



# TKA IN INDIVIDUAL WITH CP

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# Case Description

A 47-year-old female with **spastic diplegic cerebral palsy** presents to your outpatient clinic two-weeks status post **asynchronous bilateral TKAs** (Left TKA 4/11, Right TKA 5/25). Past medical history includes C3-C7 fusion (2014) with post-surgical infections, bilateral hamstring releases, and bilateral knee osteoarthritis. Patient works full-time from home but plans to return to the office at the beginning of August.

# Risk factors for OA?

- Older age
- Female
- Obesity
- History of Joint Injuries
- Bone Deformities
- Repeated Stress on Joints
- Metabolic Diseases
- Genetics

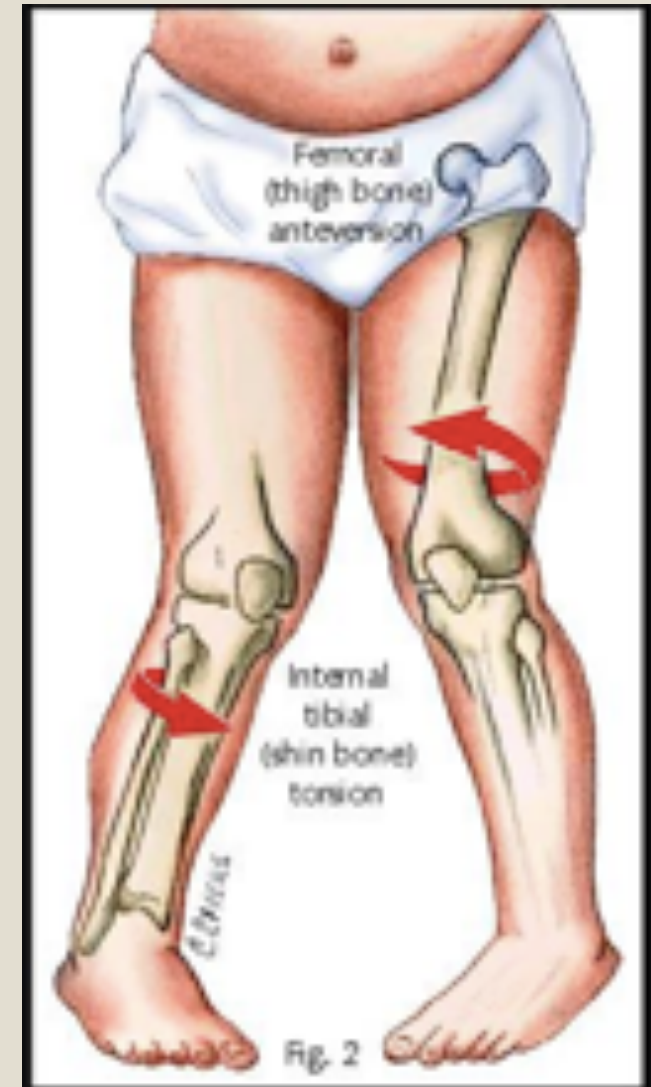


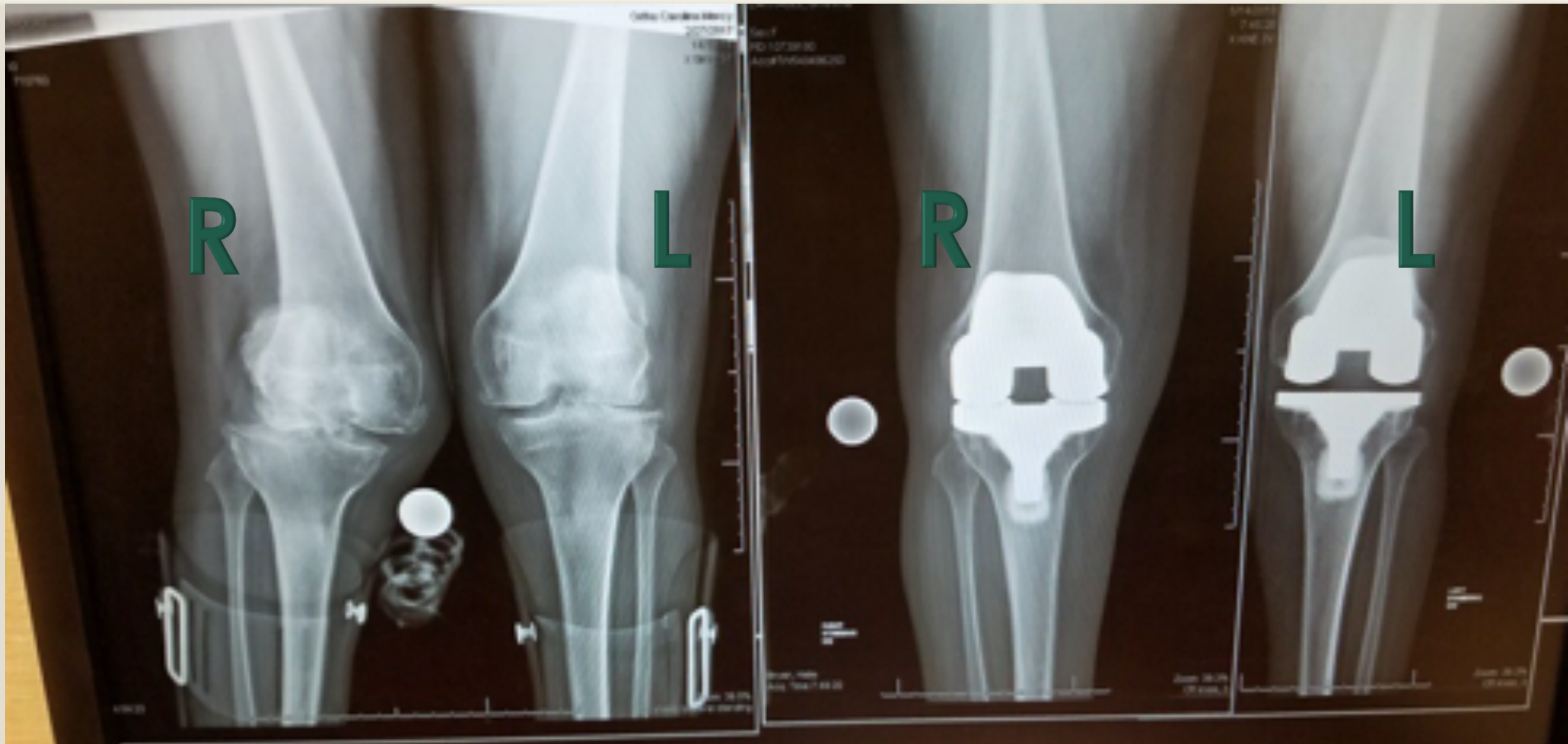
**Cerebral  
Palsy**

# CP can cause secondary degenerative conditions.

## Factors affecting physical deformity:

- Femoral Anteversion
- Coxa Valga
- Tibial torsion
- Weak knee extensor mechanism
- Hip Flexion and Adduction contractures
- Patellofemoral Joint abnormalities
- Spasticity





“The majority of individuals with CP will experience some form of **premature aging** by the time they reach their 40s due to the extra stress and strain the disability puts upon their bodies.” – *CP Foundation*

# Why might surgeons be hesitant to perform joint arthroplasties on individuals with CP?

## **Post- surgical complications & contraindications for surgery:**

- Limited ROM
- DVT
- Patellar Subluxation
- Infection
- Decreased rehab participation
- Poor Muscle Control
- Contractures/ Force imbalances

## **Additions to typical TKA surgery:**

- Posterior Capsular Release
- IT Band Release
- Quadriceps/Hamstring Release

*(Moon et al 2020, Houdek et al 2017)*

# What Else Do You Want to Know?

A 47-year-old female with **spastic diplegic cerebral palsy** presents to your outpatient clinic two-weeks status post **asynchronous bilateral TKAs** (Left TKA 4/11, Right TKA 5/25). Past medical history includes C3-C7 fusion (2014) with post-surgical infections, bilateral hamstring releases, and bilateral knee osteoarthritis. Patient works full-time from home but plans to return to the office at the beginning of August.

# What Else Do You Want to Know?

## **Prior level of function:**

- Ambulates long distances using walker and bilateral AFOs.
- Independent with all daily tasks and household chores.
- Drives, goes to gym, swims.

## **Living Situation:**

- Lives alone, two story home – bedroom on second level (downstairs now)
- Works full time at home. Going back to office in August.
- Mom lives with her currently to assist.

## **Previous PT:**

- Rehab 2 Weeks after both surgeries
- 3x/wk OP PT for 4 weeks post L TKA

## **Before Surgery Functional Level:**

- Unable to walk from bed to bathroom
- Unable to walk down the side of car to pump gas
- Very difficult to go up step
- Cannot grocery shop, go to gym, walk down driveway due to fear of falling.

## **Bracing/ Orthotics**

- Bilateral AFOs
- Velcro Full leg braces at night

## **Pain:**

- No/minimal pain
- Bilateral muscle spasms at night controlled with pain meds

## **Goal:**

**“I'm hoping that you will be able to help me regain my strength and confidence to start living my life again.” - Brooke**



# What objective Information should you collect and *how*?

- **Inspection of wound** → Irritation, infection, adhesions
- **Swelling** → circumferential
- **Range of Motion** → active and passive
- **Muscle Activation** → Quad activation
- **Strength** → hip flexors/adductors/abductors, knee flexors/extensors, PF/DF
- **Static/Dynamic Balance** → Sitting, standing, ambulating, navigating stairs/ramps.
- **Functional Tasks** →
  - Transfers (STS, bed, car, bathroom)
  - Ambulation
  - Stairs, ramps, curbs
- **Outcome Measures** →
  - STS
  - TUG

# What is your Plan of Care?

## Frequency and duration?

2-3x/wk for 8-12 weeks

1x/wk if full ROM range is achieved

## Goals for therapy?

- Restore Knee ROM **(0-125 degrees??)**
- Active knee extension without lag
- PLOF or better with transfers, stair mobility, household tasks.
- Ambulation using walker

# Based on Brooke's diagnosis of CP, what factors need to be considered with your exercise interventions?

- **Spasticity** → strength training can *improve spasticity*.
  - *Position modifications*: wedge in supine, seated exercises using bolster.
- **Quality of Movement** → May lack *selective motor control* = *compensations with movement*.
  - *Single joint exercises*:
    - *For weak muscles*
    - *For individuals that compensate with multi-joint movements*

**“Ask them what they want to do. Then say okay, lets try it” - Brooke**

Verschuren O, Peterson MD, Balemans AC, Hurvitz EA. Exercise and physical activity recommendations for people with cerebral palsy. *Dev Med Child Neurol.* 2016;58(8):798–808.

# Initial Treatment Sessions and HEP?

## ROM

- Heel Props /prone weighted extension
- Seated or supine Hamstrings/calves
- Sitting knee flexion
- Stationary bike ( partial-full revolutions)

## Manual/ Modalities

- Cryotherapy
- NMES
- Patellar/ tibial femoral joint mobs
- Effleurage for swelling

## Strengthening

- Isometric quads/gluts/HS
- Straight leg raise\*\*
- Heel slides /wall slides
- Supine short arc quads
- Supine or side-lying abduction/ER
- Prone hamstring curls
- Seated long arc quads
- Calf raises

## Functional

- Sit to stands
- Transfer training (car, bed)
- Safe stair ambulation

## HEP:

- Rest ,Ice ,Compression, Elevation
- Take home NMES unit
- Heel Props
- Hamstring/calf Stretching
- Isometric quad/glut/HS sets
- SLR 4 planes

## Education:

Bracing at night  
Resting knee in extended position  
No pillows propped under knee  
Safe ambulation and transfers

# Interventions 4-6 weeks after surgery?

## **Brooke**

- Walking short distance with walker and without AFOs
- Brushing teeth standing against the sink
- Getting in and out of the car
- Got up from normal chairs
- Walked down hallway

## **Difficulties:**

- Balance without holding onto surface
- Standing from couch or low surface
- Knee extension with ambulation

# Interventions 4-6 weeks after surgery?

## ◦ **Modalities/Manual**

- Continued NMES, patellar/ tibial femoral mobs
- Scar mobilization

## ◦ **Strength**

- Active quad exercises : quad sets, SLR, sitting LAQ, standing TKE
- Calf raises
- Standing abd/ext
- Standing hamstring curls (AAROM)
- Seated/standing marches

## ◦ **Balance**

- Standing on varying surfaces
- Standing with ball throws/ perturbations
- SL stance

## **Functional Strength**

- Sit to stands from lower surfaces
- Wall squats
- Cone stepping
- Backwards walking

# Interventions 6-8 Weeks After Surgery:?

## **Brooke:**

- Started going to work full time
- Took garbage out
- Walking up a curb/one step
- Going up a flight of stairs holding on to someone
- Turning around without LOB
- Using Bathroom at night
- Sit to stand for lower surfaces

## **Difficulties**

- Side stepping to put gas in car
- Independent stair ambulation
- Stepping up on tall stair/curb
- Walking long distances

# Interventions 6-8 Weeks After Surgery?

## **Strength**

- Wall squats with ball behind back
- Lateral side steps – with band
- Backwards stepping – with band
- Leg press
- Prone weighted HS curls
- Backwards walking on treadmill
- Forward and lateral step ups
- Walking program

## **Balance**

- Step ups on varying surfaces
  - Standing with ball throws/  
perturbations
  - SL stance
  - BOSU ball throwing, squats
  - SL squat
- \*Aquatics Program



# Discharge Criteria

- Pain-free AROM
- "Independent" stair ambulation
- PLOF ambulation
- PLOF with functional tasks (transfers, ADLs)
- Independent with HEP

# What would you say to a surgeon regarding the risks and benefits to an individual with CP getting a TKA?

- Younger Individuals.
- Fewer comorbidities: HTN, CAD, diabetes, obesity, PVD.
- No differences in number of revisions and implant survival.
- No difference in post-surgical complications for Individuals with CP except anemia and pneumonia.
- Significantly decreases patient's pain and improves function and mobility!

“Every day I find something new I can do and I’m amazed! I literally went from not being able to do anything to I’m doing everything and more!! With all these accomplishments, the most important thing that I’ve regained is my confidence. I’m no longer afraid to go out and do things. **I can live my life again!**  
**These surgeries saved my life!** - Brooke