

Comparative Case Study: OrthAlign® Vs. Robotic-Arm System

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THA Procedure with Robotic-Arm System

Introduction

The patient is a 58 year-old female, who works as an executive chef, having lived with left hip pain for many years. The pain was sharp and stabbing, and mostly in the groin. She could no longer perform yoga or pilates without significant pain. She had tried NSAIDs, PT, and steroid injections, which only provided short-term relief. She underwent a right total hip replacement surgery in 2001.

Presentation

The patient was 5'7" and 150 lbs. On exam, she had obligatory external rotation of the hip with flexion. The pain was elicited when forced internal rotation was applied. Her leg length was neutral.

X-rays of the bilateral hips were ordered, reviewed, and interpreted: On the right side she had a Stryker prosthesis in good position with no sign of loosening. There was no asymmetric polyethylene wear. On the left side, she had a large cam lesion, bone-on-bone arthritis, subchondral cysts, and subchondral sclerosis. There were also very large osteophytes.



Fig 1. Pre-Op Clinical Photo

Pre-op Plan

For this patient, I chose to perform an anterior total hip replacement using a Robotic-Arm System. She began 7mm short on the operative side. I planned for 40° inclination and 20° anteversion, and to make her leg lengths even.

Why Robotic-Arm System For This Case?

I was using robotics for all cases at that time. It was a part of my training, and I had a level of comfort with it.

Operative Findings and Approach

Anterior THA was performed without complication. Operative time was 1 hour 28 minutes, skin to skin. A size 52 mm cup was inserted with 40° inclination and 20° anteversion per plan, as told by the robot intraoperatively. Leg length was changed from -3mm to +2mm, per the robot. No screw was placed, as she had a cup without a screw on the other side.



Fig 2. Post-Op Clinical Photo

Follow Up

The patient returned for follow-up at 2, 6, 12, and 52 weeks. She was back to work in 3 weeks with total resolution of pain. Measurements on post-op films demonstrated 42 inclination, 23 anteversion, and -4mm (compared to the other side).

THA Procedure with OrthAlign®

Introduction

The patient is a 61-year-old female with right hip pain for many years. She presented a dull and achy pain in the groin that was made worse by activity.

Presentation

The patient was 5'6" and 143 lbs. On exam, she had obligatory external rotation of the hip with flexion. Pain was elicited when a forced internal rotation was applied. Neutral leg lengths.

X-rays of the bilateral hips were ordered, reviewed and my interpreted as follows: On the left side, she had very mild osteoarthritis with minimal joint space narrowing. On the right side, she had bone-on-bone arthritis with subchondral sclerosis and subchondral cysts. She had a large osteophyte laterally.

Pre-Op Plan

For this patient, I chose to perform an anterior total hip replacement using HipAlign® Navigation. She began 4mm short on the operative side. I planned for 40° inclination and 20° anteversion, and to make her leg lengths even .



Fig 3. Pre-Op Clinical Photo

Why OrthAlign For This Case?

HipAlign allows me to not only perform the anterior hip replacement with navigation, but also allows me to utilize the instruments I would normally use in a non-navigated case as well. This gives me the muscle memory and location memory of the instruments were I to not have any navigation available.

Operative Findings and Approach

Anterior THA was performed without complication. Operative time was 57 minutes, skin to skin. A 52 mm cup was used and inserted with 40 abduction and 20 of anteversion, and the leg length was changed from -4mm to -0mm as per HipAlign. I placed a screw, which was my standard protocol at that time if they did not have a cup without a screw on the other side.

Follow Up

The patient returned for follow-up at at 2, 6, 12, and 52 weeks. She was back to work in 2-3 weeks with total resolution of pain. Measurements on post-op films demonstrated 39° inclination, 22° anteversion, and -1mm leg length (compared to the other side). Screw is medial and anterior.



Fig 4. Post-Op Clinical Photo

Comparative Discussion Between Robotic-Arm System and OrthAlign

Outcomes for Each Case

Both cases did extremely well. Besides the medial screw, both cases had excellent postoperative pain relief, function, and x-rays. In both patients, the scars from the navigation had disappeared completely by one year, and the approach scars have healed well. Overall, the biggest difference was for the surgeon, which was 50% increased case time when using the robotic arm system.

Differences and Similarities Between Each Technology

Similarities: Both provide leg lengths, abduction, and anteversion. At present, the robotic assistance provides offset, whereas HipAlign does not. Both require pins in the pelvis, HipAlign on the ipsilateral side, and the robotic arm system on the contralateral side.

Differences: For me, the biggest difference is the utilization of standard tools that are augmented with the HipAlign, compared to being replaced with non-standard equipment by the Robotic-Arm System. When I stopped using the Robotic-Arm System, there was repeat of the learning curve for tool utilization, as I had not used the typical tools for anterior hip replacement with it. This was a major drawback. Other issues involve requiring another person in the OR to run the robotic-arm system, along with the massive size and necessity to bring the robot in from outside the typical sterile field. Downsides of the HipAlign include no navigated reaming, which can lead to aberrant cup placement or over-medialization.

Benefits of Using OrthAlign

1. Augmentation of standard tools to perform navigated surgery. I cannot stress enough how important this is to me. HipAlign markedly decreases my second learning curve after using robotic-assistance for over two years. HipAlign can be used to decrease the learning curve in anterior hip replacement by showing you in each case where your hands should be with the use of standard equipment.
2. Fully contained inside the surgery with no reliance on personnel outside of the sterile field. This plays into infection risk.
3. Does not rely on pre-operative imaging or engineers in order to perform the surgery with excellent accuracy. The simplicity is a huge strength. It lowers overall cost of care.
4. OR TIME! Since registration is so quick, along without the need to wait for others to move a massive robot around, OrthAlign may make the surgery more expeditious as compared to using a robotic-assisted system.

The above cases were in similarly sized females on the same day, back-to-back. There was nearly no difference, except laterality, in their cases, and HipAlign was 31 minutes faster.

A surgeon must always rely on his or her own professional clinical judgment when deciding whether to use a particular product in treatment of a particular patient. The information presented herein is intended to educate the surgeon community on OrthAlign's technologies and applications. A surgeon must always refer to the product labeling and instructions for use before using any OrthAlign Product. The products depicted are only to be used by a trained licensed physician. Please refer to the product's instructions for use for complete important safety information. Prescription Only (Rx): Federal Law restricts this device to sale by or on the order of a physician. The author was a paid consultant of the Company at the time that this case study was prepared.