

Intraoperative digital radiography provided accurate component alignment in THA

With fast results and inexpensive technology, digital radiographs provide high-quality intraoperative x-rays compared with previous technology.

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Use of intraoperative digital radiography can offer improved component alignment in patients undergoing total hip arthroplasty, according to a presenter at the Current Concepts in Joint Replacement Spring Meeting.

“An understanding of image orientation is critical in achieving accurate comparative measurements, and [digital radiography] enables an ideological paradigm shift in total hip arthroplasty based on a reliable, cost-effective, user-friendly and familiar technology and puts the outcome back into the hands of the surgeon,”

Brad L. Penenberg, MD, of Cedars-Sinai Medical Center, said in his presentation.

Intraoperative digital radiography

According to Penenberg, previous studies have shown improperly positioned cups can lead to increased failure rates in total hip arthroplasty (THA). Although technology in THA has advanced, he noted the cost for the hospital and the time required to use the technology may lead to underutilization of the technology. Penenberg said use of intraoperative digital radiography allows for accurate judgement and intraoperative measurements while “creating a profound shift in [the surgeon’s] ability to influence outcome” that is also less expensive than current robotic technology.

He added intraoperative digital radiography is less time-consuming, taking approximately 4 seconds to 6 seconds to obtain an anterior posterior pelvic radiograph and only adds 1 minute to 2 minutes of operative time to measure the cup position while minimizing interference with workflow.

“It is an important concept to most of us with experienced digital imaging these days,” Penenberg said. “We realized it is no longer a time-consuming chemical process leading to poor quality X-rays. We have high-tech equipment that gives us high-quality, readable intraoperative radiographs for any of our procedures currently. So with regard to the acetabular component in particular, dislocation rates are dramatically reduced [and] implant survival also is impacted.”

Clinical results

Penenberg and Sanjum Samagh, MD, orthopedic chief resident at Cedars-Sinai Medical Center, are currently collecting data on 350 consecutive hips using a preoperative reference radiograph to achieve component alignment.

“The preoperative reference X-ray orientation, we assume, is going to be the same orientation we are going to use postoperatively to judge our success,” he said. “So in the operating room, we try to get similar orientation and we understand pelvic tilt can impact abduction angle measurements significantly.”

Penenberg noted preoperative radiograph, intraoperative trial radiographs and the target abduction angle were the standard orientation that would result in hip stability during range of motion testing.

“Postoperative assessment and correlation with derived abduction measurements based on changes in pelvic tilt, we were 100% within 3° of the anticipated measurement,” Penenberg said.— *by Casey Tingle*

References:

Penenberg BL, et al. Paper #87. Presented at: Current Concepts in Joint Replacement Spring Meeting; May 22-25, 2016; Las Vegas.

Penenberg BL, et al. *Sem Arthroplasty*. 2015;doi:10.1053/j.sart.2015.09.005.

For more information:

Brad L. Penenberg, MD, can be reached at Cedars-Sinai Medical Center, 120 South Spalding Dr., Suite 400, Beverly Hills, Los Angeles, CA 90212; email: hipkneemd@gmail.com.

Disclosure: Penenberg reports he receives IP royalties from Microport; is an unpaid consultant for Radlink; has stock or stock options in Radlink Corp.; and is a paid consultant for Zimmer Biomet.