**Norms of the Knee**:

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| Flexion | 135° |
| Extension | 0° |
| Open Pack | 25° flexion |
| Closed Pack | Full extension |

Relevant Research:

Mobilization with Movement at the Knee Joint

* (Alkhawajah, 2019) RTC of 40 adults with knee OA
	+ MWM benefits over sham for local and widespread pain, function, knee flexor and extensor strength, and knee flexion ROM in the short term

Knee Manual + PT

* (Karaborklu, 2021) RTC of 42 patients scheduled for unilateral TKA for severe OA
	+ The combination of exercise and manual therapy provides more benefit for pain, function, and patient satisfaction than an exercise program alone

Techniques:

1. Knee Flexion Mobilization/Tib-Fib

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| Indication | Decreased knee flexion ROM, pain with knee flexion |
| Patient Position | Supine, Hip Flexed to ~90° |
| Neutral vs IR vs ER positioning | Neutral: neutral heelIR: heel toward ipsilateral greater trochanterER: heel toward contralateral ischial tuberosity |
| Hand Placement | Cephalad hand: anterior aspect of patient kneeCaudal hand: cup patient’s heel to direct line of force |
| Neutral Technique | Move patient into knee flexion to point of restriction |
| IR Technique | Move patient into restricted knee flexion angling heel toward ipsilateral greater trochanter  |
| ER Technique | Move patient into restricted knee flexion angling heel toward contralateral ischial tuberosity |
| How to Increase Force of Mob | Hand on anterior aspect of proximal tibia |
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1. Knee Extension Mobilization

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| Indication | Decreased knee extension ROM; Screw Home restriction |
| Patient Position | Supine |
| Hand Placement | Cephalad hand: proximal tibia or distal femurCaudal hand: distal leg support proximal to malleoli |
| Anterior-Posterior Technique | Passive, oscillatory, AP force to proximal tibia |
| Medial-Lateral (Varus) Technique | ER leg; passive, oscillatory, AP force to medial proximal tibia |
| Lateral-Medial (Valgus) Technique/ Screw Home | IR leg; passive, oscillatory, AP force to lateral proximal tibia |

IR PA

**Norms of the Hip:**

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| Flexion | 120° |
| Extension | 30° |
| Abduction | 45° |
| Adduction | 30° |
| IR | 45° |
| ER | 45° |
| Open Pack | 30° flexion, 30° abduction, slight ER |
| Closed Pack | Full extension, IR |

Relevant Research:

Mobilizations post-THA

* (Matheis, 2018) RTC of 39 patients post-THA
	+ Targeted mobilization and strength training in full weight-bearing 3 days post-op was tolerated well and improved hip ROM and gait compared to exercise alone

Mobilizations and OA

* (Pawlowska, 2020) RTC of 57 adult females with hip OA
	+ Hip mobilization increased ROM, decreased pain, and improved hip function more than non-weight bearing exercises
1. Long Axis Hip Distraction Mobilization and Manipulation

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| Indication | Promote hip muscle relaxation, decrease soft-tissue tension, improve hip joint capsule elasticity, decrease pain |
| Patient Position | Supine, 20-30° hip flexion, 30° hip abduction, slight ER |
| Hand Placement | Grasp patient’s lower leg superior to the ankle joint with both hands |
| Mobilization Technique | In “walk-stance” shift weight posteriorly to initiate caudal traction of LE; can add oscillation |
| Manipulation Technique | In “walk-stance” shift weight posteriorly to initiate caudal traction of LE; complete a 5-10 second pre-manipulative hold; then have patient take a deep breath and, upon exhalation, provide a quick, axial stretch |

1. SIJ/Innominate Upslip Hip Mobilization and Manipulation

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| Indication | Pain associated with an innominate upslip; promote muscle relaxation |
| Patient Position | Supine; slight adduction and IR to point of capsular tension |
| Hand Placement | Grasp patient’s lower leg superior to the ankle joint with both hands |
| Mobilization Technique | In “walk-stance” shift weight posteriorly to initiate caudal traction of LE; can add oscillation |
| Manipulation Technique | In “walk-stance” shift weight posteriorly to initiate caudal traction of LE; patient takes deep breath and, upon exhalation, provide a quick, axial stretch |

1. Lateral Hip Distraction

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| Indication | Decreased adduction and IR ROM; promote joint mobility; pain at hip joint |
| Patient Position | Supine; hip and knee flexed to 90° |
| Hand and Belt Placement | Place distraction belt close to iliofemoral joint; support leg against body with both hands |
| Technique | Provide gentle lateral hip distraction through the distraction belt providing hip IR or horizontal abduction depending on capsular tightness |

1. Prone Figure Four Mobilization

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| Indication | Decreased hip extension and ER; improve anterior joint capsule extensibility; difficulty donning socks/shoes |
| Patient Position | Prone, figure four position with knee slightly off edge of table |
| Hand Placement | Utilize web-spaces of both hands inferior to greater trochanter, rotate hands laterally 2 inches for “skin-lock” to end up posterior to greater trochanter |
| Technique | Apply PA force through proximal femur; can add oscillation |

1. Hip Caudal Glides

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| Indication | Decreased joint mobility; improve movement into flexion |
| Patient Position | Supine with hip and knee flexed to 90° |
| Hand Placement | Support lower leg on shoulder; grasp anterior aspect of proximal femur with interlaced fingers |
| Technique | Apply inferior glide while rocking thigh into and out of flexion |

References:

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2. Karaborklu Argut S, Celik D, Kilicoglu OI. The combination of exercise and manual therapy versus exercise alone in total knee arthroplasty rehabilitation: A randomized controlled clinical trial. *PM R*. 2021;13(10):1069-1078. doi:10.1002/pmrj.12542
3. Matheis C, Stöggl T. Strength and mobilization training within the first week following total hip arthroplasty. *J Bodyw Mov Ther*. 2018;22(2):519-527. doi:10.1016/j.jbmt.2017.06.012
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