UNICOMPARTMENTAL KNEE ARTHROPLASTY (UKA) PROTOCOL

Background

Unicompartmental knee arthroplasty (UKA) is a procedure designed to relieve pain caused by joint degeneration due to osteoarthritis involving only one compartment of the knee (medial, lateral, OR patellofemoral). The knee joint is opened by splitting the joint capsule and the quad tendon if needed. The procedure then involves resection of the arthritic bone and cartilage and replacement with highly specialized metal (Cobalt-chromium alloy) components that are cemented to the bone with a plastic (ultra-high molecular weight polyethylene) insert between the metal components. This procedure preserves the remaining healthy bone, cartilage and ligaments of the knee while selectively targeting the damaged area.
Impact activities are not recommended. Bicycling, golfing, walking, rowing (if flexion range of motion allows), swimming, elliptical are encouraged.

Disclaimer

Progression is time and criterion-based, dependent on soft tissue healing, patient demographics, and clinician evaluation. Contact Ohio State Sports Medicine at 614-293-2385 if questions arise.

Summary of Recommendations

Expectations	• PT will begin in the hospital on the day of your surgery. You will transfer to outpatient physical therapy 5-7 days after surgery. • Return to impact activity is not recommended. “Knee friendly” activities including bicycling, elliptical, golf and swimming.
Risk Factors	• The patient should be monitored for signs and symptoms of DVT • Emphasis should be placed on achieving full knee extension by end of Phase 1 and full knee flexion by end of phase 2
Weight Bearing Progression	• The patient will be WBAT with an assistive device for the first 2-3 weeks. Assistive device should be discharged once full knee extension is achieved and the patient is able to ambulate without obvious gait deviations
Range of Motion Progression	• 5-7 days post-op: 0-70° • 1-3 weeks post-op: 0-100° • 3-6 weeks post-op: symmetrical extension, flexion 0-120° • 6 weeks to return to PLOF: symmetrical and pain-free ROM
Patient Reported Outcomes	Collect at least one of the following at initial evaluation, every 6 weeks and discharge. Be consistant with which outcome tool is collected. • Knee Injury and Osteoarthritis Outcome Score (KOOS) • International Knee Documentation Committee (IKDC) • Lower Extremity Functional Scale (LEFS) • The Forgotten Joint Score (FJS-12)
Functional Assessments	• Timed Up and Go (TUG) • Appendix A
Criteria to Return to Non-Impact Sport	• Normal gait on all surfaces and ability to walk 1 mile or greater without pain or reactive effusion • Dynamic neuromuscular control with multi-plane activities without pain or reactive effusion

RED/YELLOW FLAGS

Red flags are signs/symptoms that require immediate referral for re-evaluation. Yellow flags are signs/symptoms that require modification to plan of care.

Red Flags	• Signs of DVT *(Refer directly to ED)*
	  ○ Localized tenderness along the distribution of deep venous system
	  ○ Entire LE swelling
	  ○ Calf swelling >3cm compared to asymptomatic limb
	  ○ Pitting edema
	  ○ Collateral superficial veins
	• Mechanical block or clunk *(Refer to surgeon for re-evaluation)*
	• Lack of full knee extension by 4-6 weeks *(Refer to surgeon for re-evaluation)*

Yellow Flags	• Persistent reactive pain or effusion following therapy or ADLs ○ *Decrease intensity of therapy interventions, continue effusion management and provide patient education regarding activity modification until reactive symptoms resolve*

PHASE 1 (Weeks 0-3)

Patients will begin rehabilitation in the hospital on the day of surgery. The patient should transfer the outpatient physical therapy 5-7 days after surgery. Rehabilitation frequency is based on patient progress, but typically occurs 1-2 times every week.

In this phase, focus is placed on restoring range of motion, ensuring proper wound healing and effusion management. Interventions should address lower extremity strength, gait mechanics and safety with IADLs.	
Precautions	• Monitor for signs/symptoms of DVT • Monitor incision for signs of infection • No lunges x8 weeks

Goals	• By 5-7 days post-op
	  ○ ROM: 0-70°
	  ○ Strength: Ability to perform independent straight leg raise (SLR)
	• By 1-3 weeks post-op
	  ○ ROM: 0-100°
	  ○ Strength: Ability to perform SLR without evidence of extensor lag

Weight Bearing	WBAT with assistive device until full knee extension is achieved and patient is able to ambulate without obvious gait deviations

Suggested Interventions	• ROM
	  ○ Extension: heel prop towel stretch, bag hangs, patellar mobilizations
	  ○ Flexion: heel slides, wall slides, active-assist flexion off edge of bed, upright bike
	• Strength
	  ○ Quad sets, SLR (4-way), SAQ, standing mini-squats, calf raises, shuttle press, steamboats
	• Effusion Management
	  ○ Ice, elevation, compression

NMES Parameters ***(Do not initiate until week 2-3)*** ***-See Appendix B***	• NMES pads are placed on the proximal and distal quadriceps • Patient: Seated with the knee in at least 60º flexion, shank secured with strap and back support with thigh strap preferred. The ankle pad/belt should be two finger widths superior to the lateral malleoli • The patient is instructed to relax while the e-stim generates at least 50% of their max volitional contraction against a fixed resistance OR maximal tolerable amperage without knee joint pain 10-20 seconds on/ 50 seconds off x 15 min
Cardiovascular Endurance	• Upper body circuit training or upper body ergometer, if desired by patient
Criteria to Progress to Phase 2	• Normal gait without assistive device on level indoor surfaces • Full knee extension • No evidence of extensor lag during SLR • Able to perform double leg squat to 45° without upper extremity support

PHASE 2 (WEEKS 3-6)

During Phase 2, emphasis is placed on increasing knee flexion ROM and improving quadriceps, gluteal and core strength.	
Precautions	• Post-activity soreness should resolve within 24 hours • No impact activities • No lunges x8 weeks
Goals	• Reciprocal stair negotiation by 6 weeks • Return to work by 6 weeks • Double leg sit to stand from a chair without upper extremity assist • Single leg balance x15 seconds or greater OR ability to put socks on in standing
Range of Motion	Extension: symmetrical to contralateral limb Flexion: 0-120°
Weight Bearing	Full weight bearing, no assistive device

Suggested Interventions	• ROM
	  ○ Continue ROM strategies from Phase 1
	• Strength
	  ○ SLR-Flexion progressions (semi-reclined or seated, add ER, eyes closed for cortical training, speed, isometric holds), LAQ, side stepping, step ups, step downs, sit to stands, wall sits
	• Balance/Proprioception
	  ○ Double leg → single leg
	  ○ Eyes open/eyes closed
	  ○ Compliant surfaces
	• Effusion
	  ○ Continue effusion management strategies from Phase 1
	• Continue NMES

Cardiovascular Endurance	• Treadmill walking, elliptical, swimming if tolerated ○ Incision must be healed and completely closed prior to swimming (typically ~4 weeks post-op)
Criteria to Progress to Phase 3	• Ambulation >2 blocks without assistive device • Reciprocal gait on stairs by 6 weeks without upper extremity support • Symmetrical ROM • Double leg sit to stand without upper extremity support x10 repetitions • Single leg balance x15 seconds or greater

PHASE 3 (WEEKS 6 – Return to Prior Level of Function)

During Phase 3, emphasis is placed on safely returning to prior level of function and knee-friendly activities	
Appointments	PT frequency will vary depending on progress. However, frequency may taper to one time every 1-2 weeks during this phase.
Precautions	• Post-activity soreness should resolve within 24 hours • No impact activities
Goals	• Ability to perform all IADL, work and non-impact sport related activity without complaints of pain or evidence of reactive effusion • Able to ambulate 1 mile or greater without pain, gait deviation or reactive effusion
Range of Motion	Symmetrical and pain-free compared to contralateral limb
Weight Bearing	FWBing without assistive device

Suggested Interventions	• ROM
	  ○ Continue ROM strategies from Phase 1
	• Strength
	  ○ Continue interventions from phases 1 and 2, leg press machine, hamstring curl machine, knee extension machine, progress towards SL CKC interventions per patient's tolerance
	• Balance/Proprioception
	  ○ Double leg → single leg
	  ○ Eyes open/eyes closed
	  ○ Compliant surfaces
	  ○ Perturbations
	  ○ Chops/lifts/ball toss
	• Effusion
	  ○ Continue effusion management strategies from Phase 1

Cardiovascular Endurance	Replicate sport or work specific energy demands (non-impact only)
Criteria to Return to Non-Impact Sport	• Normal gait on all surfaces and ability to walk 1 mile or greater without pain or reactive effusion • Dynamic neuromuscular control with multi-plane activities without pain or reactive effusion

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References:

Fransen, M., Nairn, L., Bridgett, L., Crosbie, J., March, L., Parker, D., … Harmer, A. R. (2017). Post-Acute Rehabilitation After Total Knee Replacement: A Multicenter Randomized Clinical Trial Comparing Long-Term Outcomes. *Arthritis Care & Research*, *69*(2), 192–200. https://doi.org/10.1002/acr.23117

Harikesavan, K., Chakravarty, R. D., Maiya, A. G., Hegde, S. P., & Y Shivanna, S. (2017). Hip Abductor Strengthening Improves Physical Function Following Total Knee Replacement: One-Year Follow-Up of a Randomized Pilot Study. *The Open Rheumatology Journal*, *11*, 30–42. https://doi.org/10.2174/1874312901711010030

Li, Y., Kakar, R. S., Fu, Y.-C., Mahoney, O. M., Kinsey, T. L., & Simpson, K. J. (2018). Knee strength, power and stair performance of the elderly 5 years after unicompartmental knee arthroplasty. *European Journal of Orthopaedic Surgery & Traumatology*, *28*(7), 1411–1416. https://doi.org/10.1007/s00590-018-2198-7

Mistry, J., Elmallah, R., Bhave, A., Chughtai, M., Cherian, J., McGinn, T., … Mont, M. (2016). Rehabilitative Guidelines after Total Knee Arthroplasty: A Review. *Journal of Knee Surgery*, *29*(03), 201–217. https://doi.org/10.1055/s-0036-1579670

Outpatient Rehabilitation Guidelines for MAKOplasty UKA. (2014). Retrieved from https://www.uwhealth.org/files/uwhealth/docs/sportsmed/RE-38786-14_MAKOplasty.pdf

Reilly, K. A., Beard, D. J., Barker, K. L., Dodd, C. A. F., Price, A. J., & Murray, D. W. (2005). Efficacy of an accelerated recovery protocol for Oxford unicompartmental knee arthroplasty—a randomised controlled trial. *The Knee*, *12*(5), 351–357. https://doi.org/10.1016/J.KNEE.2005.01.002

Witjes, S., Gouttebarge, V., Kuijer, P. P. F. M., van Geenen, R. C. I., Poolman, R. W., & Kerkhoffs, G. M. M. J. (2016). Return to Sports and Physical Activity After Total and Unicondylar Knee Arthroplasty: A Systematic Review and Meta-Analysis. *Sports Medicine*, *46*(2), 269–292. https://doi.org/10.1007/s40279-015-0421-9

Appendix A: Timed Up and Go Test

1. Equipment- arm chair, tape measure, tape, stop watch
2. Begin the test with the patient sitting in a chair with arm rests (hips all the way to the back of the seat).
3. Place a piece of tape or other marker on the floor 3 meters away from the chair so that it can be easily seen by the subject
4. Instructions: “On the work ‘GO,’ you will stand up, walk to the line on the floor, turn around and walk back to the chair and sit down. Please walk at your regular pace.”
5. Start timing on the word ‘GO’ and stop timing when the subject is seated with their back rested on the back of the chair.
6. The patient should wear their regular footwear and may use any gait aid they would normally use during ambulation. They may not be assisted by another person. There is no time limit. They may stop and rest (but not sit down) if they need to.
7. Normal healthy controls complete the task in 10 seconds or less.
8. The patient can complete a practice trial before testing.
9. Interpretation:
    - ≤ 10 seconds = normal
    - ≤ 20 seconds = fair mobility
    - ≤ 30 seconds = impaired mobility
    - A score of ≥ 14 seconds has been shown to indicate high risk of falls
10. Age matched norms:
    - 60-69 years old: 7.9 ± 0.9 seconds
    - 70-79 years old: 7.7 ± 2.3 seconds
    - 80-89 years old
        - No device: 11.0 ± 2.2 seconds
        - With device: 19.9 ± 6.4 seconds
    - 90-101 years old:
        - No device: 14.7 ± 7.9 seconds
        - With device: 19.9 ± 2.5 seconds

1. Bohannon RW. Reference values for the Timed Up and Go Test: A Descriptive Meta-Analysis. Journal of Geriatric Physical Therapy, 2006;29(2):64-8.
2. Shumway-Cook A, Brauer S, Woollacott M. Predicting the probability for falls in community-dwelling older adults using the timed up & go test. Phys Ther. 2000;80:896-903.
3. Kristensen MT, Foss NB, Kehlet H. Timed "Up and Go" Test as a predictor of falls within 6 months after hip fracture surgery. Phys Ther. 2007.87(1):24-30.

Appendix B: NMES Set Up

2 or 4 pad set-up is appropriate