconds for every 3 repetitions during the resting break the patient had to put her right knee in semi flexion position due to the over-ball under the ankle being uncomfortable.
- Increasing the ROM of the right knee flexion by applying PIR with stretching (according to Lewit) for quadriceps in prone position, repeated 3 times.
- Increasing the ROM of the right knee extension by applying PIR with stretching for hamstrings in prone position, repeated 3 times.
- Relaxing tensor fasciae latae on right leg with PIR (according to Lewit), repeated 3 times.
- Relaxing hip adductors on both legs by PIR (according to Lewit), repeated 3 times
- Relaxing hip adductors on both legs by activation the anti-agonist muscles (hip abductors), the patient is supine on the treatment table then we ask the patient to

actively abduct the hip maximally then right away we take hold of the patient abducted leg on the thigh and ankle and ask the patient to completely relax the leg and then we move the patient leg into adduction passively, repeated 10 times on both legs.

- Relaxing Hamstrings on both legs by PIR (according to Lewit), repeated 3 times.
- Joint play mobilization of patella and fibula head joints (according to Lewit) in the right leg.
- Train walking up and down stairs with close supervision and protection measures been taken.
- Gait exercising by walking with the patient at the beginning of the therapy session from her room walking through the corridor to the therapy room.

Self-therapy:

- Active movements of the ankles: dorsal/plantar flexion and rotations in both ankles for deep vein thrombosis prevention every 2 hours while in bed and for 10 repetitions in each movement.
- While patient laying supine in bed and an over-ball placed under the right knee then the patient is instructed to press the knee down towards the bed for about 4-6 seconds, repeated 10 times 3 times a day.
- Cold pack at the temperature of approximately -6° C applied on the right knee joint for 20 minutes twice a day.

After the session and therapy evaluation:

Subjective: the patient was scared at first when I did patella mobilization but soon she got relieved and wasn't scared anymore

Objective: PIR of the hip adductors on both sides and on tensor fasciae latae on the right side was really effective, I achieved an improvement on the tonicity of those muscles, I still didn't get the chance to try to apply soft tissue techniques below the right knee due to pain caused by the hematoma.

Session 3

Date: 8 February 2019

Duration of therapy: 50 minutes.

Subjective: Patient is really satisfied with the kinesio tape that was applied yesterday she feels better and the pain has decreased.

Objective: Patient had an 85° flexion today morning on the Motor Splint Machine (MSM) for 30 minutes, kinesio tape was removed today morning by the doctor, Pain level on the skin of the right leg if being touched today is 6 out of 10.

Goal of today's therapy unit

- Deep vein thrombosis prevention.
- Increase ROM of the right knee in flexion and extension.
- Strengthen right quadriceps muscles.
- Reduce the swelling around the right knee joint.
- Trying to apply soft tissue techniques below the right knee with the foam ball.
- Scar therapy: gently stretching the skin around the scar, mobilization of the scar tissue with various techniques including stretching the scar with folding, stretching the borders of the tissue as an S shape etc.
- Train walking up and down stairs with crutches.

- Relax Hypertonic muscles of Tensor fasciae latae on right leg and hamstrings and hip adductors on both sides.
- Release the restriction of patella and fibula head joints in the right leg.
- Correcting of gait.

Therapy applied

- Soft tissue technique using the foam ball on the swelling around the right knee joint starting from the lateral borders of the knee joint going up to hip joint, also was applied gently below the right knee.
- Scar therapy: gently stretching the skin around the scar, mobilization of the scar tissue with various techniques including stretching the scar with folding, stretching the borders of the tissue as an S shape etc.
- Active movements of the ankles: dorsal/plantar flexion and rotations in both ankles for 10 repetitions in each movement.
- Isometric contraction of quadriceps with an over-ball under the right knee while the patient in supine position, the patient is instructed to press the knee down towards the treatment table for about 4-6 seconds, repeated 10 times.
- Increasing the ROM of the right knee flexion and extension and strengthen quadriceps and hamstrings by the patient laying supine and an over-ball placed under the right ankle, raising the knee from the treatment table slowly against gravity until the barrier is met then lowering the right leg slowly to the starting position, repeated 10 times with a small resting break for 30 seconds for every 3 repetitions, patient no longer feels the need to put her knee in semi flexion.
- Increasing the ROM of the right knee flexion by applying PIR with stretching (according to Lewit) for quadriceps in prone position, repeated 3 times.
- Increasing the ROM of the right knee extension by applying PIR with stretching (according to Lewit) for hamstrings in prone position, repeated 3 times.
- Relaxing tensor fasciae latae on right leg with PIR (according to Lewit), repeated 3 times.

- Relaxing hip adductors on both legs by PIR (according to Lewit), repeated 3 times
- Relaxing hip adductors on both legs by activation the anti-agonist muscles (hip abductors), the patient is supine on the treatment table then we ask the patient to actively abduct the hip maximally then right away we take hold of the patient abducted leg on the thigh and ankle and ask the patient to completely relax the leg and then we move the patient leg into adduction passively, repeated 10 times on both legs.
- Relaxing Hamstrings on both legs by PIR (according to Lewit), repeated 3 times.
- Joint play mobilization of patella and fibula head joints (according to Lewit) in the right leg.
- Train walking up and down stairs with close supervision and protection measures been taken.
- Gait exercising by walking with the patient at the beginning of the therapy session from her room walking through the corridor to the therapy room.

Self-therapy:

- Active movements of the ankles: dorsal/plantar flexion and rotations in both ankles for deep vein thrombosis prevention every 2 hours while in bed and for 10 repetitions in each movement.
- While patient laying supine in bed and an over-ball placed under the right knee then the patient is instructed to press the knee down towards the bed for about 4-6 seconds, repeated 10 times 3 times a day.
- Cold pack at the temperature of approximately -6° C applied on the right knee joint for 20 minutes twice a day.

After the session and therapy evaluation:

Subjective: the patient was really scared at first when I did Soft tissue technique using the foam ball on the right tibia which was extremely painful to the touch previously but soon she got relieved and wasn't scared anymore, and in fact she did like it.

Objective: PIR of the hip adductors on both sides and on tensor fasciae latae on the right side was really effective they are not hypertonic anymore and in the next session we will start to strengthen the hip adductors, scar tissue is more flexible now especially at the middle of the scar.

Session 4

Date: 11 February 2019

Duration of therapy: 50 minutes.

Subjective: This is our first session together after the weekend, patient said she is excited to train today.

Objective: Patient had an 90° flexion today morning on the Motor Splint Machine (MSM) for 30 minutes, pain level on the skin of the right leg if being touched today is 5 out of 10.

Goal of today's therapy unit

- Deep vein thrombosis prevention.
- Increase ROM of the right knee in flexion and extension.
- Strengthen right quadriceps muscles.
- Soft tissue technics with the foam ball.
- Scar therapy.
- Strengthen hip adductors on both sides
- Train walking up and down stairs with crutches.
- Relax Hypertonic hamstrings on both sides.

- Release the restriction of patella and fibula head joints in the right leg.
- Correcting of gait.

Therapy applied

- Soft tissue technique using the foam ball going from the right ankle cranially to the hip.
- Scar therapy: gently stretching the skin around the scar, mobilization of the scar tissue with various techniques including stretching the scar with folding, stretching the borders of the tissue as an S shape etc.
- Active movements of the ankles: dorsal/plantar flexion and rotations in both ankles for 10 repetitions in each movement.
- Isometric contraction of quadriceps with an over-ball under the right knee while the patient in supine position, the patient is instructed to press the knee down towards the treatment table for about 4-6 seconds, repeated 10 times.
- Increasing the ROM of the right knee flexion and extension and strengthen quadriceps and hamstrings by the patient laying supine and an over-ball placed under the right ankle, raising the knee from the treatment table slowly against gravity until the barrier is met then lowering the right leg slowly to the starting position, repeated 10 times with a small resting break for 30 seconds for every 3 repetitions during the resting break the patient had to put her right knee in semi flexion position due to the over-ball under the ankle being uncomfortable.
- Increasing the ROM of the right knee flexion by applying PIR with stretching (according to Lewit) for quadriceps in prone position, repeated 3 times.
- Increasing the ROM of the right knee extension by applying PIR with stretching (according to Lewit) for hamstrings in prone position, repeated 3 times.
- Strengthen hip adductors on both legs by placing an over-ball between the knees while both of them semi flexed and both foot on the treatment table then we instruct the patient to push the ball with her knees for 4 seconds bringing it into adduction then relax for 2 seconds and push again, repeated 10 times.

- Relaxing Hamstrings on both legs by PIR (according to Lewit), repeated 6 times.
- Joint play mobilization of patella and fibula head joints (according to Lewit) in the right leg.
- Train walking up and down stairs with close supervision and protection measures been taken.
- Gait exercising by walking with the patient at the beginning of the therapy session from her room walking through the corridor to the therapy room.

Self-therapy:

- Active movements of the ankles: dorsal/plantar flexion and rotations in both ankles for deep vein thrombosis prevention every 2 hours while in bed and for 10 repetitions in each movement.
- While patient laying supine in bed and an over-ball placed under the right knee then the patient is instructed to press the knee down towards the bed for about 4-6 seconds, repeated 10 times 3 times a day.
- Cold pack at the temperature of approximately -6° C applied on the right knee joint for 20 minutes twice a day.

After the session and therapy evaluation:

Subjective: Patient expressed that she feels more pain now at the hamstrings when moving the right knee in maximum flexion or extension.

Objective: Today the exercise involving flexion and extension of the knee with the over-ball under the heel was painful at the hamstrings, so I palpated the hamstrings today and it was hypertonic and painful too, so I increased the regular repetitions for PIR of hamstrings from 3 to 6 and there was a

slight improvement, there is an improvement of the gait, patient now walks with her head forward not looking down anymore.

Session 5

Date: 12 February 2019

Duration of therapy: 50 minutes.

Subjective: Patient said that she had a pain yesterday at the right hamstrings when she did the self-therapy exercise with the over-ball placed under the right knee then the patient is instructed to press the knee down towards the bed.

Objective: Patient had an 90° flexion today morning on the Motor Splint Machine (MSM) for 30 minutes, most of the metallic staples on the scar have been removed today in the morning except for the metallic staples on the 6th - 9th cm caudally from the cranial part of the scar due to not being fully adhesions yet, pain level on the skin of the right leg if being touched today is 4 out of 10.

Goal of today's therapy unit

- Deep vein thrombosis prevention.
- Increase ROM of the right knee in flexion and extension.
- Strengthen right quadriceps muscles.
- Soft tissue technics with the foam ball.
- Scar therapy.
- Strengthen hip adductors on both sides
- Train walking up and down stairs with crutches.
- Relax Hypertonic hamstrings on both sides.
- Release the restriction of patella and fibula head joints in the right leg.
- Correcting of gait.

Therapy applied

- Soft tissue technique using the foam ball going from the right ankle cranially to the hip.
- Scar therapy: gently stretching the skin around the scar, mobilization of the scar tissue with various techniques including stretching the scar with folding, stretching the borders of the tissue as an S shape etc.
- Active movements of the ankles: dorsal/plantar flexion and rotations in both ankles for 10 repetitions in each movement.
- Isometric contraction of quadriceps with an over-ball under the right knee while the patient in supine position, the patient is instructed to press the knee down towards the treatment table for about 4-6 seconds, repeated 10 times.
- Increasing the ROM of the right knee flexion and extension and strengthen quadriceps and hamstrings by the patient laying supine and an over-ball placed under the right ankle, raising the knee from the treatment table slowly against gravity until the barrier is met then lowering the right leg slowly to the starting position, repeated 2 times.
- Strengthening quadriceps and hamstrings, patient is sitting on the treatment table with her knees at the edge and her feet hanging down the table, we fix a small weight vest (.5 kg) around the right ankle then we ask the patient to do slow knee extension- hold the position- and then slow knee flexion- rest for 5 seconds and repeat the procedure, repeated 6 times.
- Increasing the ROM of the right knee flexion by applying PIR with stretching (according to Lewit) for quadriceps in prone position, repeated 3 times.
- Increasing the ROM of the right knee extension by applying PIR with stretching (according to Lewit) for hamstrings in prone position, repeated 3 times.
- Strengthen hip adductors on both legs by placing an over-ball between the knees while both of them semi flexed and both foot on the treatment table then we instruct the patient to push the ball with her knees for 4 seconds bringing it into adduction then relax for 2 seconds and push again, repeated 10 times.
- Relaxing Hamstrings on both legs by PIR (according to Lewit), repeated 6 times.

- Joint play mobilization of patella and fibula head joints (according to Lewit) in the right leg.
- Train walking up and down stairs with close supervision and protection measures been taken.
- Gait exercising by walking with the patient at the beginning of the therapy session from her room walking through the corridor to the therapy room.

Self-therapy:

- Active movements of the ankles: dorsal/plantar flexion and rotations in both ankles for deep vein thrombosis prevention every 2 hours while in bed and for 10 repetitions in each movement.
- While patient laying supine in bed and an over-ball placed under the right knee then the patient is instructed to press the knee down towards the bed for about 4-6 seconds, repeated 10 times 3 times a day.
- Cold pack at the temperature of approximately -6° C applied on the right knee joint for 20 minutes twice a day.

After the session and therapy evaluation:

Subjective: Patient said that she doesn't like the supine exercise with the over-ball under her heel and she does flexion and extension of the right knee due to being painful and not being comfortable any more.

Objective: Today the exercise involving flexion and extension of the knee with the over-ball under the heel was painful at the hamstring just like yesterday, so I stopped it after 2 repetitions and I introduced a new exercise which puts her into more comfortable position (sitting) for her right knee movements, I maintained the amount of repetitions for PIR of hamstrings

of 6 because I want to insure the maximum benefit of relaxation, scar tissue after removing most of the metallic staples is more free in the movement and easier to work with.

Session 6

Date: 13 February 2019

Duration of therapy: 50 minutes.

Subjective: Patient said that she didn't feel any pain yesterday at the right hamstrings when she did the self-therapy exercises with the over-ball placed under the right knee then the patient is instructed to press the knee down towards the bed.

Objective: Patient had an 95° flexion today morning on the Motor Splint Machine (MSM) for 30 minutes, pain level on the skin of the right leg if being touched today is 3 out of 10.

Goal of today's therapy unit

- Deep vein thrombosis prevention.
- Increase ROM of the right knee in flexion and extension.
- Strengthen right quadriceps muscles.
- Soft tissue technics with the foam ball.
- Scar therapy.
- Strengthen hip adductors on both sides
- Train walking up and down stairs with crutches.
- Relax Hypertonic hamstrings on both sides.
- Release the restriction of patella and fibula head joints in the right leg.
- Correcting of gait.

Therapy applied

- Soft tissue technique using the foam ball going from the right ankle cranially to the hip.
- Scar therapy: gently stretching the skin around the scar, mobilization of the scar tissue with various techniques including stretching the scar with folding, stretching the borders of the tissue as an S shape etc.
- Active movements of the ankles: dorsal/plantar flexion and rotations in both ankles for 10 repetitions in each movement.
- Isometric contraction of quadriceps with an over-ball under the right knee while the patient in supine position, the patient is instructed to press the knee down towards the treatment table for about 4-6 seconds, repeated 10 times.
- Strengthening quadriceps and hamstrings, patient is sitting on the treatment table with her knees at the edge and her feet hanging down the table, we fix a small weight vest (.5 kg) around the right ankle then we ask the patient to do slow knee extension- hold the position- and then slow knee flexion- rest for 5 seconds and repeat the procedure, repeated 6 times.
- Increasing the ROM of the right knee flexion by applying PIR with stretching (according to Lewit) for quadriceps in prone position, repeated 3 times.
- Increasing the ROM of the right knee extension by applying PIR with stretching (according to Lewit) for hamstrings in prone position, repeated 3 times.
- Strengthen hip adductors on both legs by placing an over-ball between the knees while both of them semi flexed and both foot on the treatment table then we instruct the patient to push the ball with her knees for 4 seconds bringing it into adduction then relax for 2 seconds and push again, repeated 10 times.
- Relaxing Hamstrings on both legs by PIR (according to Lewit), repeated 6 times.
- Joint play mobilization of patella and fibula head joints (according to Lewit) in the right leg.
- Train walking up and down stairs with close supervision and protection measures been taken.

- Gait exercising by walking with the patient at the beginning of the therapy session from her room walking through the corridor to the therapy room.

Self-therapy:

- Active movements of the ankles: dorsal/plantar flexion and rotations in both ankles for deep vein thrombosis prevention every 2 hours while in bed and for 10 repetitions in each movement.
- While patient laying supine in bed and an over-ball placed under the right knee then the patient is instructed to press the knee down towards the bed for about 4-6 seconds, repeated 10 times 3 times a day.
- Cold pack at the temperature of approximately -6° C applied on the right knee joint for 20 minutes twice a day.

After the session and therapy evaluation:

Subjective: Patient said that she feels more stable at her right knee, and that she likes the exercise while sitting.

Objective: There is a noticeable improvement of the active ROM of the right knee joint especially in flexion also the movement now is more smooth, right fibular head joint is no longer restricted.

Session 7

Date: 14 February 2019

Duration of therapy: 50 minutes.

Subjective: Patient asked if we can put more weight on her right ankle during the exercise with knee flexion and extension.

Objective: Patient had an 95° flexion today morning on the Motor Splint Machine (MSM) for 30 minutes, pain level on the skin of the right leg if being touched today is 3 out of 10.

Goal of today's therapy unit

- Deep vein thrombosis prevention.
- Increase ROM of the right knee in flexion and extension.
- Strengthen right quadriceps muscles.
- Soft tissue techniques with the foam ball.
- Scar therapy.
- Strengthen hip adductors on both sides
- Train walking up and down stairs with crutches.
- Relax Hypertonic hamstrings on both sides.
- Release the restriction of patella and fibula head joints in the right leg.
- Correcting of gait.

Therapy applied

- Soft tissue technique using the foam ball going from the right ankle cranially to the hip.
- Scar therapy: gently stretching the skin around the scar, mobilization of the scar tissue with various techniques including stretching the scar with folding, stretching the borders of the tissue as an S shape etc.
- Active movements of the ankles: dorsal/plantar flexion and rotations in both ankles for 10 repetitions in each movement.

- Isometric contraction of quadriceps with an over-ball under the right knee while the patient in supine position, the patient is instructed to press the knee down towards the treatment table for about 4-6 seconds, repeated 10 times.
- Strengthening quadriceps and hamstrings, patient is sitting on the treatment table with her knees at the edge and her feet hanging down the table, we fix a small weight vest (1 kg) around the right ankle then we ask the patient to do slow knee extension- hold the position- and then slow knee flexion- rest for 5 seconds and repeat the procedure, repeated 10 times.
- Increasing the ROM of the right knee flexion by applying PIR with stretching (according to Lewit) for quadriceps in prone position, repeated 3 times.
- Increasing the ROM of the right knee extension by applying PIR with stretching (according to Lewit) for hamstrings in prone position, repeated 3 times.
- Strengthen hip adductors on both legs by placing an over-ball between the knees while both of them semi flexed and both foot on the treatment table then we instruct the patient to push the ball with her knees for 4 seconds bringing it into adduction then relax for 2 seconds and push again, repeated 10 times.
- Relaxing Hamstrings on both legs by PIR (according to Lewit), repeated 6 times.
- Joint play mobilization of patella and fibula head joints (according to Lewit) in the right leg.
- Train walking up and down stairs with close supervision and protection measures been taken.
- Gait exercising by walking with the patient at the beginning of the therapy session from her room walking through the corridor to the therapy room.

Self-therapy:

- Active movements of the ankles: dorsal/plantar flexion and rotations in both ankles for deep vein thrombosis prevention every 2 hours while in bed and for 10 repetitions in each movement.

- While patient laying supine in bed and an over-ball placed under the right knee then the patient is instructed to press the knee down towards the bed for about 4-6 seconds, repeated 10 times 3 times a day.
- Cold pack at the temperature of approximately -6° C applied on the right knee joint for 20 minutes twice a day.

After the session and therapy evaluation:

Subjective: Patient is feeling good and all the movements is now pain free.

Objective: Gait have improved a lot; patient no longer have excessive right hip elevation and flexion of the right hip during the gait is now better, quadriceps and hip adductors strength have improved, hamstrings still hypertonic but no longer painful during palpation.

Session 8

Date: 15 February 2019

Duration of therapy: 60 minutes.

Subjective: Patient is going home tomorrow and she is really happy about it.

Objective: Patient had an 95° flexion today morning on the Motor Splint Machine (MSM) for 30 minutes, bandage dressing applied yesterday on the 6th - 9th cm caudally from the cranial part of the scar because there was a little bit of blood leaking out the scar segment, pain level on the skin of the right leg if being touched today is 2 out of 10.

Goal of today's therapy unit

- Deep vein thrombosis prevention.
- Increase ROM of the right knee in flexion and extension.
- Strengthen right quadriceps muscles.
- Soft tissue techniques with the foam ball.
- Scar therapy.
- Strengthen hip adductors on both sides
- Train walking up and down stairs with crutches.
- Relax Hypertonic hamstrings on both sides.
- Release the restriction of patella and fibula head joints in the right leg.
- Correcting of gait.

Therapy applied

- Soft tissue technique using the foam ball going from the right ankle cranially to the hip.
- Scar therapy: gently stretching the skin around the scar, mobilization of the scar tissue with various techniques including stretching the scar with folding, stretching the borders of the tissue as an S shape etc.
- Active movements of the ankles: dorsal/plantar flexion and rotations in both ankles for 10 repetitions in each movement.
- Isometric contraction of quadriceps with an over-ball under the right knee while the patient in supine position, the patient is instructed to press the knee down towards the treatment table for about 4-6 seconds, repeated 10 times.
- Strengthening quadriceps and hamstrings, patient is sitting on the treatment table with her knees at the edge and her feet hanging down the table, we fix a small weight vest (1 kg) around the right ankle then we ask the patient to do slow knee extension- hold the position- and then slow knee flexion- rest for 5 seconds and repeat the procedure, repeated 6 times.

- Increasing the ROM of the right knee flexion by applying PIR with stretching (according to Lewit) for quadriceps in prone position, repeated 3 times.
- Increasing the ROM of the right knee extension by applying PIR with stretching (according to Lewit) for hamstrings in prone position, repeated 3 times.
- Strengthen hip adductors on both legs by placing an over-ball between the knees while both of them semi flexed and both foot on the treatment table then we instruct the patient to push the ball with her knees for 4 seconds bringing it into adduction then relax for 2 seconds and push again, repeated 6 times.
- Relaxing Hamstrings on both legs by PIR (according to Lewit), repeated 3 times.
- Joint play mobilization of patella and fibula head joints (according to Lewit) in the right leg.
- Train walking up and down stairs with close supervision and protection measures been taken.
- Gait exercising by walking with the patient at the beginning of the therapy session from her room walking through the corridor to the therapy room.

Self-therapy:

- Active movements of the ankles: dorsal/plantar flexion and rotations in both ankles for deep vein thrombosis prevention every 2 hours while in bed and for 10 repetitions in each movement.
- While patient laying supine in bed and an over-ball placed under the right knee then the patient is instructed to press the knee down towards the bed for about 4-6 seconds, repeated 10 times 3 times a day.
- Cold pack at the temperature of approximately -6° C applied on the right knee joint for 20 minutes twice a day.

After the session and therapy evaluation:

Subjective: Patient is really glad with the improvement she achieved especially the right knee ROM and the healing of hematoma

Objective: We achieved 90° active flexion of the right knee which was our goal, most of the time we spent taking the final Kinesiological examination.

3.6. Final Kinesiological Examination

3.6.1. Postural Examination (*According to Kendall*):

All Postural Examinations were done while standing with crutches.

Posterior view	
The base of support	Narrow base of support, weight is more distributed on the left side.
The shape and position of the heels	Right heel is slightly ahead than the left heel.
Shape and position of the ankle joints	Symmetrical.
Shape and the thickness of Achilles tendon	Left is more wide.
Calf muscle	Right is noticeably in an atrophy especially on the medial side.
Knee Joints	Right knee in semi-flexion.
Popliteal line	Right is slightly higher.

Thigh muscles	Atrophy on the right.
Sub gluteal line	Symmetrical.
Gluteal muscles	Right in atrophy.
Pelvis	Right PSIS is higher
Thoracobrachial triangles	Symmetrical.
Cervical spine	Hyper kyphosis from C5-C7.
Thoracic spine	Hyper kyphosis in C-TH junction.
Lumbar spine	Lordosis.
Position of the scapula	Right in a bit of abduction of the inferior angle and is more prominent.
Position of the shoulder girdle	Right shoulder is higher.
Upper limbs	Symmetrical.
Position of the head	Physiological.
Trunk	Slightly shifted to the left.

Table 16 Final Posterior Posture view

Anterior view	
Foot arches	Both feet have more contact of the lateral arch to the floor while the medial arch is in less contact, this is more prominent on the right foot.
The position and shape of toes	Symmetrical
Knee joints	Right is higher.
Thigh muscles	More volume on the left
Thoracobrachial triangles	Symmetrical.
Pelvis	Right ASIS is higher
Position of the shoulder girdle	Right shoulder is higher.
Position of the head	Physiological.
Upper limbs	Symmetrical.

Table 17 Final anterior posture view

Lateral view	
Ankle joints	Symmetrical.
Calf muscles	Atrophy on the right.
Knee joints	Right in semi-flexion
Thigh muscles	Atrophy on the right.
Pelvis	Slight anterior tilt.
Curvature of the spine	Hyper kyphosis in the C-TH junction, lordosis in the lumbar spine.
Shoulder girdle	Right is higher.
Position of the head	Protracted.
Trunk	In Flexion.

Table 18 Final lateral posture view

3.6.2. Gait

Patient walks with crutches without any troubles using Three-point gait pattern.

Width of base of support	Narrow base of support.
Walking rhythm	Periodic.
Walking speed	Slow.
Stride length	Asymmetrical, right leg cover more distance.
Movement of the foot	Excessive heel strike in both feet, right foot has less contact of the medial edge to the floor.
Position and movement of the knee and hip joints	Right knee has less flexion during the gait while the left knee seems physiological.
Position and movement of the pelvis	Right ilium spine is higher
Position and movement of the upper extremity	Upper extremities are moving the crutches ideally in the three-point gait pattern and they are symmetrical.

Position of the head	Neutral
Stability of walking	Patient walks with the trunk leaning more forward.

Table 19 Final gait

3.6.3. Pelvis palpation

Height and symmetry of Iliac Crest	Right Iliac crest is higher
Posterior Superior Iliac Spine	Right is higher
Anterior Superior Iliac Spine	Right is higher
Pelvic rotation/ torsion	Slightly tilted
Ante version (anterior tilt) or Retroversion (posterior tilt)	Slight ante version

Table 20 Final pelvis examination

3.6.4. Specific testing

Romberg test: Wasn't examined due to the patient can only stand with crutches.

Vele test: Wasn't examined due to the patient can only stand with crutches.

Trendelenburg test: Wasn't examined due to the patient can only stand with crutches.

3.6.5. Anthropometric Measurement

Lower extremity	Right	Left
Anatomical length	86.5 cm	86.5 cm
Functional length	89.5 cm	88.5 cm

Thigh circumference (15 cm above the knee cap)	52 cm	57 cm
Thigh circumference (10 cm above the knee cap)	48 cm	47 cm
Knee circumference	43 cm	41 cm
Calf circumference	35.5 cm	36 cm
Ankle circumference	22 cm	22 cm

Table 21 Final anthropometric measurements

3.6.6. ROM Goniometer Measurements & End Feel. (Janda Approach & SFTR format)

Hip	Active		Passive	
	Left	Right	Left	Right
Extension & Flexion	45-0-90	35-0-95	50-0-100	40-0-120
Adduction & Abduction	20-0-35	20-0-25	30-0-45	30-0-30
External rotation & Internal rotation	40-0-20	30-0-25	50-0-30	40-0-35

Table 22 Final ROM of hip

Knee	Active		Passive	
	Left	Right	Left	Right
Extension & Flexion	10-0-125	10-0-90	10-0-130	10-0-90

Table 23 Final ROM of knee

Ankle	Active		Passive	
	Left	Right	Left	Right

Dorsiflexion & Plantar flexion	20-0-40	15-0-40	25-0-50	20-0-50
Eversion & Inversion	15-0-35	15-0-25	20-0-45	20-0-35

Table 24 Final ROM of ankle

3.3.7. Muscle Length Test (Evaluation by Janda)

Grade 0 = No shortness.

Grade 1 = Slight shortness.

Grade 2 = Marked shortness.

Muscle	Right	Left
One joint hip flexors	Grade 0	Grade 0
Tow joint hip flexors	Grade 0	Grade 0
Hip adductors	Grade 1	Grade 1
Hamstrings	Grade 0 *	Grade 0 *
One joint planter flexors	Grade 1	Grade 0
Tow joint planter flexors	Grade 1	Grade 0

Table 25 Final muscle length

* Knees aren't fully extended.

3.3.8. Manual Muscle Strength Test (Evaluation by Kendall)

- **Grade 0:** No Contraction of the muscle.
- **Grade 1:** Contraction of the muscle felt but no movement seen.
- **Grade 2:** Position in horizontal plane with gravity.
- **Grade 3:** Against gravity.
- **Grade 4:** Against gravity with moderate resistance given.

- **Grade 5:** Against gravity with maximum resistance given.

Muscle	Right	Left
Gluteus maximus	Grade 4	Grade 4+
Gluteus medius	Grade 4	Grade 5
Gluteus minimus	Grade 4	Grade 4+
Tensor fasciae latae	Grade 5	Grade 5
Iliopsoas	Grade 5	Grade 5
Sartorius	Grade 4+	Grade 4+
Lateral rotators	Grade 4	Grade 5
Medial rotators	Grade 4	Grade 4+
Hip adductors	Grade 3+	Grade 3+
Biceps femoris	Grade 4+	Grade 4+
Semitendinosus	Grade 4	Grade 4
Semimembranosus	Grade 4	Grade 4
Quadriceps femoris	Grade 4	Grade 4
Ankle plantar flexors	Grade 5	Grade 5
Peroneus longus	Grade 4	Grade 4
Peroneus brevis	Grade 5	Grade 4
Tibialis anterior	Grade 4	Grade 5
Tibialis posterior	Grade 5	Grade 5

Table 26 Final muscle strength

3.3.9. Muscle tone palpation

Muscle	Right	Left
Gluteus maximus	Normal tone	Normal tone
Gluteus medius	Normal tone	Normal tone

Gluteus minimus	Normal tone	Normal tone
Tensor fasciae latae	Normal tone	Normal tone
Piriformis	Normal tone	Normal tone
Iliopsoas	Normal tone	Normal tone
Sartorius	Normal tone	Normal tone
Rectus femoris	Normal tone	Normal tone
Vastus medialis	Normal tone	Normal tone
Vastus lateralis	Hypotonic	Normal tone
Biceps femoris	Hypertonic	Hypertonic
Semitendinosus	Hypertonic	Hypertonic
Semimembranosus	Hypertonic	Hypertonic
Gastrocnemius	Normal tone	Normal tone
Soleus	Normal tone	Normal tone
Hip adductors	Normal tone	Normal tone
Tibialis anterior	Normal tone	Normal tone
Tibialis posterior	Normal tone	Normal tone

Table 27 Final muscle tone

3.3.10. Joint Play Examination (Lewit Approach)

Examined joint	Right	Left
Patella	Restricted in the caudal direction	Not restricted but painful in the caudal direction
Tibiofemoral	Contraindicated	Not restricted
Fibula head	Not restricted	Not restricted
Talocrural	Not restricted	Not restricted
Subtalar	Not restricted	Not restricted
Transverse tarsal	Not restricted	Not restricted
Tarsometatarsal	Not restricted	Not restricted

Metatarsophalangeal	Not restricted	Not restricted
Proximal interphalangeal	Not restricted	Not restricted
Distal interphalangeal	Not restricted	Not restricted

Table 28 Final joint play

3.3.11. Basic Movement Pattern Examination (Janda Approach)

Movement	Right	Left
Hip extension	Hamstrings were activated first followed by contra lateral paravertebral muscles then ipsilateral paravertebral muscles and finally Gluteus maximus	Hamstrings were activated first followed by ipsilateral paravertebral muscles then contra lateral paravertebral muscles and finally Gluteus maximus
Hip abduction	Physiological timing of muscle activation	Physiological timing of muscle activation

Table 29 Final stereotypes

3.3.12. Soft tissue examination (according to lewit)

Hematoma: Has been greatly reduced and now only occupy a small area of the right medial tibia, it's not that painful to the touch any more, from the scale of 1-10 (10 being the most painful) patient said that she feels the pain at the level 2 if the skin affected by the hematoma on the tibia is being touched.

Scar: Is 22.5 cm at length, all of the metallic staples are removed, scar isn't painful if being touched, mobility of the scar is mostly good, stiffness is only present on the 6th - 9th cm caudally from the cranial part of the scar, the scar healed ok except the part where a new bandage dressing

applied on it due to leaking out a little bit of blood which is the 6th - 9th cm caudally from the cranial part of the scar.

Skin: Slight Restriction lateral to the right knee and on the medial tibia, swelling have been greatly reduced.

Sub skin: Slight Restriction lateral to the right knee and on the medial tibia.

Facia: Restricted on the medial part of the right tibia.

3.3.13. Neurological examination

Dermatome	Right	Left
L1	Normal sensation	Normal sensation
L2	Normal sensation	Normal sensation
L3	Normal sensation	Normal sensation
L4	Normal sensation	Normal sensation
L5	Normal sensation	Normal sensation
S1	Normal sensation	Normal sensation
S2	Normal sensation	Normal sensation

Table 30 Final dermatomes

3.3.14. Conclusion of the examination

The final kinesiology examination of E.T showed great improvement in many factors that were set up as a goal of the therapy aimed to improve. The main focus of the therapy was on the right knee to help the patient gain back some of the lost ROM following the surgery which we have achieved, the hematoma also was remarkably decreased which also relieved most of the pain my patient was dealing with, in the postural and gait examinations we can see an improvement in the aspects which

is related to the patient chief complain on the other hand some aspects haven't improved such as hyper kyphosis in the C-TH junction for example due to being problems associated with certain stereotypes been practiced by my patient for a long time and will require a special attention and care which I don't have the luxury of since I had limited time(10 days) and there was more acute problems I had to treat, moving to the anthropometric measurements we can see clearly the big reduction of swelling on the right leg, ROM of the right knee was greatly increased and to some degree on the hips especially in abduction,

We managed to greatly increase the ROM of the right knee in flexion and extension, Pain has greatly decreased from 8-2, shortness of hip adductors has been treated, hypertonicity of most of lower extremity muscles have also been reduced with the expiation of hamstrings, muscle length examination showed an improvement in the right 2 joint hip flexors length and on both of the hip adductors on the other hand the right planter flexors still slightly shortened, the muscle strength examination showed an overall improvement of most of the lower extremities muscles especially the hip adductors and the right quadriceps, muscle palpation showed an improvements of almost all the lower extremity muscles with the exception of hamstrings which is still hypertonic, the joint play examination showed all the joints of lower extremities are non-restricted with exception of right patella, in the soft tissue examination we can see clearly the huge improvement of the hematoma either in size or in the caused pain, scar didn't have the same result there is generally an improvement in the swelling, texture and mobility but there is still a spot which haven't healed as nicely as the other parts of the scar, skin- sub skin both showed a slight restriction on the right leg mainly on the lateral right knee and on tibia, fascia is restricted on the medial part of right tibia, there is Physiological superficial sensation on both lower extremities.

4. Evaluation

4.1. Therapy effect & Initial to Final Examination comparison:

In this evaluation, I will be demonstrating only the results of the right lower extremity since the left had almost identical results on the initial and final examinations.

Corrective gait was educated to the patient by showing the correct movement of the foot during the walking, instructing the patient to move the right hip more into flexion instead of hip elevation and look with her head in front her instead of looking at her feet while walking.

Gait		
Examination	Final	Initial
Movement of the foot	Excessive heel strike in both feet, right foot has less contact of the medial edge to the floor.	Excessive heel strike and the toes are always in flexion in both feet, right foot have less contact of the medial edge to the floor.
Position and movement of the knee and hip joints	Right knee has less flexion during the gait while the left knee seems physiological.	Right knee has less flexion during the gait while the left knee seems physiological, the hip flexion of the right side is less than ideal and the stepping forward have more activation of the ipsilateral quadratus

		lumborum which make the hip in hyper elevation during the movement.
Position and movement of the pelvis	Right ilium spine is higher	Right ilium spine is significantly higher when making a step forward with the right leg compared to the left ilium spine when making a step forward with the left leg.
Position of the head	Neutral	Protraction of the head with flexion due to the patient looking at the floor most of the time.

Table 31 Gait comparison

Swelling at the right knee was treated by cold packs and soft tissue techniques using the foam ball, the result is a big decrease in the swelling.

Anthropometric measurements		
Examination	Final	Initial
Thigh circumference (15 cm above the knee cap)	52cm	54 cm
Thigh circumference (10 cm above the knee cap)	48 cm	53 cm
Knee circumference	43 cm	44.5 cm
Calf circumference	35.5 cm	35 cm
Ankle circumference	22 cm	22 cm

Table 32 Anthropometric comparison

ROM of the hip adductors was increased by applying PIR techniques (by Lewit) and activation of the antagonist muscle groups while relaxing the hip adductors, the result is satisfactory.

Hip	Final		Initial	
	Active	Passive	Active	Passive
Extension & Flexion	35-0-95	40-0-120	30-0-95	40-0-120
Adduction & Abduction	20-0-25	30-0-30	15-0-20	20-0-30
External rotation & Internal rotation	30-0-25	40-0-35	30-0-25	40-0-35

Table 33 ROM of hip comparison

Rom of the right knee joint was increased by applying PIR with stretching techniques (by Lewit) for both quadriceps and hamstring muscles, the result is great.

Knee	Final		Initial	
	Active	Passive	Active	Passive
Extension & Flexion	10-0-90	10-0-90	5-0-70	5-0-80

Table 34 ROM of knee comparison

Shortness of hip adductors was increased by applying PIR techniques (by Lewit) and activation of the antagonist muscle groups while relaxing the hip adductors, the result is satisfactory.

Muscle length		
Examination	Final	Initial
One joint hip flexors	Grade 0	Grade 0
Tow joint hip flexors	Grade 0	Grade 1
Hip adductors	Grade 1	Grade 2
Hamstrings	Grade 0 *	Grade 0 *
One joint planter flexors	Grade 1	Grade 1

Table 35 Muscle length comparison

Quadriceps muscle strength was increased by doing isometric and active movements against gravity and then small weights, hamstrings was increased by doing active movements against gravity and then small weights. hamstrings was increased by doing active movements against the over-ball. The results were good.

Muscle strength		
Examination	Final	Initial
Hip adductors	Grade 3+	Grade 3
Biceps femoris	Grade 4+	Grade 4
Semitendinosus	Grade 4	Grade 3+
Semimembranosus	Grade 4	Grade 3+
Quadriceps femoris	Grade 4	Grade 3+

Table 36 Muscle Strength comparison

All the muscles were treated by PIR techniques (by Lewit), all the muscles hypertonicity have been treated with the exception of hamstrings muscles which only improved a bit.

Muscle Tone		
Examination	Final	Initial

Tensor fasciae latae	Normal tone	Hypertonic
Hip adductors	Normal tone	Hypertonic
Biceps femoris	Hypertonic	Hypertonic
Semitendinosus	Hypertonic	Hypertonic
Semimembranosus	Hypertonic	Hypertonic
Quadriceps femoris	Normal tone	Hypertonic

Table 37 Muscle tone comparison

Hematoma was treated with cold packs and soft tissue techniques using the foam ball, the result is astonishing.

Scar was treated with stretching the skin around the scar, mobilization of the scar tissue with various techniques, the result is good.

Skin and sub skin was treated with soft tissue techniques using the foam ball, the result is good.

Facia was treated with soft tissue techniques using the foam ball, the result is below expectations.

Soft tissues		
Examination	Final	Initial
Hematoma	Has been greatly reduced and now only occupy a small area of the right medial tibia, it's not that painful to the touch any more, from the scale of 1-10 (10 being the most painful) patient said that she feels the pain at the level 2 if the skin affected by the hematoma on the tibia is being touched.	Is covering an intermediate area of the operated leg specifically in the ventral and medial tibia which is extremely painful for any touch, from the scale of 1-10 (10 being the most painful) patient said that she feels the pain at the level 8 if the skin affected by the hematoma on the tibia is being touched, there also a hematoma spot on

		the thigh just above the scar it's smaller and it's not painful if being touched.
Scar	Is 22.5 cm at length, all of the metallic staples are removed, scar isn't painful if being touched, mobility of the scar is mostly good, stiffness is only present on the 6 th - 9 th cm caudally from the cranial part of the scar, the scar healed ok except the part where a new bandage dressing applied on it due to leaking out a little bit of blood which is the 6 th - 9 th cm caudally from the cranial part of the scar.	Is 22.5 cm at length, most of the metallic staples are still there, scar isn't painful if touched except for the caudal end, mobility of the scar is mostly good, stiffness is only present at the caudal end of the scar and from the 6 th - 9 th cm caudally from the cranial part of the scar, the scar doesn't seem to be healing very well due to freshly blood stain on the bandage dressing applied on the caudal end of the scar and the fact that most of the metallic staples are still there.
Skin	Slight Restriction lateral to the right knee and on the medial tibia, swelling have been greatly reduced.	Restriction lateral to the right knee, skin below the knee joint to the right foot haven't been examined due to the pain of touching, other than that there is no restriction compared to the left lower extremity.
Sub skin	Slight Restriction lateral to the right knee and on the medial tibia	Restriction lateral to the right knee, sub skin below the knee joint to the right foot haven't

		been examined due to the pain of touching, other than that there is no restriction compared to the left lower extremity.
Facia	Restricted on the medial part of the right tibia.	Facia below the knee joint to the right foot haven't been examined due to the pain of touching, other than that there is no restriction compared to the left lower extremity.

Table 37 Soft tissue comparison

4.2. Prognosis

Knee replacement is quite common procedure with clear guidelines for the patient, since we met almost all of our short-term goals also the fact that the pain from hematoma have been eliminated, the positive character of my patient and the fact she will be walking more outdoors when she will be leaving the hospital and have more physical activity in general with the self-therapy exercise that she is been taught, I see the prognosis is to improve.

E.T showed favorable outcome despite her complications with the hematoma, scar and overweight.

4.3. Conclusion

Working at the rehabilitation department of Kladno general hospital was a great experience, I had patients with different diagnosis's and was lucky enough to work under the supervision of Mgr. Ilona Kučerová who was super helpful, having been working with different patients and seeing the improvements at their conditions and especially working with E.T who I managed to achieve almost of my short-term goals, gave me a good amount of confidence on my practical skills, and I got the chance to demonstrate the theoretical and practical knowledge that I have gained at my study of Charles university.

I must say that I wish I have tried a different treatment method on the hamstrings since it wasn't improved much I think if I have applied PNF with relation I could have had a different result.

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6. Supplements

6.1. Application approval by the UK FTVS Ethics Committee

CHARLES UNIVERSITY
FACULTY OF PHYSICAL EDUCATION AND SPORT
José Martího 31, 162 52 Prague 6-Vešelavín

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 physiotherapy treatment of a patient with total knee replacement

Project form: bachelor

Period of realization of the project: February 2019

Applicant: Fahad Alqazlan, UK FTVS – Physiotherapy department

Main researcher: Fahad Alqazlan, UK FTVS – Physiotherapy department

Workplace: Oblastní nemocnice Kladno

Supervisor: Mgr. Helena Vomáčková

Project description: the case study of a patient with total knee replacement on the right knee. The aim of the case study is to first exam the patient initial state using specific physiotherapy examinations and observations after two working weeks of physiotherapy techniques based on the knowledge earned from the physiotherapy bachelor program in the UK FTVS the patient will undergo a final examination observations and specific physiotherapy examinations to observe changes from initial state and evaluate the effectiveness of the physiotherapeutic procedures used.

Characteristics of participants in the research: 1 female patient aged 63. The patient is staying at Oblastní nemocnice Kladno during the full 2 working weeks that the research is occurring.

Ensuring safety within the research: risks to the patient will be minimised there will be a team of qualified physiotherapists on the same floor during all procedures doing the research, conditions and rules of the hospital will be respected. The physical presence of responsible supervision of Mgr. Ilona Kučerová and Bc. Tomáš Modlinger. Risks of therapy and methods will not be higher than the commonly anticipated risks for this type of therapy.

Ethical aspects of the research: all data obtained during the research will strictly be used only for bachelor thesis and possible further research at UK FTVS, any photographs containing the likeness of the patient will be blurred or modified to ensure full anonymity, all photos and videos will be deleted after the research, I shall ensure to the maximum extent possible that the research data will not be misused.

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 regulative 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, 14 February 2019

Applicant's signature: 

Approval of UK FTVS Ethics Committee

The Committee: Chair: doc. PhDr. Irena Parry Martínková, Ph.D.

Members: prof. PhDr. Pavel Slepíčka, DrSc.

doc. MUDr. Jan Heller, CSc.

PhDr. Pavel Hráský, Ph.D.

Mgr. Eva Prokešová, Ph.D.

MUDr. Simona Majorová

The research project was approved by UK FTVS Ethics Committee under the registration number: 125/2019

Date of approval: 3.4.2019

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.

UNIVERZITA KARLOVA
Fakulta sportovních studií
José Martího 31, 162 52, Praha 6

- 20 -


Signature of the Chair of
UK FTVS Ethics Committee

6.2. Informed consent

INFORMOVANÝ SOUHLAS

Vážená paní, vážený pane,

v souladu se Všeobecnou deklarácí lidských práv, zákonem č. 101/2000 Sb., o ochraně osobních údajů a o změně některých zákonů, ve znění pozdějších předpisů, Helsinskou deklarácí, přijatou 18. Světovým zdravotnickým shromážděním 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 nebudou uvedena a budou uchována v anonymní podobě. V maximální možné míře zabezpečím, aby získaná data nebyla zneužita.

Jméno a příjmení řešitele Podpis:.....

Jméno a příjmení osoby, která provedla poučení³ 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 zvážit všechny relevantní informace, zeptat se na vše podstatné a že jsem dostal(a) jasné a srozumitelné 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 Etické komisi 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: