

# Case Study: Christopher

## Conditions Treated

Anterior Knee Pain, Severe Crouch Gait, & Hip Flexion Contracture

## Age Range During Treatment

23 Years to 24 Years

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# BACKGROUND

At the age of 23, Christopher a young man with left hemiplegic cerebral palsy visited me for an evaluation of right knee pain which began eight years prior without any known injury. The pain in his knee had been severe and primarily constant but the source of the pain had never been found. His knee cap was ultimately excised (by a different surgeon) at age 20 in hopes of alleviating the pain but the procedure proved ineffective.

Christopher had a history of lower limb issues and had undergone several surgeries prior to and after the occurrence of his knee pain. He'd began using a walker at age three which remained in use until the age of 12 when he began to use a Lofstrand crutch. He later became wheelchair dependent at the age of 15. There was a brief period at the age of 22 where he was able to walk in physical therapy with a walker but he soon regressed back to being wheelchair dependent.

# EVALUATION

During his evaluation I found that Christopher's knee pain was causing him to walk with a crouched gait that was putting force on the anterior portion of his right knee. He also had an equinovalgus left foot, a 50 degree right hip flexion contracture, and bilateral knee flexion contractures. The combination of these issues was causing his discomfort.



# TREATMENT

Following the evaluation, I felt that additional knee releases at this point would only worsen Christopher's gait. However, I thought that he would benefit greatly from a right hip flexor release and a right knee extension osteotomy. In the interim I gave Christopher an injection of 10cc of lidocaine in his right knee which provided significant but temporary relief of his pain. I also recommended that Christopher undergo a gait analysis.

# Surgery

- Iliopsoas Recession From Over The Pelvic Brim
- Tensor Fascia Iliotibial Band Open Tenotomy
- Right Distal Femoral Extension Osteotomy with Variable Axis Distal Femoral Locking Plate





A small incision was made over the brim of Christopher's pelvis and care was taken to not cause injury to the femoral nerves as the major and minor psoas tendons were released.

Christopher's femoral deformity was addressed with a 20-degree distal femoral extension osteotomy. A lateral incision was then made along his outer thigh and the iliotibial band was incised. There was no patella in the knee joint but the vastus lateralis was lifted up over the femur and dissected.

At this point extension and closing wedge dorsal osteotomies were performed. A plate was applied, fixed with a locking plate, and locking screws were applied distally and proximally to ensure good fixation and correction of Christopher's knee. The iliotibial band was quite tight so it was incised down to the intermuscular septum.

# Observations

## 2 Weeks

Christopher's surgical wounds were completely healed and there was good range of motion in his knee and hip. His staples were removed and steri strips were applied. He was given instructions to sleep with an ace wrap around his right knee beneath a knee immobilizer to ensure his knee remained in full extension. However, there was to be no pillow placed under his feet while sleeping to prevent his hip from flexing.

I also provided Christopher with a physical therapy regimen that was to take place three times per week for four weeks. At the end of the four week period, new x-rays were to be taken and if needed adjustments would be made to the regimen.



# Physical Therapy Regimen

- Hip extension exercises.
- Physical therapy for improved range of motion in his right knee and hip and ambulation training and full weight bearing with knee immobilizer in place while using a walker.
- Placement of a rolled towel beneath his right ankle and the use of passive and active assistance to extend the right knee downward towards table.
- Ambulation without right knee immobilizer in a pool up to mid-chest height as much as could be tolerated.
- Permitted to sit in a regular wheel chair with knees bent but for no more than 45 minutes at a time.

## 3 Months

Christopher's right knee was now fully straight and his hip contracture had been decreased from 50 to 15 degrees. He had been keeping up with his physical therapy regimen, walking with a hinged brace, wearing a knee immobilizer when seated, and wearing a 1.5cm (.59in) left shoe lift. He no longer required a brace or knee immobilizer but had the option of continuing to use the immobilizer for ambulation during therapy.

I encouraged Christopher to participate in one year of physical therapy to continue working on strengthening and ambulation. I asked Christopher's mother to have him reassessed for a limb length discrepancy to ensure his shoe lift was sufficient. In addition, I suggested that he have his knee-ankle-foot orthosis braces remade with new positioning to keep his knee in full extension.

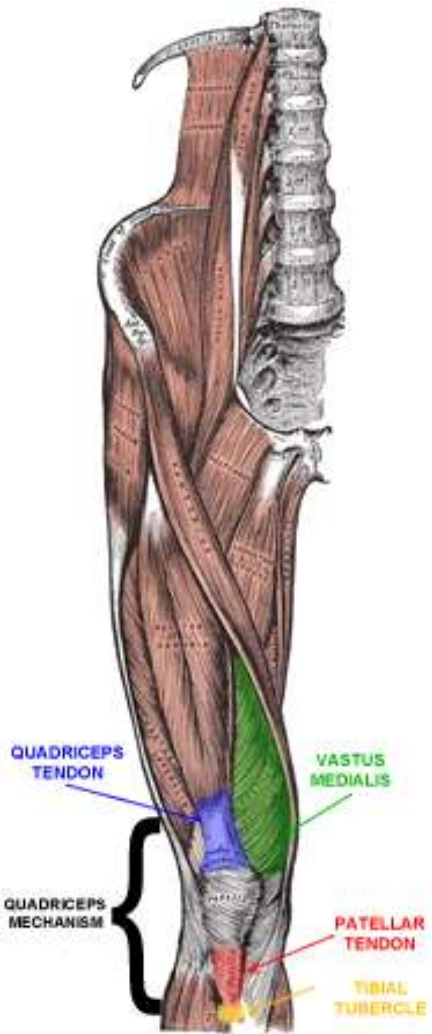


# 7 Months

The surgical procedure had proven successful and Christopher was still receiving physical therapy three times a week. However, his quadriceps tendon was rubbing against his femur resulting in continued anterior knee pain. We discussed patellar resurfacing with the goals of eliminating pain when at rest and improving his gait. In the interim he was given a prescription for custom floor reaction ankle-foot orthosis. I also recommended that he consider seeing a neurologist to discuss Sinemet as a possible treatment option for his dystonia.

# Surgery

- **Reconstruction Of The Patellar Tendon And The Quadriceps Tendon with A Lateral Release And A VMO Advancement**
- **Computer Assisted Mako Trochlear Replacement Of The Trochlear Groove**
- **Fulkerson Tibial Tubercle Osteotomy**



A tourniquet was applied to Christopher's right thigh and an incision was made down the front of his leg and around the outside of his knee (lateral parapatellar incision). The quadriceps mechanism and patellar tendon were exposed and released. The vastus medialis oblique (VMO) was also released from the quadriceps mechanism and patellar tendons.



We found that the trochlea had severe osteoarthritis and in some spots the cartilage had worn away and the exposed bone had become dense and smooth (eburnation). A Mako system was used to perform a computer guided trochlea replacement. The patellar tendon was still laterally dislocated and the quadriceps mechanism was at an improper angle. The tourniquet was let down and multiple drill holes were made around the patellar tubercle and an osteotomy was performed. The tubercle was then moved over approximately 20mm (.78in) and was fixed in place with two stainless steel screws. The quadriceps mechanism and patellar tendon now moved smoothly over the trochlea replacement.

We decided against performing a patellar replacement because we felt Christopher's cerebral palsy and spasticity would increase the risk of his patellar tendon becoming dislocated.

# Observations

# 1 Month

X-rays of Christopher's right knee revealed good alignment. His staples were removed, the wound was dressed with steri strips, and he was cleared to begin orthopedic physical therapy.



# CONCLUSION

Christopher has regained the ability to walk which he had been unable to do for many years. He now has minimal to no residual pain and continues to improve.

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