

SPECIALTY UPDATE

What's New in Hip Replacement

Mengnai Li, MD, PhD, and Andrew H. Glassman, MD, MS

Investigation performed at The Ohio State University Wexner Medical Center, Columbus, Ohio

Many studies of higher-level evidence were published last year related to total hip arthroplasty (THA). Among them, outcome studies related to implant design, optimizing patient factors, streamlining postoperative placement, and minimizing complications dominated the body of literature. A recent systematic review also called for the development of a core outcome set for THA clinical trials. Among the 26 instruments being reviewed, the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) was considered the highest-quality instrument overall, followed by the Hip disability and Osteoarthritis Outcome Score (HOOS) and the European Health Interview Survey (EUROHIS)-Quality of Life 8-item index¹.

Implant Design and Related Outcomes**Cemented THA**

A study using data from the Australian National Joint Replacement Registry followed 96,315 cemented THAs performed with use of 2 distinctive femoral stem designs². The cumulative revision rate at 14 years for the polished tapered stems was significantly lower than that for the matte-finished stems (3.6% compared with 4.9%; $p < 0.001$). Aseptic loosening was the leading cause of revision in the matte-finished group (75%), while periprosthetic fracture was the main reason for revision in the polished tapered group. This latter finding was echoed by another study that showed a higher rate of periprosthetic fracture among polished, collarless, tapered stems as compared with a composite beam design³. The only parameter demonstrating any significant difference between the fracture and control group was canal bone ratio, suggesting that osteoporosis might be a confounding factor.

Bearings

In a recent Humana dataset review, the use of ceramic-on-polyethylene bearings dramatically increased from 6.4% in

2007 to 52% in 2015, while the use of metal-on-metal bearings decreased during that same period. Patients >65 years of age were more likely to receive metal-on-polyethylene bearings⁴. The majority of recent studies investigating bearing surfaces focused on metal-on-metal bearings.

Metal-on-Metal**Blood Ion Level**

There remained substantial overlaps between the metal ion levels of well-functioning and poorly functioning metal-on-metal implants⁵. Both lower serum cobalt and chromium thresholds (5 ppb and 2.5 ppb, respectively)⁶ as well as implant-specific thresholds⁷ were proposed as potential cutoffs for performing metal artifact reduction sequence (MARS) magnetic resonance imaging (MRI) with fewer missed cases.

The results of smaller-head (28-mm) metal-on-metal hip replacement with a minimum of 10 years of follow-up also were reported⁸. About 41% of the patients with blood cobalt or chromium ion levels of >1 ppb were found to have MARS MRI findings of adverse reactions to metal debris (ARMD), although most of these patients were asymptomatic. Blood cobalt level was identified as a risk factor for ARMD; however, it did not necessarily correlate with aseptic lymphocyte-dominated vasculitis-associated lesion (ALVAL) scores.

Cardiotoxicity

An autopsy study from the Mayo Clinic found significantly higher median myocardial concentrations of cobalt in individuals who were post-THA compared with controls⁹. The majority, however, were below those seen in case reports of death from cobalt cardiotoxicity associated with metal-on-metal prostheses.

In a matched cohort study comparing the incidence of newly diagnosed cardiac disease (arrhythmia, myocardial infarction, cardiac failure, and cardiomyopathy), no significant differences were found between metal-on-metal and metal-on-polyethylene groups¹⁰. Similarly, the risk of cardiac failure was

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not found to be elevated among patients treated with metal-on-metal versus non-metal-on-metal hip arthroplasty designs¹¹. Berber et al. showed that high blood cobalt and chromium levels (<100 ppb) were not associated with any substantial cardiotoxic effect in a prospective, single-center, blinded study¹².

Metal-on-Polyethylene

Although less commonly reported, corrosion at the modular head-neck junction with a metal-on-polyethylene articulation in implants with no other modularity was found to cause severe ALTR (adverse local tissue reaction)¹³. Unexplained hip pain combined with normal radiographs was commonly observed. High corrosion scores were noted for all retrieved implants. Using 7 ppb as a cutoff for MRI testing would have missed two-thirds of the patients with severe ALTR on MRI. The authors recommended using 1 ppb as a cutoff in this population, as previously suggested by other studies^{14,15}.

Ceramic-on-Polyethylene

Among asymptomatic patients with a ceramic-on-polyethylene hip replacement, MARS MRI identified an 18% rate of fluid collections (9 of 50 hips)¹⁶. No solid lesions or tissue destructions were seen in this cohort. The clinical importance and natural history of these findings remain unknown and warrant longer-term follow-up.

Ceramic-on-Ceramic

Ceramic head and liner fractures were main concerns for THAs with ceramic-on-ceramic bearings. Data from the National Joint Registry for England, Wales, Northern Ireland and the Isle of Man showed that the odds of head fractures involving the latest generation of ceramic were dramatically reduced as compared with early generations of ceramic heads (0.119% to 0.009%), while the odds of liner fracture remained unchanged¹⁷. Smaller femoral head size and higher body mass index (BMI) were associated with increased risk of ceramic bearing fracture.

Highly Cross-Linked Polyethylene (HXLPE)

In a Level-I, double-blinded study from New Zealand, patients were randomized to receive either a conventional ultra-high molecular weight polyethylene (UHMWPE) liner or an HXLPE liner from the same manufacturer. At a minimum of 10 years of follow-up, significantly lower wear rates were noted for the HXLPE group (mean, 0.03 mm/yr) compared with the UHMWPE group (mean, 0.27 mm/yr)¹⁸. The prevalence of osteolysis and rate of revision were also much lower in the HXLPE group. A prospective randomized controlled trial by other authors also found a significantly lower wear rate for HXLPE compared with UHMWPE among younger patients (<65 years old) at 10-year follow-up¹⁹.

Other Level-I and II studies demonstrated significantly less wear for vitamin E-infused HXLPE compared with

UHMWPE²⁰, medium cross-linked polyethylene²¹, and HXLPE without vitamin E²² at mid-term follow-up.

Modularity

In a French study investigating 324,108 patients followed for up to 6 years from the index procedure, the cumulative revision rate was 6.5% for a modular femoral neck design compared with 4.7% for a fixed-neck design ($p < 0.001$), favoring a fixed-neck design²³.

When comparing 2 stem-sleeve designs, an alarmingly higher rate of stem fracture was reported for the Emperion (Smith & Nephew) group (1.5%) compared with the S-ROM (DePuy Orthopaedics) group (0.2%)²⁴.

An Australian registry study demonstrated that, when used specifically for the treatment of dislocation, constrained acetabular components actually had a higher second-revision rate for repeated dislocation compared with nonconstrained designs after 9 months²⁵. This suggests that a different approach needs to be taken to address the challenges of treating dislocation.

In a systematic review of dual mobility designs from 2007 to 2016, a dual mobility articulation was considered a viable alternative to traditional bearing surfaces in primary and revision THA, and for patients with a fracture of the femoral neck²⁶.

Patient Factors in Relation to Outcomes

Medical Comorbidities

Metabolic syndrome (MetS) (dyslipidemia, hypertension, abnormal fasting glucose, and visceral obesity) was found to be an independent risk factor for Centers for Medicare & Medicaid Services (CMS)-reportable complications, wound complications, and readmission following total joint arthroplasty (TJA)²⁷. The group with MetS and a BMI of >40 kg/m² was noted to have a significantly higher risk compared with lower BMI groups.

Chronic obstructive pulmonary disease (COPD)²⁸, multiple sclerosis²⁹, and Parkinson disease³⁰ all were recently shown to be associated with increased risk of perioperative complications, a longer length of stay, and an increased likelihood of discharge to an extended care facility following THA.

There are mixed reports regarding the outcomes of THA among patients with hepatitis C. In a mid-term follow-up study, patients with hepatitis C were found to have similarly good implant survivorship and clinical outcomes after THA compared with matched controls³¹. Cancienne et al., however, showed that patients with hepatitis C had significantly higher risk of infection, aseptic revision surgery, medical complications, and blood transfusions compared with a matched cohort followed for up to 8 years³².

An increased risk of perioperative complications, longer length of stay, and higher admission cost following THA were associated with a patient history of solid organ transplant and hematologic malignancies^{33,34}.

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Prior Hip Pathology

There are conflicting reports concerning the influence of prior arthroscopic surgery on the outcome of subsequent THA. In a prospective, match-controlled study, Perets et al. reported inferior outcomes for patients who had prior hip arthroscopy³⁵. This was contrary to the findings of a retrospective case-control matched study performed in the United Kingdom³⁶.

Patients <30 years of age who undergo THA following prior hip salvage procedures (open osteotomies, core decompression, bone-grafting, and arthroscopic procedures) were found to have a higher risk of wound complications, superficial infections, and reoperations but similar implant survivorship compared with those who did not have any prior salvage procedures³⁷.

THA for hip fractures and conversion THA in the Medicare-covered population were both found to be associated with an increased risk of CMS-reportable complications, non-homebound discharge, and readmission³⁸⁻⁴¹. A recent study from Duke University Hospital showed an approximate 19% greater cost for conversion THA compared with primary THA⁴².

BMI

In a recent retrospective review of 684 consecutive cases with failed THA referred to a single academic center for revision over a 10-year period, obesity was found to be independently associated with primary THA failure for aseptic loosening, while an American Society of Anesthesiologists (ASA) classification of ≥ 3 was independently associated with primary THA failure for infection⁴³.

Purcell et al. showed that obese patients (BMI of >35 kg/m²) had higher rates of deep infection and superficial wound complications compared with nonobese patients, regardless of surgical approach⁴⁴.

Smoking

In a propensity score-matched analysis, Sahota et al. found that smokers who underwent THA had higher rates of deep surgical site infections (SSIs) and readmission within 30 days postoperatively compared with matched controls⁴⁵.

Surgical Approach and Outcome

There is an ongoing debate on what is the "best" approach for primary THA. A pragmatic, parallel, 3-arm randomized controlled trial is currently underway in Australia comparing the outcome measures and complication rates following 3 different approaches (anterior, lateral and posterior) for primary THA and hopefully will shed light on this issue⁴⁶.

Direct Anterior Approach

In a study by Trousdale et al., 76% of new patients being evaluated for hip osteoarthritis in the authors' clinic were unaware of the direct anterior approach⁴⁷. The majority of health-care information on surgical approach was conveyed by

friends and family members. Patient perceptions were inconsistent with published data about the direct anterior approach and were likely influenced by marketing and the individuals surrounding them.

That being said, >20% of the members of the American Association of Hip and Knee Surgeons (AAHKS) promoted the direct anterior approach on the Internet⁴⁸. Faster recovery and decreased pain were mentioned 9 times more often than were the potential risks. Besides the known higher risk of intraoperative fractures and the steeper learning curve, the direct anterior approach was associated with a higher risk of femoral nerve injury than other approaches, although complete nerve recovery with only mild motor deficits could be expected for 75% of patients in <2 years⁴⁹. Hyperextension-induced fracture-dislocation of an ankylosed lumbar spine following the use of a direct anterior approach for THA was recently reported, and it was recommended that these patients would be best served with a lateral decubitus position with avoidance of aggressive hyperextension and traction⁵⁰.

A retrospective review of 4,651 cases in which primary THA was performed through either the direct anterior approach or the posterior approach found that deep infection rates did not differ significantly between the 2 approaches⁴⁴. The direct anterior approach showed higher rates of superficial wound complications among both obese and nonobese patient groups. Compared with the direct anterior approach, the anterolateral approach was found to have a lower incidence of superior gluteal nerve injury in a recent prospective controlled study of 30 patients who underwent single-stage bilateral THA with use of the anterolateral approach on 1 side and the direct anterior approach on the other⁵¹.

The radiation exposure to the patient during THA with the direct anterior approach was also addressed and found to be 178 mrem, less than a single pelvic radiograph (600 mrem), while the surgeon's exposure was undetectable⁵². Patient exposure was slightly lower than the previously established 300 mrem by Curtin et al.⁵³.

Minimally Invasive Surgery (MIS)

Compared with a standard incision (16-cm) posterior approach, minimal incision THA (<10 cm) performed by a high-volume surgeon showed no clear benefit at 10-year follow-up in a Level-I study⁵⁴. The revision rates for MIS through the use of anterior and anterolateral approaches were also comparable with those of conventional posterior and direct lateral approaches⁵⁵.

THA Complications

The frequency of revision THA is projected to double from 2017 to 2027; dislocation and mechanical loosening are the predominant indications for revision THA in the United States⁵⁶. Nerve injury, dislocation, and leg-length discrepancy continue to dominate as the leading causes of malpractice claims⁵⁷. Another report found that there is considerable

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variation in complication rates following THA depending on the database used for analysis⁵⁸.

Sciatic Nerve Injury

Both decompression at the site of surgery and at the distal end of the peroneal nerve around the fibular head showed improved sciatic nerve recovery (65% to 92%) compared with nonoperative controls (33%)^{59,60}. Considering that the mean time from sciatic nerve injury to actual distal peroneal nerve decompression procedure was slightly more than 1 year (397 days; range, 30 to 980 days), the findings by Wilson et al., showing 65% recovery, are very encouraging⁶⁰.

Dislocation**“Target Zone”**

Penenberg et al. showed an extremely low rate of dislocation (1 of 369, 0.3%) when they started using digital radiographs made during surgery to guide the placement of all acetabular cups in the “target zone” (30° to 50° of abduction and 15° to 35° of anteversion), with exceptions made only for hips with impingement identified intraoperatively⁶¹.

Spine Pathology and THA Dislocation

The association between spine pathology, including lumbar spine instrumentation, and THA dislocation or the likelihood of THA revision continued to be a hot topic of research. In a recent review of the impact of spinopelvic alignment on THA outcomes, 8 of 14 studies were published in 2017, although most were Level-IV studies⁶².

Several spine conditions were found to place patients at higher risk of prosthetic dislocation. These included greater thoracolumbar kyphosis, pelvic compensation, and a lumbar flatback deformity⁶³, lumbar fusion within 5 years of THA⁶⁴, multilevel thoracolumbar fusion prior to THA⁶⁵, and longer fusions or fusions including the pelvis⁶⁶. Compared with patients without dislocation, the cohort with dislocation in a study by Esposito et al. showed significantly less spine flexion, less change in pelvic tilt, and more hip flexion from standing to sitting positions⁶⁷.

Lum et al. classified 5 patterns of spinopelvic mobility (normal, hypermobile normal, fixed anterior tilt, fixed posterior tilt, and kyphosis) and recommended that acetabular cup implantation ideally should be adapted on the basis of spinopelvic interactions rather than using arbitrary “safe zones.”⁶⁸

Infection/Periprosthetic Joint Infection (PJI)

Even though the rate of PJI may be plateauing⁶⁹, the lifetime cost of treating PJI after THA is much higher than previously estimated (\$390,000 compared with \$100,000)⁷⁰. One recent study showed an approximate 8% mortality rate among cases of revision for PJI within 1 year of the index primary THA procedure⁷¹. Patients with an enterococci-infected THA had a 3.10-fold higher mortality risk than did patients infected with other bacteria. In addition, methicillin-resistant *Staphylococcus*

aureus (MRSA), *Pseudomonas*, and *Proteus* were associated with a lower infection-free rate, more surgeries, and more time in hospital for PJI treatment⁷².

Risk Factors

Data from the Australian Orthopaedic Association National Joint Replacement Registry showed a higher cumulative risk of revision for infection for metal-on-metal bearing surfaces (in particular, large-head metal-on-metal) compared with others at both the national and individual-surgeon level⁷³. In a systematic review and meta-analysis, Hexter et al. found no differences in the incidence of revision for infection when comparing metal-on-polyethylene, ceramic-on-polyethylene, and ceramic-on-ceramic articulations⁷⁴.

Thresholds of 7.5% and 7.7% for hemoglobin A1c have been recommended to be more predictive of infection than the commonly used 7% and should perhaps be the goal in preoperative patient optimization^{75,76}.

Shohat et al. recommended that a fructosamine level of ≥ 292 $\mu\text{mol/L}$ be used as an alternative in the setting of preoperative glycemic assessment⁷⁷.

Previous MRSA carriers who undergone successful decolonization and had confirmed eradication of MRSA still had a significantly higher risk of SSI when undergoing THA or TKA (total knee arthroplasty) compared with those who never tested positive for MRSA⁷⁸.

Diagnosis

Higuera et al. found that the threshold values for the optimal accuracy in the diagnosis of PJI after THA were a synovial fluid white blood-cell (WBC) count of 3,966 cells/ μL and a polymorphonuclear cell (neutrophil) percentage of the WBC count (PMN%) of 80%⁷⁹. However, the authors also acknowledged a clinically important “gray area” around the thresholds, with uncertainty highlighting the challenge of accurate diagnosis.

The commercially available Synovasure Alpha Defensin Test (Zimmer Biomet) with a lateral flow device was recently demonstrated to be highly accurate when diagnosing PJI following THA and TKA, with sensitivity of 92.1% and specificity of 100%⁸⁰.

Serum D-dimer (850 ng/mL threshold) appears to be a promising marker for the diagnosis of PJI, and this test may have a great utility for determining the optimal timing of reimplantation⁸¹. A urine leukocyte esterase test was also recommended as a rapid point-of-care test after initial serologic screening of the erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP)⁸². Compared with testing with the Synovasure Alpha Defensin Test, serum D-dimer and urine leukocyte esterase test are much cheaper and more accessible.

Treatment

As noted in a study by Edelstein et al., systemic absorption of antibiotics from high-dose antibiotic-loaded cement spacers persists for at least 8 weeks⁸³. It is recommended that patients

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should be monitored closely for complications related to systemic absorption of antibiotics from such treatment. Petis et al. found a very high risk of mechanical complications including fractures and loosening, in addition to poorer outcomes, for those with retention of antibiotic spacers that did not go through 2-stage exchange⁸⁴.

From the medical-management perspective, a Level-I study in 2017 showed that an additional 3 months of oral antibiotic treatment in 2-stage revision for PJI appeared to improve infection-free survival⁸⁵.

Venous Thromboembolism (VTE) and Acute Ischemic Stroke

In a multicenter, double-blinded, randomized controlled trial involving 3,424 patients who received 5 days of rivaroxaban prophylaxis after THA or TKA, the results were not significantly different between those who received extended prophylaxis with aspirin and those who continued with rivaroxaban in the prevention of symptomatic VTE⁸⁶. The risk of recurrent VTE with tranexamic acid (TXA) administration was also evaluated. In a retrospective matched control study, a group at the Mayo Clinic found that the use of intravenous TXA did not increase the rate of recurrent VTE among patients with a prior history of VTE undergoing THA or TKA⁸⁷.

Regarding the risk of perioperative acute ischemic stroke, Perfetti et al. found that the risk is 29 times higher among THA patients with an atrial septal defect/patent foramen ovale compared with matched controls⁸⁸.

Acute Kidney Injury/Disease

Three recent studies provided a better understanding of the complication of acute kidney injury/disease. In a nested case-control study from the Mayo Clinic, 114 (1.1%) of 10,323 THA cases developed acute kidney injury using KDIGO (Kidney Disease Improving Global Outcomes) criteria⁸⁹. Older age, male sex, chronic kidney disease, heart failure, diabetes, and hypertension were risk factors for postoperative acute kidney injury. When several risk factors presented before surgery, the risk of acute kidney injury increased significantly, from <1% to >20%.

Using the same criteria for acute kidney injury diagnosis, another group studied the combined local effect of an antibiotic spacer with intravenous antibiotics after first-stage joint revision for infection⁹⁰. Higher BMI, lower preoperative hemoglobin, and medical comorbidities (diabetes mellitus, chronic kidney disease, cardiovascular disease, and hypertension) were significant risk factors associated with acute kidney injury. Neither the dose of vancomycin nor tobramycin used in the spacer was found to be a risk factor for acute kidney injury.

A third study found a much higher rate of postoperative acute kidney disease (6.8%) in THA and TKA patients when acute kidney disease was diagnosed using the “Risk, Injury, Failure, Loss of kidney function, and End-stage kidney disease” criteria⁹¹. Perioperative use of angiotensin receptor blockers or angiotensin-converting enzyme inhibitors, perioperative van-

comycin use, and increased BMI were associated with increased odds of postoperative acute kidney disease.

It is very likely that the actual rate of acute kidney injury/acute kidney disease falls somewhere in between the rates noted in the studies highlighted above and a mutually agreed upon definition of acute kidney injury/acute kidney disease would better guide clinical practice.

Urinary Retention/Postoperative Urinary Retention

Spinal anesthesia is becoming more prevalent in short-stay and rapid-recovery THA pathways. A history of prior urinary retention and high intraoperative fluid volume were found to be risk factors for postoperative urinary retention following THA under spinal anesthesia⁹². A prospective observational study from the Netherlands found that both spinal anesthesia and preoperative residual urine volume were significant risk factors associated with postoperative urinary retention, while increased perioperative fluid administration was not correlated with the rate of postoperative urinary retention⁹³.

Postoperative Discharge Settings and Complications

The U.S. national rates of 30 and 90-day readmission after THA were noted to be 4% and 8%, respectively⁹⁴. As found in a study by Fleischman et al., a large majority of patients living alone could be sent home directly after TJA⁹⁵. They tended to stay an additional night in the hospital and utilized more home health services.

Current Trends and Controversies

Computer Navigation and Robotic Surgery

The proportion of THA cases using technology assistance grew each year, increasing from 0.5% in 2008 to 5.2% in 2015 ($p < 0.001$)⁹⁶. Current evidence demonstrates equivalent outcomes when computer navigation and robotic assistance is compared with traditional THA techniques, with the potential benefit of decreasing complications such as hip instability⁹⁷.

“Outpatient” THA and Same-Day THA

In a recent study of 2005 to 2014 data from the National Surgical Quality Improvement Program (NSQIP) database, Bovonratwet et al. found significantly more adverse events, complications, and readmissions for an inpatient compared with an outpatient THA group; however, they acknowledged there was considerable selection bias in their study. In addition, they subsequently found no difference between the groups when the “outpatient” definition was changed to LOS (length of stay) = 0⁹⁸.

Querying the same NSQIP dataset from 2005 to 2014, Basques et al. found no significant differences in overall postoperative complications or readmission between same-day and inpatient hip arthroplasties⁹⁹. In the study, a BMI of ≥ 35 kg/m², both insulin and non-insulin-dependent diabetes, and an age of ≥ 85 years were associated with increased 30-day readmission following same-day procedures. In select, healthier patients, outpatient arthroplasty (hip and knee) alone did not increase

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the risk of readmission or reoperation and was a negative independent risk factor for complications¹⁰⁰.

A standardized risk-assessment score for the safe selection of outpatient joint replacement patients was recently advocated¹⁰¹. Other investigators noted that the presence of ≥ 1 comorbidity (coronary artery disease, COPD, and frequent urination or benign prostatic hypertrophy) was associated with an increased risk of overnight observation¹⁰².

Multimodal Pain Control/Perioperative Pain Management

Recent advances in multimodal analgesia target different pathways of pain management, achieving maximize pain control while minimizing the side effects of narcotics. However, there is no consensus on the ideal perioperative analgesic modality for THA¹⁰³.

A Cochrane review of 45 randomized controlled trials demonstrated that peripheral nerve blocks provide better pain control compared with systemic analgesia, with no major differences found between peripheral nerve blocks and neuraxial blocks¹⁰⁴.

In a 3-arm randomized clinical trial, Johnson et al. found that continuous posterior lumbar plexus block or periarticular infiltration (PAI) with liposomal bupivacaine, ketorolac, and epinephrine provides superior postoperative analgesia compared with PAI with ropivacaine, ketorolac, and epinephrine¹⁰⁵. However, in a prospective randomized trial, the superiority of liposomal bupivacaine was not confirmed when compared with control (bupivacaine hydrochloride alone)¹⁰⁶.

Health-Care Policy

Medicare-mandated, but potentially medically unnecessary, inpatient days at a higher level of care increase the total cost of

TJAs. Policies regarding minimum-stay requirements before discharge should be reevaluated¹⁰⁷.

Upcoming Meetings and Events Related to THA

The 13th Congress of the European Hip Society will be held September 20-22, 2018, in The Hague, the Netherlands (www.europeanhipsociety.com).

The 28th Annual Meeting of the AAHKS will be held November 1-4, 2018, in Dallas, Texas (www.aahks.org).

The Hip Society's 2018 Summer Meeting will be held October 4-6, 2018, in New York, NY (www.hipsoc.org).

Evidence-Based Orthopaedics

The editorial staff of *The Journal* reviewed a large number of recently published research studies related to the musculoskeletal system that received a higher Level of Evidence grade. In addition to articles cited already in the Update, 6 other articles with a higher Level of Evidence grade were identified that were relevant to total hip replacement. A list of those titles is appended to this review after the standard bibliography. We have provided a brief commentary about each of the articles to help guide your further reading, in an evidence-based fashion, in this subspecialty area.

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Mengnai Li, MD, PhD¹

Andrew H. Glassman, MD, MS¹

¹The Ohio State University, Columbus, Ohio

E-mail address for M. Li: limengnai@hotmail.com

ORCID iD for M. Li: [0000-0003-1749-1662](https://orcid.org/0000-0003-1749-1662)

ORCID iD for A.H. Glassman: [0000-0002-5718-0239](https://orcid.org/0000-0002-5718-0239)

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Evidence-Based Orthopaedics

Abdel MP, Chalmers BP, Trousdale RT, Hanssen AD, Pagnano MW. Randomized clinical trial of 2-incision vs mini-posterior total hip arthroplasty: differences persist at 10 years. *J Arthroplasty*. 2017 Sep;32(9):2744-7. Epub 2017 Apr 13.

This retrospective study presented 10-year follow-up results of a randomized trial including 71 patients who had undergone 2-incision or mini-posterior THA. There were no improvements in early or mid-term clinical outcomes from use of the 2-incision technique. However, there was a clinical trend toward a higher rate of aseptic revision in the 2-incision group.

Austin MS, Urbani BT, Fleischman AN, Fernando ND, Purtill JJ, Hozack WJ, Parvizi J, Rothman RH. Formal physical therapy after total hip arthroplasty is not required: a randomized controlled trial. *J Bone Joint Surg Am*. 2017 Apr 19; 99(8):648-55.

In this therapeutic Level-I study, unsupervised home exercise was found to be both safe and efficacious for a majority of patients who underwent THA. The authors suggested that formal physical therapy may not be required. Ten (19%) of the patients who were randomized to unsupervised home exercise and 20 (37%) of the patients who were randomized to formal outpatient therapy crossed over between groups. Identifying certain patient populations who may require formal physical therapy would optimize the outcome.

Goodman SM, Springer B, Guyatt G, Abdel MP, Dasa V, George M, Gewurz-Singer O, Giles JT, Johnson B, Lee S, Mandl LA, Mont MA, Sculco P, Sporer S, Stryker L, Turgunbaev M, Brause B, Chen AF, Gililland J, Goodman M, Hurley-Rosenblatt A, Kirou K, Losina E, MacKenzie R, Michaud K, Mikuls T, Russell L, Sah A, Miller AS, Singh JA, Yates A. 2017 American College of Rheumatology/American Association of Hip and Knee Surgeons guideline for the perioperative management of antirheumatic medication in patients with rheumatic diseases undergoing elective total hip or total knee arthroplasty. *J Arthroplasty*. 2017 Sep;32(9):2628-38. Epub 2017 Jun 16.

The American College of Rheumatology and the AAHKS developed an evidence-based guideline regarding when to continue, when to withhold, and when to restart antirheumatic medications and the optimal perioperative dosing of glucocorticoids. The guideline includes 7 recommendations. Overall,

the guideline recommends continuing nonbiologic disease-modifying anti-rheumatic drugs (DMARDs), and continuing the same daily dose of corticosteroids instead of administering stress doses in patients who have rheumatic diseases. In addition, the guideline recommends withholding biologic agents prior to surgery and planning to have the surgery at the end of the dosing cycle. All recommendations are conditional and based on low or moderate-quality evidence; however, the report still provides important guidance that was informed by the available literature, clinical expertise and experience, and patient values and preferences.

Kayupov E, Fillingham YA, Okroj K, Plummer DR, Moric M, Gerlinger TL, Della Valle CJ. Oral and intravenous tranexamic acid are equivalent at reducing blood loss following total hip arthroplasty: a randomized controlled trial. *J Bone Joint Surg Am*. 2017 Mar 1;99(5):373-8.

In this prospective, double-blinded, randomized controlled trial, oral TXA was found to provide equivalent reductions in blood loss in the setting of primary THA, at a greatly reduced cost, compared with the intravenous formulation.

Rykov K, Reininga IHF, Sietsma MS, Knobben BAS, Ten Have BLEF. Posterolateral vs direct anterior approach in THA (POLADA trial): a randomized controlled trial to assess differences in serum markers. *J Arthroplasty*. 2017 Dec; 32(12):3652-3658.e1. Epub 2017 Jul 14.

A prospective randomized controlled trial in the Netherlands failed to show significant differences in serum creatine kinase and CRP levels between the direct anterior and the posterolateral approach. It appears that the often-claimed "muscle sparing" benefit of the direct anterior approach may not be true when compared with the traditional posterolateral approach.

Sershon RA, Tetreault MW, Della Valle CJ. A prospective randomized trial of mini-incision posterior and 2-incision total hip arthroplasty: minimum 5-year follow-up. *J Arthroplasty*. 2017 Aug;32(8):2462-5. Epub 2017 Mar 23.

In this prospective randomized trial, no differences in outcomes could be found between mini-incision posterior and 2-incision THA at early and minimum 5-year follow-up. The senior author has abandoned the 2-incision approach given its increased complexity, operative time, and need for fluoroscopy.