

Case Study: David

Conditions Treated

Femoral Neck Fracture with Avascular Necrosis of the Hip

Age Range During Treatment

16 Years

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BACKGROUND

David is an avid hiker who fell and landed on his hip during a hike. He continued to hike for 13 more miles and then sought treatment at a local emergency room where x-rays revealed a left femoral neck fracture. He was transferred to a children's hospital where he underwent an open reduction and internal fixation (*ORIF*) procedure on his left femur to fix the femoral neck fracture and an aspiration of the left hip due to an accumulation of blood.

The fracture healed but David later felt pain in his left hip. An MRI was ordered and he was diagnosed with Stage III avascular necrosis of the left hip. His doctor placed him on crutches to prevent the bearing of weight on his left leg and two days later he visited me for a second opinion.

EVALUATION

David had full range of motion in his right hip and knee as well as in his left knee and ankle with no fluid or tenderness. However, his left hip had a diminished range of motion during abduction and internal rotation and he felt pain during internal rotation. These observations in addition to an MRI confirmed that David had an early case of avascular necrosis of the left hip with a femoral head in the early stages of collapse.



TREATMENT

While there is no single solution for treating a hip with avascular necrosis, simple non-weight bearing and observation was guaranteed to fail. Therefore, I discussed treatment options, risks, benefits, and alternatives with David and his parents. I ultimately recommended a multi-faceted course of treatment that would include bisphosphonates, core decompression, BMP/Calcium phosphate, and arthrodiastasis.

Surgery

- **Removal of Hardware, Left Proximal Femur**
- **Left Hip Core Decompression**
- **Insertion of Calcium Phosphate & BMP7 Into Left Femoral Head**
- **Left Hip Arthrodiastasis -Placement of Complex Multiplanar External Fixator, Hinge Fixator Across Pelvis / Hip**

Procedure

An incision was made into the previous surgical scar and the screws from the ORIF were removed from David's femoral neck. A core decompression was performed by placing a guide wire within the bone at which point a hole was drilled into the avascular bone, the dead cells were scraped away, and calcium phosphate mixed with infuse/ bone morphogenetic protein (BMP7) was injected into the femoral head.

At this point a distraction arthroplasty/ arthrodiastasis was performed. Three proximal pins were applied over the superior acetabular into the iliac wing. Three pins were applied to the distal femur, fixators were applied, and the hip was distracted. The surgical wound was then irrigated and closed in layers.

Observation: 3 Months

X-rays showed good healing of the avascular necrosis and plans were made for removal of the fixator.



Surgery

- **Removal of Hardware & Debridement of Pin Sites**

Procedure

The entire fixator was removed and all of the pin sites were debrided. David's leg moved in excellent alignment and x-rays confirmed good positioning of the femoral head.

Observations: 2 Weeks

David had good range of motion with no pain and x-rays showed good femoral head coverage. He was doing very well at this point but needed to work on motion and strengthening.

Observations: 5 Weeks

David's surgical wound was healed and while he was still using crutches his gait was good. X-rays revealed that his left femoral head had not collapsed but was healed. He was cleared to begin transitioning off of his crutches along with physical therapy (with no high impact exercises) for adductor strengthening, improved range of motion, and further improvement of his gait.



CONCLUSION

Months after his surgery, David's hip has good range of motion and we've successfully prevented the collapse of his femoral head. David has been permitted to continue strengthening and begin use of a treadmill in anticipation of returning to hiking.



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