



Adult Reconstruction Fellowship Guidelines

Approved March 2022 by AAHKS, THS, and TKS.

Suggested Reading: HIP TOPICS

1) Surgical Approaches: Posterior, Anterior, Lateral

Credit: Jessica Lee, MD

1. Orthopedic Knowledge Update 5: Hip and Knee: Chapter 28 Surgical Approaches and Bearing Surfaces

Hozack W, Duncan C, Herman A, Hansen E, Pagnano M, Howard J, McAuley J, Jiranek W, Feltman T, Muratoglu O, Oral E, Deirmengian G, Walter W, Levy Y, McCalden R, Schemitsch E AAOS 2017

This chapter classifies contemporary surgical approaches to the hip, providing benefits, complications and outcomes of standard as well as minimally invasive and extensile approaches.

2. Higgins BT, Barlow DR, Heagerty NE, Lin TJ. Anterior vs. posterior approach for total hip arthroplasty, a systematic review and meta-analysis. J Arthroplasty. 2015 Mar;30(3):419-34. doi: 10.1016/j.arth.2014.10.020. Epub 2014 Oct 22. PMID: 25453632.

This study fails to demonstrate clear superiority in clinical, radiographic and surgical outcomes between primary THAs performed with anterior versus posterior approach. The authors conclude that approach should be dictated by patient characteristics, surgeon experience, as well as surgeon and patient preference.

3. The AAHKS Clinical Research Award: No Evidence for Superior Patient-Reported Outcome Scores After Total Hip Arthroplasty with the Direct Anterior Approach at 1.5 Months Postoperatively, and Through a 5-Year Follow-Up Sauder, Nicholas et al. The Journal of Arthroplasty, Volume 35, Issue 6, S15 - S21

This study comparing patient-reported outcomes (PROs) of the direct anterior versus posterolateral approaches found that the direct anterior approach was associated with improved PROs at the first postoperative visit, but there were no differences after six weeks.

4. [Surgical approach significantly affects the complication rates associated with total hip arthroplasty](#)

V. K. Aggarwal, A. Elbuluk, J. Dundon, C. Herrero, C. Hernandez, J. M. Vigdorichik, R. Schwarzkopf, R. Iorio, and W. J. Long. The Bone & Joint Journal 2019 101-B:6, 646-651

This study on surgical approaches for THA (anterior, posterior, anterolateral, and direct lateral) found that the anterior approach had the highest overall complication rate (8.5%) and the posterior the lowest (5.85%), with equivocal dislocation rate.



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2) Avascular Necrosis (AVN) of the Hip: Diagnosis and Management

1. Orthopedic Knowledge Update 5. Chapter 4: Osteonecrosis of the Hip and Knee. Patel NK, Mistry JB, Elmallah RK, Chughtai M, Nace J, Mont MA. American Academy of Orthopedic Surgeons, 2017.

This chapter provides a comprehensive review of the pathophysiology, radiographic evaluation, classification, natural history, surgical options (both joint preservation and arthroplasty), and treatment outcomes for AVN of the femoral head.

2. Mont MA, Cherian JJ, Sierra RJ, Jones LC, Lieberman JR: Nontraumatic osteonecrosis of the femoral head: Where do we stand today? A ten-year update. J Bone Joint Surg Am 2015;97(19):1604-1627.

This review article covers the pathophysiology, as well as joint preservation and arthroplasty treatments for osteonecrosis of the femoral head.

3. Mont MA, Zywiell MG, Marker DR, McGrath MS, Delanois RE: The natural history of untreated asymptomatic osteonecrosis of the femoral head: A systematic literature review. J Bone Joint Surg Am 2010;92(12):2165-2170.

This review article describes the progression of asymptomatic femoral head AVN to symptomatic disease or collapse, which occurred in 59% of patients (394/664).

4. Kim SM, Lim SJ, Moon YW, Kim YT, Ko KR, Park YS: Cementless modular total hip arthroplasty in patients younger than fifty with femoral head osteonecrosis: Minimum fifteen-year follow-up. J Arthroplasty 2013;28(3): 504-509.

This study demonstrates excellent outcomes, with no revisions for aseptic loosening, 93.8% overall survival, and Harris Hip Score 92.7 after 16.8 years.

5. Marker DR, Seyler TM, Ulrich SD, Srivastava S, Mont MA: Do modern techniques improve core decompression outcomes for hip osteonecrosis? Clin Orthop Relat Res 2008;466(5):1093-1103.

This study compares radiographic and clinical outcomes between core decompression techniques. Success was greatest in patients with small, Ficat Stage I lesions, confirming that core decompression is safe and effective for early stage AVN of the femoral head.



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3) THA Femoral Revision: Bone Loss Classification & Management

Credit: Eric Smith, MD

1. Orthopedic Knowledge Update 6, Chapter 37. Revision Total Hip Arthroplasty. Lewallen DG. American Academy of Orthopaedic Surgeons, 2021

This updated chapter provides a thorough review of femoral defects and treatment options. The bone loss classification used in this chapter is based on the Paprosky classification, which is introduced in Chapter 33 of this same review text. The management of femoral defects focuses on fully porous coated stems, tapered modular stems, impaction grafting, allograft-prosthetic-composite (APC) and proximal femoral replacements.

2. Orthopaedic Knowledge Update 5, Chapter 34. Revision Total Hip Arthroplasty. Pages 453-471. Albers A. et al. AAOS, 2017.

This chapter provides a thorough review of the management of femoral revisions. This management spans fully porous coated stems, tapered modular stems, impaction grafting, allograft-prosthetic-composite (APC) and proximal femoral replacements.

3. JAAOS. Oct 2013, volume 21, issue 10 p 601-612. Femoral Bone Loss in Revision Total Hip Arthroplasty: Evaluation and Management. Sheth, Neil P. MD; Nelson, Charles L. MD; Paprosky, Wayne G. MD

This review article provides a comprehensive overview of the Paprosky classification for femoral defects as well as clear examples of typical solutions to the femoral defects. This review article also details clinical outcome papers based on the method of fixation and stem design used for femoral revision.

4. Rodriguez JA, Deshmukh AJ, Robinson J, et al: Reproducible fixation with a tapered, fluted, modular, titanium stem in revision hip arthroplasty at 8-15 years follow-up. J Arthroplasty 2014;29(9suppl):214-218.

In this retrospective study, 71 hips received a tapered fluted modular titanium stem for revision THA, and 79% had Paprosky type 3A or worse femoral defects. All stems were osseointegrated distally; two hips subsided greater than 5 mm, 68% of hips had evidence of bony reconstitution, and 21% demonstrated diaphyseal stress shielding.

5. Revision Total Hip Arthroplasty Study Group: A comparison of modular tapered versus modular cylindrical stems for complex femoral revisions. J Arthroplasty 2013;28(8suppl):71-73.

In a multicenter review of 105 femoral revisions in patients with Paprosky type III/IV femoral defects using modular titanium stems, either tapered fluted or cylindrical, with an average follow-up of 5 years, the tapered component group had fewer osseointegration failures (1.6% versus 15.9%) and fewer re-revisions (4.9% versus 22.7%), despite having had more severe femoral defects.



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4) Bearings in THA: Polyethylene History, Osteolysis, Poly Exchange, Ceramics, COC

1. Orthopaedic Knowledge Update 5, Chapter 28: Surgical Approaches and Bearing Surfaces (pg. 345). AAOS, 2017.
2. Orthopaedic Knowledge Update 5, Chapter 29: The Biological Response to Bearing Materials (pg. 367). AAOS, 2017.
3. History and systematic review of wear and osteolysis outcomes for first-generation highly crosslinked polyethylene (PMID 21431461)

Clinical study demonstrating advantage of cross-linked polyethylene over historical polyethylene.

4. Cross-linked compared with historical polyethylene in THA: an 8-year clinical study (PMID 19030941)

Clinical study demonstrating advantage of cross-linked polyethylene over historical polyethylene

5. Comparison of ten-year survivorship of hip prostheses with use of conventional polyethylene, metal-on-metal, or ceramic-on-ceramic bearings (PMID 23032586)
6. Isolated Head and Liner Exchange in Revision Hip Arthroplasty (PMID 28291145)
7. Early failure of metal-on-metal bearings in hip resurfacing and large-diameter total hip replacement (PMID 20044676)

Most cited study into the effects of metal debris resulting in eventual implant failure and the operative factors that contribute to increased wear.

8. Videos:

- <https://www.vumedi.com/video/modern-implant-materials-dont-forget-the-host/>
- <https://www.vumedi.com/video/bearing-case-based-chrome-cobalt-on-hxlpe/>
- <https://www.vumedi.com/video/avoid-trunnionosis-and-use-ceramic/>
- https://aahkszoom.s3.amazonaws.com/Focal/FOCAL+Session+23_Jennings.mp4



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Suggested Reading: HIP TOPICS

5) Infection; Hip Management

1. Orthopaedic Knowledge Update 5, Chapter 34: Revision Total Hip Arthroplasty (pg. 453). AAOS, 2017.
2. Orthopaedic Knowledge Update 5, Chapter 35: Complications of Total Hip Arthroplasty (pg. 473). AAOS, 2017.
3. AAOS Clinical Practice Guideline: diagnosis and treatment of periprosthetic joint infections of the hip and knee (PMID 21119143)
4. Diagnosis and management of prosthetic joint infection: clinical practice guidelines by the Infectious Diseases Society of America (PMID 23223583)
5. Prosthetic joint infection risk after total hip arthroplasty in the Medicare population (PMID 19493644)
6. Infection burden for hip and knee arthroplasty in the United States (PMID 18534466)
7. Videos:
 - https://aahkszoom.s3.amazonaws.com/Focal/FOCAL+Session-32_WarthBuller.mp4
 - <https://www.vumedi.com/video/current-consensus-guidelines-for-the-prevention-of-periprosthetic-joint-infection/>
 - <https://icjr.net/surgeries/acute-periprosthetic-infection-role-for-id-component-retention-with-suppression>
 - <https://www.vumedi.com/video/infected-total-hip-arthroplasty-single-vs-two-stage-technique>

6) Infection; Hip Diagnosis

1. Journal of Arthroplasty. 2018 May 33(5) 1304-1309 *PMID 29551303*

The latest definition of MSIS criteria for hip and knee PJI [latest musculoskeletal infection society consensus summary]
2. JBJS Am 2012 4;94(7) p594-600 *PMID 22488615*

Serum and Synovial fluid analysis for diagnosing PJI in patients with inflammatory arthritis
3. JBJS Am 2017 May 3; 99 (9) 753-759 *PMID 28463919*

Synovial fluid cell count for diagnosis of Chronic PJI hip- [study validating the use of MSIS criteria numbers for hip PJI]
4. CORR 2014 Feb 472(2) 429-9 *PMID 23884798*

The diagnosis of infection in the early post op period after Total hip arthroplasty [threshold criteria for diagnosing an acute post op infection after THA]



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7) THA Periprosthetic Fractures

1. Orthopaedic Knowledge Update 5, Chapter 34: Revision Total Hip Arthroplasty (pg. 453). AAOS, 2017.
2. Orthopaedic Knowledge Update 5, Chapter 35: Complications of Total Hip Arthroplasty (pg. 473). AAOS, 2017.
3. Treatment of Periprosthetic Femoral Fractures Following Total Hip Arthroplasty with Femoral Component Revision (PMID 14630846)
4. The risk of peri-prosthetic fracture after primary and revision total hip and knee replacement (PMID 21196551)
5. Epidemiology of periprosthetic femoral fractures in 5417 revision total hip arthroplasties: a 40-year experience (PMID 27037428)
6. Periprosthetic fractures around loose femoral components (PMID: 25063746)
7. Principles of treatment for periprosthetic femoral shaft fractures around well-fixed total hip arthroplasty (PMID: 19880678)
8. Videos:
 - https://aahkszoom.s3.amazonaws.com/Focal/FOCAL+Session+8+-+Rothman_Dr.+Hozack_.mp4
 - <https://www.vumedi.com/video/periprosthetic-fractures-following-total-hip-arthroplasty/>
 - <https://icjr.net/surgeries/periprosthetic-fracture-in-tha-acetabulum>
 - <https://icjr.net/surgeries/periprosthetic-fractures-of-the-femur-2>



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8) THA Hip/Spine Interaction

1. McKnight BM, Trasolini NA, Dorr LD. Spinopelvic Motion and Impingement in Total Hip Arthroplasty. *J Arthroplast.* 2019;34(7):S53–6.

PMID: 30773360

This review article covers important recent research in the topic of spinopelvic motion and its relation to impingement in total hip arthroplasty. The review covers normal and abnormal spinopelvic motion, breaking down the measurements and variations of spinopelvic imbalance including stuck sitting, stuck standing, and neutral stiff. Lastly, it reviews how these types of spinopelvic imbalances affect component positioning, impingement, and ways to avoid potential pitfalls.

2. Heckmann N, McKnight B, Stefl M, Trasolini NA, Ike H, Dorr LD. Late Dislocation Following Total Hip Arthroplasty: Spinopelvic Imbalance as a Causative Factor. *J Bone Joint Surg.* 2018;100(21):1845–53.

PMID: 30399079

This retrospective study examines 20 patients with late dislocations. Spinopelvic motion was assessed for all patients, finding that 8 of 9 anterior dislocations and 10 of 11 posterior dislocations had abnormal spinopelvic motion. Key finding that for every 1 degree decrease in spinopelvic motion, there was a 0.9 degree increase in femoral motion, which resulted in bony impingement and contributed to dislocation in some patients.

3. Eftekhary N, Shimmin A, Lazennec JY, Buckland A, Schwarzkopf R, Dorr LD, et al. A systematic approach to the hip-spine relationship and its applications to total hip arthroplasty. *Bone Jt J.* 2019;101-B(7):808–16.

PMID: 31256658

This review from the Hip-Spine Workgroup systematically covers the measurements and terminology relating to spinopelvic motion and total hip arthroplasty. It furthermore provides a basic set of guidelines for identification, evaluation and proper treatment of patients spinal deformity and spinal stiffness with suggestions for intraoperative techniques to mitigate instability risks.

4. Videos:

- FOCAL – Understanding the Spinopelvic Relationship in THA
https://aahkszoom.s3.amazonaws.com/Focal/FOCAL+Webinar+6_Dennis%2C+Kleeman%2C+Jennings.mp4
- FOCAL – Hip-Spine Relationship in THA
https://aahkszoom.s3.amazonaws.com/Focal/FOCAL+Session+10+-+NYU_Dr.+Schwarzkopf.mp4



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9) THA Complications: Nerve Injuries, Leg Length Discrepancy, Heterotopic Ossification

1. Orthopaedic Knowledge Update 5, Chapter 35: Complications of Total Hip Arthroplasty (pg. 473). AAOS, 2017. Limb-Length Discrepancy After THA; Heterotopic Ossification; Neurovascular Injuries.
2. Adult Reconstruction Hip 2—Chapter 18: Optimizing Stability and Limb Length
3. Adult Reconstruction Hip 2—Chapter 36: Management of Peripheral Nerve and Vascular Injuries Associated with Total Hip Arthroplasty
4. Zhu Y, Zhang F, Chen W, Zhang Q, Liu S, Zhang Y. Incidence and risk factors for heterotopic ossification after total hip arthroplasty: a meta-analysis. Arch Orthop Traum Su. 2015;135(9):1307–14.

PMID: 26155968

This study is a meta-analysis of 14 studies of 6468 cases with total hip arthroplasty with 1939 (30%) cases of heterotopic ossification. It identified male gender, cemented implants, bilateral operations, ankylosing spondylitis, and ankylosed hips as significantly increased risk factors for heterotopic ossification. Rheumatoid arthritis was found to be protective. Age, use of NSAIDs, femoral neck fractures, prior hip fracture, hypertrophic osteoarthritis and osteophytes were not found to be risk factors.

5. Park JH, Hozack B, Kim P, Norton R, Mandel S, Restrepo C, et al. Common Peroneal Nerve Palsy Following Total Hip Arthroplasty. J Bone Jt Surg. 2013;95(9):e55.

PMID: 23636194

A retrospective review examining 7969 primary and 1601 revision total hip arthroplasties over an eight year period demonstrated 31 common peroneal nerve palsies. One half of patients with a palsy recovered fully. The mean time to recovery was approximately one year for partial and one and a half years for complete palsy. Higher body mass index was noted to be a negative prognostic factor for recovery from the palsy, and those patients who sustained a palsy were significantly younger than those who did not.

6. Plaass C, Clauss M, Ochsner PE, Ilchmann T. Influence of Leg Length Discrepancy on Clinical Results after Total Hip Arthroplasty - A Prospective Clinical Trial. Hip Int. 2011;21(4):441–9.

PMID: 21818744

A prospective trial of 94 patients examined the effect of leg length discrepancy on walking ability, limping, pain and patient satisfaction following total hip arthroplasty. Patients with a shortened operative leg demonstrated more limping, lengthening was associated with more pain following THA. Harris Hip Scores were not significantly affected.



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10) Hip Fracture Management: ORIF vs. THA

1. Orthopaedic Knowledge Update 5, Chapter 25: Arthroplasty Management of Hip Fractures: Hemiarthroplasty Versus Total Hip Arthroplasty—Results and Complications, Pages 313-321

2. Okike K, Udogwu UN, Isaac M, Sprague S, Swiontkowski MF, Bhandari M, et al. Not All Garden-I and II Femoral Neck Fractures in the Elderly Should Be Fixed: Effect of Posterior Tilt on Rates of Subsequent Arthroplasty. *J Bone Joint Surg Am* 2019;101:1852–9. <https://doi.org/10.2106/JBJS.18.01256>.

Outcomes after fixation of Garden I and II FN fractures have not been uniformly positive, with the rates of revision surgery ranging from 8% to 27%. Complications after fixation of nondisplaced FN fractures include nonunion, fixation failure, osteonecrosis, and femoral shortening causing inferior hip function. For these reasons, arthroplasty is increasingly considered a viable option in the treatment of these fractures, especially in the presence of factors that predispose to failure after fixation

3. Hopley C, Stengel D, Ekkernkamp A, Wich M. Primary total hip arthroplasty versus hemiarthroplasty for displaced intracapsular hip fractures in older patients: systematic review. *BMJ* 2010;340:c2332. <https://doi.org/10.1136/bmj.c2332>.

Systematic review and meta-analysis of 15 RCTs including 1890 patients comparing outcomes of hip hemiarthroplasty versus total hip arthroplasty for femoral neck fractures. Single stage total hip arthroplasty may lead to lower reoperation rates and better functional outcomes compared with hemiarthroplasty in older patients with displaced femoral neck fractures.

4. Dolatowski FC, Frihagen F, Bartels S, Opland V, Šaltytė Benth J, Talsnes O, et al. Screw Fixation Versus Hemiarthroplasty for Nondisplaced Femoral Neck Fractures in Elderly Patients: A Multicenter Randomized Controlled Trial. *J Bone Joint Surg Am* 2019;101:136–44. <https://doi.org/10.2106/JBJS.18.00316>

In this multicenter RCT, hemiarthroplasty was not found to be superior to screw fixation in reestablishing hip function as measured by the HHS (the primary outcome). However, hemiarthroplasty led to improved mobility and fewer major reoperations. The findings suggest that certain elderly patients with a nondisplaced femoral neck fracture may benefit from being treated with a latest-generation hemiarthroplasty rather than screw fixation.

5. Afaq S, O’Hara NN, Schemitsch EH, Bzovsky S, Sprague S, Poolman RW, et al. Arthroplasty Versus Internal Fixation for the Treatment of Undisplaced Femoral Neck Fractures: A Retrospective Cohort Study. *J Orthop Trauma* 2020;34 Suppl 3:S9–14. <https://doi.org/10.1097/BOT.0000000000001940>.

A retrospective cohort study that included over 2000 patients suggested that arthroplasty for a FNF may reduce the risk of mortality and reoperation at 24 months compared with internal fixation of undisplaced fractures. This finding is counter to many current surgical practices but consistent with a mounting body of evidence. Before widespread adoption of arthroplasty for undisplaced fractures, these results should be confirmed in a definitive comparative trial.

6. Videos

- <https://www.vumedi.com/video/optimal-management-of-the-displaced-femoral-neck-fractures-in-the-elderly/>



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11) Hip Instability, Diagnosis and Management

1. Orthopaedic Knowledge Update 5, Chapter 1: Imaging of the Hip and Knee for Primary and Revision Arthroplasty
2. Advanced Reconstruction Hip 2, Chapter 7: Primary Total Hip Arthroplasty: Preoperative Planning and Templating
3. JBJS Rev. 2016 May 17;4(5):01874474-201605000-00001. PMID: 27490215
4. J Bone Joint Surg Am. 2013 Sep 18;95(18):e133. PMID: 24048564
5. J Bone Joint Surg Am. 2017. PMID: 29206797

12) Failed MOM and Corrosion in THA: Diagnosis, Workup, Management

1. Orthopaedic Knowledge Update 5, Chapter 35: Complications of Total Hip Arthroplasty
2. Advanced Reconstruction Hip 2, Chapter 40: Revision Total Hip Arthroplasty: Indications and Contraindications
3. J Bone Joint Surg Am. 2014. PMID: 24382732
4. J Bone Joint Surg Am. 2021 Jan 7 PMID: 33411461
5. J Bone Joint Surg Am. 2013 Nov 6;95(21):e163. PMID: 24196475

13) Fixation and Stem Design: Cemented vs. Cementless Hip

1. Orthopaedic Knowledge Update 5, Chapter 30: Primary Total Hip Arthroplasty
2. JAAOS 2019 Feb 15;27(4):119-127 - PMID 30531379
3. JAAOS 2020 Jul 15;28(14):586-594 PMID 32692094
4. CORR. 2018 Jul;476(7):1428-1437 PMID 29683803 & 32271174
5. CORR. 2013 Nov;471(11):3588-95. PMID 23873609
6. BJJ 2017 Jan;99-B(1 Supple A):50-59. PMID 28042119



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Suggested Reading: HIP TOPICS

14) Workup and Management of Painful THA

1. Orthopaedic Knowledge Update 5, Chapter 35: Complications of Total Hip Arthroplasty
2. JOA. 2020 Jul 2;S0883-5403(20)30801-9. PMID 32778414
3. JOA. 2019 May;34(5):912-919 PMID 30773357
4. JAAOS 2018 Oct 15;26(20):717-72 PMID 30138292
5. Int Orthop. 2013 Jan;37(1):1-7. PMID 23180100
6. JOA. 2019 Sep;34(9):2184-2191. PMID 31147246

15) Hip Arthrodesis and Resurfacing: Indications, Conversions, Outcomes

1. Orthopaedic Knowledge Update 5, Chapter 27: Alternatives to Conventional Total Hip Arthroplasty for Osteoarthritis
Osteotomies and resurfacing are covered in this chapter, but not arthrodesis.
2. JAAOS 2010 May;18(5):306-14. PMID: 20435881
3. JAAOS. 2011 Dec;19(12):737-45 PMID: 22134206
4. JOA 2013 Oct;28(9):1596-602. PMID: 23523503



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Suggested Reading: HIP TOPICS

16) Hip Biomechanics, Imaging, THA Indications and Templating

1. Advanced Reconstruction Hip 2, Chapter 1: Primary Total Hip Arthroplasty: Posterolateral Approach and Extensile Methods. Matthew P. Abdel, MD.
2. Advanced Reconstruction Hip 2, Chapter 29: Total Hip Arthroplasty: Inflammatory Arthritis and Other Conditions Affecting Bone Quality. Michael E. Berend, MD.
3. Advanced Reconstruction Hip 2, Chapter 61: Femoral Revision: Impaction Bone Grafting and Cement. Andrew J. Timperley, MD (UK); Jonathan R. Howell, MD (UK).
4. Della Valle AG, Padgett DE, Salvati EA. Preoperative Planning for Primary Total Hip Arthroplasty. *Journal of the American Academy of Orthopaedic Surgeons*. 2005;13(7):455–462. PMID: 16272270
5. Iorio R, Siegel J, Specht LM, Tilzey JF, Hartman A, Healy WL. A comparison of acetate vs digital templating for preoperative planning of total hip arthroplasty: is digital templating accurate and safe? *J Arthroplasty*. 2009 Feb;24(2):175-9. doi: 10.1016/j.arth.2007.11.019. Epub 2008 Mar 28. PMID: 18534425.
6. Maloney WJ, Keeney JA. Leg length discrepancy after total hip arthroplasty. *J Arthroplasty*. 2004 Jun;19(4 Suppl 1):108-10. doi: 10.1016/j.arth.2004.02.018. PMID: 15190563.
7. Videos:
 - Preoperative Planning and Templating in THA
<https://www.vumedi.com/video/preoperative-planning-and-templating-in-tha/>



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17) Non-Arthroplasty Management of the Hip:

Workup and Management—Arthroscopy, Surgical Dislocation, Osteotomy

1. Advanced Reconstruction Hip 2, Chapter 52: Acetabular Revision: Triflange Cups. Jason M. Jennings, MD, DPT; Raymond H. Kim, MD; Douglas A. Dennis, MD.
2. Advanced Reconstruction Hip 2, Chapter 53: Acetabular Revision With Cup-Cage Constructs. James A. Browne, MD; David G. Lewallen, MD.
3. Advanced Reconstruction Hip 2, Chapter 54: Pelvic Discontinuity Femur. Jeremy M. Gililland, MD; Robert B. Jones, MD; Christopher E. Pelt, MD; Christopher L. Peters, MD.
4. Advanced Reconstruction Hip 2, Chapter 55: Femoral Revision: Overview and Strategy. John J. Callaghan, MD.
5. Draovitch P, Edelstein J, Kelly BT. The layer concept: utilization in determining the pain generators, pathology and how structure determines treatment. *Curr Rev Musculoskelet Med.* 2012 Mar;5(1):1-8. doi: 10.1007/s12178-011-9105-8. PMID: 22371303
6. Tannast M, Siebenrock KA, Anderson SE. Femoroacetabular impingement: radiographic diagnosis--what the radiologist should know. *AJR Am J Roentgenol.* 2007 Jun;188(6):1540-52. doi: 10.2214/AJR.06.0921. PMID: 17515374.
7. Philippon MJ, Stubbs AJ, Schenker ML, Maxwell RB, Ganz R, Leunig M. Arthroscopic management of femoroacetabular impingement: osteoplasty technique and literature review. *Am J Sports Med.* 2007 Sep;35(9):1571-80. doi: 10.1177/0363546507300258. Epub 2007 Apr 9. PMID: 17420508.
8. Steppacher SD, Anwander H, Zurmühle CA, Tannast M, Siebenrock KA. Eighty percent of patients with surgical hip dislocation for femoroacetabular impingement have a good clinical result without osteoarthritis progression at 10 years. *Clin Orthop Relat Res.* 2015 Apr;473(4):1333-41. doi: 10.1007/s11999-014-4025-8. PMID: 25367110
9. Siebenrock KA, Schaller C, Tannast M, Keel M, Büchler L. Anteverting periacetabular osteotomy for symptomatic acetabular retroversion: results at ten years. *J Bone Joint Surg Am.* 2014 Nov 5;96(21):1785-92. doi: 10.2106/JBJS.M.00842. PMID: 25378505.
10. Ganz R, Huff TW, Leunig M. Extended retinacular soft-tissue flap for intra-articular hip surgery: surgical technique, indications, and results of application. *Instr Course Lect.* 2009;58:241-55. PMID: 19385538.
11. Videos:
 - Hip Preservation Current Concepts and Decision Making – Preservation vs. Arthroplasty
<https://aahkszoom.s3.amazonaws.com/Focal/FOCAL+Session+13+-+Utah+Dr.+Peters.mp4>
 - Hip Preservations Surgery
<https://aahkszoom.s3.amazonaws.com/Focal/FOCAL+Session+16+-+Mayo+Dr.+Sierra.mp4>



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18) DDH in THA: Diagnosis, Classification and Management

—Sub-troch Osteotomy Indications and Technique

1. Advanced Reconstruction Hip 2, Chapter 56: Femoral Revision: Component Removal
2. Advanced Reconstruction Hip 2, Chapter 77: Hip Dysplasia
3. Crowe JF, Mani VJ, Ranawat CS. Total hip replacement in congenital dislocation and dysplasia of the hip. *J Bone Joint Surg Am.* 1979 Jan;61(1):15-23. PMID: 365863.
4. Zhu J, Fernando ND. Classifications in Brief: The Hartofilakidis Classification of Developmental Dysplasia of the Hip. *Clin Orthop Relat Res.* 2020 Jan;478(1):189-194. PMID: 31135539
5. Mendes DG, Said MS, Aslan K. Classification of adult congenital hip dysplasia for total hip arthroplasty. *Orthopedics.* 1996 Oct;19(10):881-7. PMID: 8905863
6. Krych AJ, Howard JL, Trousdale RT, Cabanela ME, Berry DJ. Total hip arthroplasty with shortening subtrochanteric osteotomy in Crowe type-IV developmental dysplasia. *J Bone Joint Surg Am.* 2009 Sep;91(9):2213-21. PMID: 19723999.
7. Greber EM, Pelt CE, Gililand JM, Anderson MB, Erickson JA, Peters CL. Challenges in Total Hip Arthroplasty in the Setting of Developmental Dysplasia of the Hip. *J Arthroplasty.* 2017 Sep;32(9S):S38-S44. Epub 2017 Feb 22. PMID: 28291651.
8. Videos:
 - Challenging Primary THA: Developmental Dysplasia of the Hip
<https://www.vumedi.com/video/challenging-primary-tha-developmental-dysplasia-of-the-hip/>



Adult Reconstruction Fellowship Guidelines

Approved March 2022 by AAHKS, THS, and TKS.

Suggested Reading: HIP TOPICS

19) THA Acetabular Revision: Bone Loss Classification & Management

1. Advanced Reconstruction Hip 2, Chapter 92: Acetabular Reconstruction—Classification of Bone Defects and Treatment options
2. D'Antonio JA, Capello WN, Borden LS, Bargar WL, Bierbaum BF, Boettcher WG, Steinberg ME, Stulberg SD, Wedge JH. Classification and management of acetabular abnormalities in total hip arthroplasty. Clin Orthop Relat Res. 1989 Jun;(243):126-37. PMID: 2721052
3. Paprosky WG, Perona PG, Lawrence JM. Acetabular defect classification and surgical reconstruction in revision arthroplasty. A 6-year follow-up evaluation. J Arthroplasty. 1994 Feb;9(1):33-44. PMID: 8163974.
4. Sporer SM, Paprosky WG, O'Rourke MR. Managing bone loss in acetabular revision. Instr Course Lect. 2006;55:287-97. PMID: 16958464.
5. Sheth NP, Nelson CL, Springer BD, Fehring TK, Paprosky WG. Acetabular bone loss in revision total hip arthroplasty: evaluation and management. J Am Acad Orthop Surg. 2013 Mar;21(3):128-39. PMID: 23457063.
6. Videos:
 - Acetabular Bone Loss
<https://aahkszoom.s3.amazonaws.com/Focal/FOCAL-4-acetabular-bone-loss.mp4>