

Case Study: Treatment of Congenital Femoral Deficiency (CFD) in an Adolescent Patient

Pediatric Orthopedics

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One of the potential risks in femoral lengthening for congenital femoral deficiency (CFD) is subluxation or dislocation of a joint, particularly the hip. This case describes an adolescent patient who presented with a fixed superior hip dislocation following an attempted femoral lengthening at another institution — a complication compounded by infection, degenerative changes and substantial limb-length discrepancy. Prior interventions, including pelvic osteotomy and multiple debridements, had failed to restore stability or relieve pain, leaving the patient with functional

decline and limited mobility. The complexity of his condition required a creative solution that could address both hip position and long-term functional potential. At Nationwide Children's, the surgical team employed a hip distalization using a custom 3D-printed iliac anchor and intramedullary lengthening nail, repositioning the hip to improve alignment and preserve future reconstructive options. This approach represents a specialized surgical strategy designed to address complex complications of limb lengthening.



When your child needs a hospital, everything matters.

Presentation and History

A 13-year-old male with an underlying diagnosis of left congenital femoral deficiency (Paley Type 1A) presented to Nationwide Children's Hospital in February 2023. He had undergone multiple previous surgeries at another institution. Examination

determined there was painful and limited range of motion to the left hip and he was unable to bear weight without assistance. Radiographically, he had degenerative changes to the left femoral head and a fixed superior hip dislocation (Figure 1).

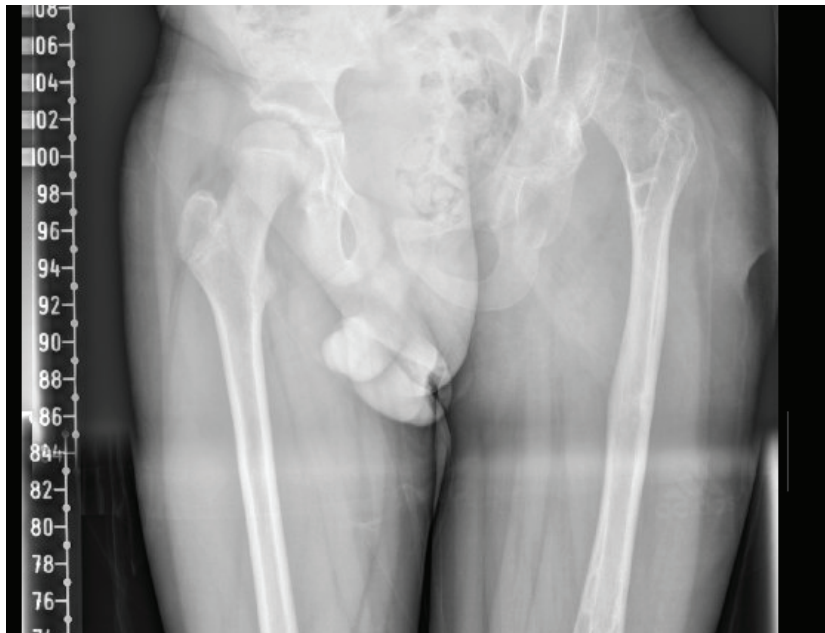


Figure 1. Pre-operative radiograph demonstrating degenerative changes to the left femoral head and a fixed superiorly dislocated left hip.

Potential Treatment Options

Although alternative options such as hip fusion or pelvic support osteotomy were discussed, the family was interested in pursuing a left total hip arthroplasty. Because of the fixed superior position of the hip, a traditional hip arthroplasty would pose unique challenges. A large portion of the proximal femur would need to be removed in order to get the hip components in the proper position. This would also require a proximal femoral replacing femoral component that might complicate any future revision attempts. Therefore, a unique option was presented to the family – hip distalization.

Using the power of an internal lengthening nail, the soft tissues could be gradually stretched allowing the

femur to be returned to its normal alignment with the acetabulum. This would also maintain the full existing femur length and avoid the need to resect the proximal portion.

A custom 3D-printed iliac anchor point was created to match the patient's anatomy (Figures 2a and 2b). With the nail anchored in the iliac component and anchored inside the proximal femur, the patient was able to slowly distract the tissues until the femur could be pushed down to the appropriate level for a traditional femoral stem to be utilized (Figure 3).

At this point, the internal lengthening nail and iliac anchor could be removed and the full hip arthroplasty components inserted (Figure 4).

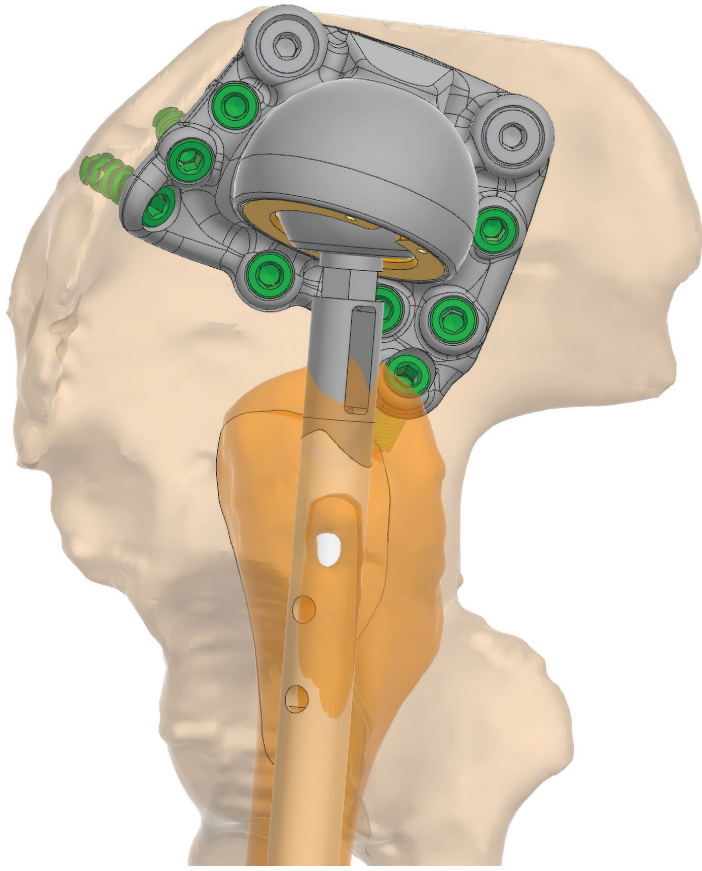


Figure 2a. Custom 3D-printed iliac anchor was combined with an internal lengthening nail inserted into the proximal femur.

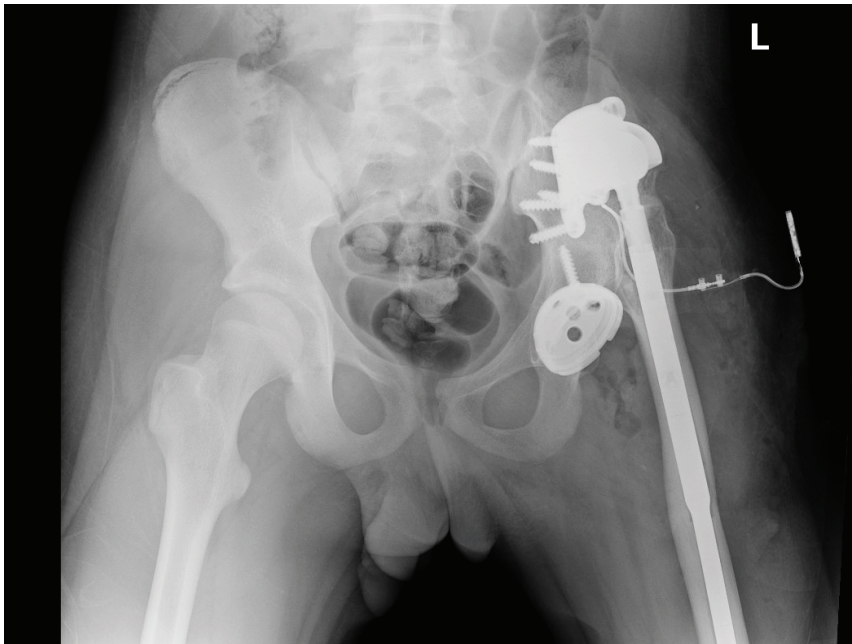


Figure 2b. Immediate post-operative radiograph demonstrating the iliac anchor and the internal lengthening nail components in place. Note the acetabular portion of the total hip arthroplasty has already been inserted.



Figure 3. The internal lengthening nail has gradually stretched the soft tissues allowing the proximal femur to be brought down to station allowing conversion to a traditional proximal femoral arthroplasty component.

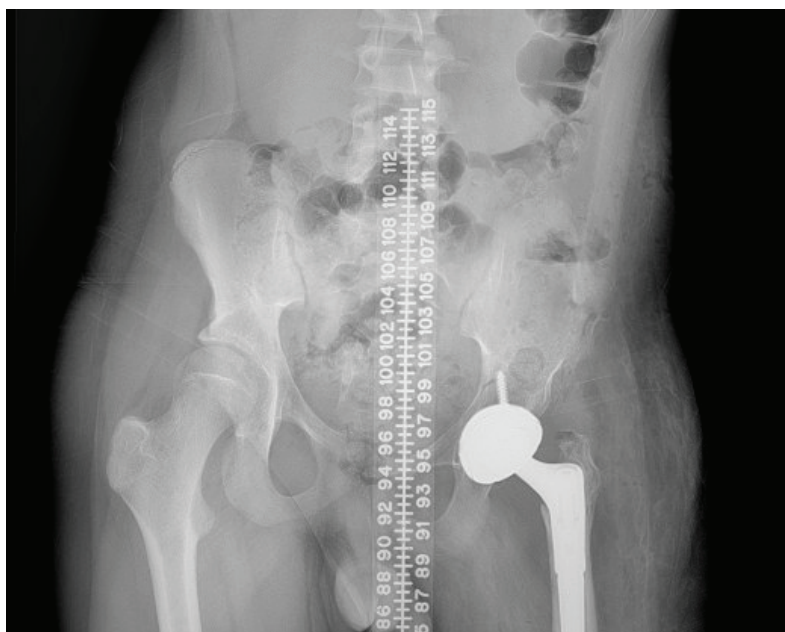


Figure 4. Post-operative radiograph demonstrating removal of the iliac anchor and internal lengthening nail components and the successful completion of the total hip arthroplasty.

Treatment and Outcome

Using a multi-surgeon team that included Thomas J. Scharschmidt, MD; Craig A. Smith, MD; and Christopher A. Iobst, MD, the initial stage of the procedure was completed. This involved removal of the femoral head, insertion of the acetabular component and insertion of the internal lengthening nail and iliac wing anchor components.

The patient was then seen on a weekly basis by the Center for Limb Lengthening and Reconstruction team while the tissues were gradually stretched internally.

After 12 weeks of distraction, the patient was ready for the second stage which involved removing the internal lengthening nail and iliac anchor followed by insertion of the femoral component of the hip arthroplasty system. This surgery was a joint effort of Drs. Scharschmidt and Iobst.

With a new total hip in place, the patient was safely guided through the total hip post-operative protocol by Dr. Scharschmidt's team. Within a few weeks, the patient was able to regain full weight bearing on the left lower extremity without pain, something that he had not been able to do for the previous two years.

The family has been thrilled with his final result and has also been very complimentary of the care he received. Due to their previous challenging limb lengthening experience the family was initially not interested in having another lengthening surgery to correct his residual limb length discrepancy. However, they are planning to proceed with lengthening of his left tibia.

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About the Authors



Christopher A. Iobst, MD, is a pediatric orthopedic surgeon and director of the Center for Limb Lengthening and Reconstruction at Nationwide Children's. He has presented his clinical and research work at national and international medical meetings and has been awarded the St. Giles Young Investigator Award by the Pediatric Orthopedic Society of North America (POSNA). Dr. Iobst is a clinical associate professor of Orthopedic Surgery in The Ohio State University College of Medicine.



Thomas J. Scharschmidt, MD, is a pediatric orthopedic surgeon and director of the Center for Orthopedic Oncology at Nationwide Children's. Dr. Scharschmidt's clinical interests include bone and soft tissue sarcomas, benign bone and soft tissue tumors, complex limb reconstruction, advanced reconstruction options in the growing child, care of the oncologic amputee patient and spine tumors. He is a professor of Orthopedic Surgery at The Ohio State University Medical Center and James Cancer Hospital.



About Our Program

The Department of Orthopedics at Nationwide Children's is among the leading programs in the United States, conducting more than 41,000 patient visits and performing more than 3,000 surgeries each year. The new state-of-the-art Livingston Orthopedic and Surgery Center offers an integrated approach to orthopedic care and innovation through advanced clinics, operating rooms, gait and spine motion analysis labs, comprehensive physical therapy center, dedicated academic spaces, and in-house orthotics services. The department is home to multiple specialty programs and centers, including comprehensive care for trauma and fractures, spine conditions and scoliosis, hip preservation, limb lengthening and reconstruction, neuromuscular orthopedics, musculoskeletal oncology, upper extremity care and sports medicine.

Led by Christopher A. Iobst, MD, one of the nation's leading pediatric limb surgeons, the Center for Limb Lengthening and Reconstruction treats children, adolescents and adults from across the country with all types of limb length discrepancies and limb differences, including congenital, developmental and post-traumatic limb differences that cause curvature, shortening or rotational issues to the bone.



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