



ICL Technical Skills Moderator Instructions

What is a Technical Skills Instructional Course Lecture and how does it work?

This one-hour, technique-focused session uses **high-quality, fully edited videos** to demonstrate positioning, approach, and step-by-step technical techniques. Each video segment should be approximately **10 minutes**, followed by discussion of technical pearls, pitfalls, and key takeaways. **Four to five topics per session are suggested.**

Technical Skills ICLs work well for demonstrating individual procedures or breaking a more complex operation into multiple technical components.

Faculty Limit: 4 total — 1 moderator + up to 3 faculty.

Required Material: A fully edited **10-minute technical skills video** is required for each topic and must be submitted by the designated deadline. A traditional literature handout is not required.

Your Role as Moderator

As moderator, you are responsible for coordinating the session, communicating with your faculty, and ensuring the course provides a cohesive, practical, and technique-focused educational experience.

Before the Annual Meeting

- Communicate with your faculty and ensure everyone understands the Technical Skills format, assigned topic, and time allotment.
- Coordinate topics to create a cohesive course and avoid unnecessary overlap or redundancy.
- Ensure each topic focuses on practical, step-by-step technical instruction.
- Confirm faculty are preparing their required **fully edited 10-minute videos** by the designated deadline.
- Review session content for balance, bias, and commercialism.

- Ensure presentations support the course learning objectives and incorporate evidence-based information when appropriate.
- Develop a session outline that allows sufficient time for video presentations, faculty discussion, and audience engagement.

Technical Skills Video Requirement

A **fully edited technical skills video is mandatory** for this course format.

Videos should:

- Be approximately **10 minutes in length**.
- Demonstrate positioning, approach, and/or step-by-step technical techniques.
- Be fully edited and ready for presentation.
- Focus on practical instruction, including relevant pearls and pitfalls.
- Be supplemented with slides when necessary to support the educational content.

The submitted videos will also be made available to attendees as course materials.

A traditional literature handout is **optional** for Technical Skills ICLs.

Detailed **video specifications, submission instructions, review requirements, and deadlines** will be provided separately.

*Please see below for handout samples!

During Your Session

The moderator leads the overall session and helps connect the technical demonstrations with meaningful faculty and audience discussion.

1. Introduce the Session

Welcome attendees, briefly introduce the course topic and faculty, and explain the Technical Skills format.

2. Present the Technical Skills Videos

Guide the course through each planned technical topic and video demonstration.

3. Discuss Pearls & Pitfalls

Following each video, facilitate discussion of important technical considerations, pearls, pitfalls, and alternative approaches.

4. Engage the Audience

Encourage questions and discussion throughout the course when appropriate.

5. Keep the Session on Schedule

Manage transitions and discussion time so all planned topics can be completed within the allotted **60 minutes**.

Maintaining Balance & Managing Disclosures

As moderator, you are responsible for helping ensure the session remains **fair, balanced, evidence-based, and free of commercial bias**.

- Be alert to bias or commercialism from both faculty and participants.
- Avoid promotion of a specific company's product, device, or treatment.
- When discussing products or treatment options, encourage balanced consideration of available alternatives.
- Clearly identify emerging or new content that is not yet supported by established evidence.
- Address potential conflicts or bias during the discussion when necessary.

Faculty disclosures will be displayed at the start of the session. If a disclosure does not display properly, direct attendees to the disclosure information available through AAOS Annual Meeting resources.

Day-of Reminders

- Arrive early and confirm your faculty are present and prepared.
- Ensure all required videos are ready for presentation.
- Keep video presentations and discussions within their assigned time limits.
- Facilitate discussion of practical pearls, pitfalls, and technical considerations.
- Encourage audience questions and participation.
- Keep discussion focused on the course objectives and educational content.
- Ensure the session concludes within the allotted **60 minutes**.

Questions?

For questions regarding your Technical Skills ICL, please contact the AAOS Education team.

Taylor Scott

Education Coordinator

tscott@aaos.org

(847) 384-4244

April Holmes

Director, Live Events Education

holmes@aaos.org

(847) 384-4189

ICL Technical Skills Handout Sample

This course should be focused on positioning, approach, and step by step technical tips in an edited 10-minute video. Video must not be branded by or have logos and/or content in it from industry or an ineligible company (commercial entity).

- Video Sample:
<https://vimeo.com/1231679890/254f43577e?share=copy&fl=sv&fe=ci>
- PDF Sample to accompany video (optional):

Tips and Tricks to Save You During Revision TKAs: Video-Based Demonstrations

Instructional Course Lecture #141

Cones or Sleeves to Manage Metaphyseal Bone Loss and Optimize Fixation

Matthew P. Abdel, M.D.

Andrew A. and Mary S. Sugg Professor of Orthopedic Surgery

Mayo Clinic

Rochester, Minnesota, USA

The two primary goals of bone defect management during revision total knee arthroplasty (TKA) include:

- Providing a proper foundation for prosthetic support and position
- Adequate adjunctive fixation for prosthesis durability

In general, ***small to moderate bone defects*** can be managed with use of morselled cancellous bone filling, use of bone cement with or without screws, and small metal augments attached to the prosthesis ¹⁻⁴.

Beyond the treatment of these minor defects, there are three primary methods of treating more extensive or ***severe bone defects*** of the tibia and/or femur:

- Impaction cancellous bone grafting⁵
- Structural bone allograft technique ⁶⁻¹⁰
- Metaphyseal fixation devices (cones and sleeves) ¹¹⁻¹⁴

NOTES

Treatment of bone loss during revision TKA has evolved considerably over the past decade, primarily due to the emergence and rapid adoption of metaphyseal fixation devices. Currently, use of structural allografts and impaction cancellous allografting for moderate to severe bone defects is performed less often.

In general, there are two basic categories of metaphyseal fixation devices:

- Porous coated solid sleeves that are unitized/attached to an intended implant stem
- Highly porous cones that are implanted into the metaphyseal region separate from the intended final implant

Bone defects of the femur and tibia (types 1, 2A, 2B and 3) have previously been classified by Engh et al ⁹. Although this defect classification has previously provided some usefulness for comparison of reported series, the character and extent of bone lesions has changed considerably over the past few decades. With the adoption of metaphyseal fixation devices, there is a need for newer classifications that will facilitate treatment choices with these devices¹¹. It is primarily Engh type 2B defects that remain problematic,

as the variability and magnitude of bone lesions within this subtype represents a majority of more severe bone defects that require different methods of reconstruction.

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The following Venn diagram demonstrates the severity of bone lesions, their classification according to Engh et al ⁹, and the use of available reconstructive techniques for treatment of these bone defects.

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Recently, innovations in highly porous cones with three-dimensional (3-D) printing of implants have been promising¹⁵⁻¹⁷. This new system is based on an intramedullary milling system that provides precise bone preparation. These cones are unlinked to a specific prosthesis and like the tantalum cones, are inserted independent of the prosthesis being used. Given the available shapes and sizes, these can be used with smaller and larger bone defects.

Metaphyseal fixation, in the form of sleeves and cones, has shown good mid-term results with survivorship free from re-revision for any reason 78%-91%¹⁸⁻²², and survivorship free from aseptic loosening ranging from 93-100%^{23, 24}. In the context of two stage septic TKA revisions, metaphyseal sleeves have shown excellent mid-term results with survivorship free from re-revision for any reason of 84% and survivorship for aseptic loosening of 100% at 5.3 years²⁵.

For the vast majority of revision TKAs with associated bone loss, it is advisable to use adjunctive stem fixation. Although it remains controversial, prior to the use of metaphyseal fixation devices, cemented stem fixation provided a more durable construct with increasing severity of metaphyseal bone loss²⁶⁻³¹. Although this remains somewhat true, we have transitioned to shorter cemented stems when utilizing a metaphyseal cone.

NOTES

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Tips and Tricks to Save You During Revision TKAs: Video-Based Demonstrations

Instructional Course Lecture #141

Extensor Mechanism Disruptions: A Synthetic Mesh Reconstruction

Matthew P. Abdel, M.D.

Andrew A. and Mary S. Sugg Professor of Orthopedic Surgery

Mayo Clinic

Rochester, Minnesota, USA

Problem

- Extensor mechanism failure is one of the most debilitating complications after TKA with a substantial compromise in function for patients
- Incidence of extensor mechanism rupture is up to 3%

Reconstruction options

- Primary extensor mechanism repair
 - ♣ Only for acute ruptures
 - ♣ Otherwise poor results
- Autograft
 - ♣ Options: Hamstring tendon, quadriceps turndown, fascia lata
 - ♣ Limited use in chronic setting
- Allograft
 - ♣ Options: Achilles tendon, fascia lata, whole extensor mechanisms
 - ♣ High rate of mechanical failure, infection, poor functional results, inconsistent results

Synthetic reconstruction with polypropylene mesh

- Advantages:
 - ♣ High primary mechanical stability
 - ♣ No remodeling with subsequent weakening of reconstruction in remodeling phase
 - ♣ Elongation not possible

- ♣ No tibial osseous ingrowth required
- ♣ Standardized product, no variability as in allografts
- ♣ Augmentation of remaining host tissue possible, complete excision not obligatory
- ♣ Straight-forward operating technique
- In summary, these advantages allow for high primary stability and reproducible results

NOTES

Surgical Technique

- Depending upon the location of the extensor mechanism disruption, the choice of how to perform the arthrotomy is critical
- Patellar tendon disruption:
 - o In these patients, the distal tissue is often thin and redundant.
 - o Midline division of this tissue to create equal medial and lateral tissue flaps up to the inferior pole of the patella is important for eventual wound closure and distal coverage of the mesh
- Quadriceps tendon disruption
 - o In these patients the medial and lateral halves of the quadriceps are usually retracted proximally, and to their respective sides
 - o The arthrotomy in these circumstances should be performed adjacent to the medial edge of the vastus lateralis to maximize the amount of tissue that remains attached to the vastus medialis muscle
 - o This is very helpful for eventual distal and lateral translation of the vastus medialis at final closure
- If the patella is absent, simply extending the arthrotomy in the midline is performed, otherwise a standard medial parapatellar arthrotomy is performed
- If the patella is present, distal extension of a parapatellar arthrotomy is performed otherwise the arthrotomy is carried in the midline down to the tibial tubercle

- Important Note: Do not resect any redundant tissue, particularly distally, as often this tissue is required for arthrotomy closure and coverage of the mesh
 - Determination is made as to whether the tibial and femoral components require revision or whether a tibial liner exchange will confer adequate joint stability
 - If the tibial component is retained, the technique for distal stabilization of the mesh is performed by the creation of a proximal tibial window using a high speed burr
 - The mesh is inserted into the tibial window with bone cement and transfixed into either the lateral or medial tibia with a cancellous bone screw
 - If the tibial component is revised, the mesh is inserted into the medullary canal simultaneously with implantation of the new tibial component
 - As most cases are chronic, extensile proximal exposure of the quadriceps mechanism is required to release scar on both the ventral and dorsal aspects of the vastus medialis and vastus lateralis. Usually the vastus lateralis does not retract as much as the vastus medialis which can retract a surprisingly long distance.
 - The vastus lateralis is then drawn as far distally as possible so that the mesh can be delivered from inside out through a small portal and secured with several non-absorbable sutures.
 - The mesh is then securely attached to the ventral surface of the vastus lateralis with either multiple interrupted sutures, a running Krackow suture, or both
 - The vastus medialis is now advanced distally and laterally over the mesh in a pants-over-vest method
 - It is important to make sure the mesh is entirely covered by the vastus medialis so that the mesh does not wick blood and joint fluid into the subcutaneous tissue plane
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- At some point in the distal closure, redundant tissue from the medial or lateral tissues should be placed between the mesh and the tibial component so that the mesh is not in direct contact with the prosthesis
 - Occasionally, this is done with a free tissue flap harvested from the fibrous tissue in the suprapatellar region of the knee joint.
 - Multiple #5 and #1 non-absorbable sutures are passed through the vastus medialis and mesh so that every suture incorporates mesh
 - Typically, advancement and closure of the vastus medialis is performed from distal to proximal so that several deep drains can be inserted prior to final proximal closure.

- After closure, the knee joint typically has only 30 to 40° of flexion present, although this should not be tested
- The subcutaneous tissues and skin are closed in usual fashion and the limb is placed in a bulky Robert Jones cotton compression dressing with a posterior plaster slab

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Postoperative Care

- At 48 hours, the wound is evaluated and the leg is placed in a long leg cast incorporating the foot with the knee flexed to 5°
- In extremely obese patients, a custom bivalved thigh-leg-foot orthosis is used and it is most helpful to have this fitted preoperatively
- The cast is changed and sutures removed at 2 to 3 weeks. Total casting time is 12 weeks.
- At 3 months, the cast is removed and the limb is placed in a hinged knee brace full time for an additional 3 months. The patient is allowed to do only active gravity flexion exercises in the brace which is adjusted monthly at 45° for first month, 60° for second month, and 90° for third month. The patient is allowed to weight bear during this time with the brace locked at 0°.
- During this time, and after brace removal, it is recommended that the patient use an ambulatory aid such as a cane or walking stick to help prevent a fall that hyperflexes the knee and disrupts the extensor mechanism reconstruction

NOTES

Results of polypropylene mesh

Article	Methods	Results
Browne et al. <i>JBJS</i> . 2011	• N=13 • Follow-up: 42 months (11-118 months)	• 3 failures in first 6 months (23% failure rate) • Extensor lag: <10° • Flexion: 103° • KSS and FS improved

		significantly ($p<0.01$)
Ichikawa et al. <i>Knee</i> . 2015	• N=9 • Follow-up: 33 months (20-50 months)	• One above knee amputation for infection (11% failure rate) • Extensor lag: 5° • Flexion: 96.25° • ISOLS scores: 21/30
Nodzo et al. <i>The Knee</i> . 2016	• N=7 • Follow-up: 34 months (24-49 months)	• 3 failures (43% failure rate) • Extensor lag: 20° • Flexion: 115° • KSS for function and pain significantly improved
Ormaza et al. <i>Orthopedics</i> . 2017	• N=3 • Follow-up: 19 months	• No complications • Extensor lag: 3.3 degrees • KSS and pain scores improved
Abdel et al. <i>JBJS Am</i> . 2018	• N=77 • Follow-up: 48 months	• At latest follow-up, 84% (65 out of 77) had intact mesh • Extensor lag: 9° • KSS significantly improved ($p<0.001$)
Perry et al. <i>JBJS Am</i> . 2018	• N=16 • Follow-up: 48 months • Patients w/2 stage exchange and	• At 2 years, 86% survivorship free of mesh failure • At 2 years, 87% survivorship free of PJI • Extensor lag: 3°

	polypropylene mesh reconstruction	• KSS improved
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Tips and Tricks to Save You During Revision Total Knee Arthroplasties

Instructional Course Lecture

March 2026

The Deficient Patella

Brian P. Chalmers, M.D.

During most revision TKA, the existing patellar component can be retained.^{2,4,5,17} Indications for patellar revision include:

- Aseptic loosening of the patellar component
- Moderate to severe damage to the patellar component
- Malposition affecting patellar tracking
- Incongruity of patellar articular surface with new femoral trochlea
- Removal required due to presence of active infection

Key Point: Regardless of whether or not the patellar component is revised, a successful clinical outcome for patellar function and long-term durability of the patellar construct is highly dependent on proper axial and rotational positioning of the femoral and tibial components.

If revision of the patellar component is deemed necessary, the vast majority can be revised with standard pegged or biconvex polyethylene patellar components.^{2,3-5,17} However, in approximately 10-15 % of cases, patellar bone stock is insufficient enough that alternative treatment strategies are required. Severe patellar bone deficiency, ie. < 8-10mm of remaining bone, has historically been a difficult problem and has adversely affected clinical outcomes of revision TKA. Over the past several decades, a variety of treatment options have emerged to address patellar bone deficiency during revision TKA.²

Treatment Options for the Bone Deficient Patella

1. ***Patellectomy.*** This treatment option should be avoided in revision TKA unless it is necessary for treatment of a necrotic and infected patella.
2. ***Patellar Resection Arthroplasty.*** Historically, simple removal of the patellar component, known as patellar resection arthroplasty or patelloplasty, was an easy and often used option.¹⁰ Unfortunately, the clinical outcomes of this approach are inferior to other available treatment approaches.^{1,3,13,17} Typically, at mid-term follow-up, these patellar remnants fragment and sublux laterally over the lateral femoral trochlea.¹³ In an ex-vivo study, it was clearly shown that reconstruction of the normal anteroposterior patellar height optimizes patellar kinematics and quadriceps extensor forces.¹¹ Currently, the only time patellar resection arthroplasty is preferred is when the soft tissues and capsule are so tight, as in the 2nd stage of reimplantation for infection, that capsular closure is facilitated by avoiding patellar resurfacing.¹²

3. ***Gull-Wing Osteotomy.*** In preference to simple patellar resection arthroplasty, sagittal osteotomy of the remaining patellar shell was described in 4 patients to allow centralization of the patellar fragments within the femoral trochlea.¹⁸ Since that initial description, several studies have reported reasonable clinical outcomes in selected patients wherein the patellar fragments consolidate and remain centralized.^{4,8} However, in one patient, avascular necrosis with fragmentation of the patella occurred at 4 months postoperatively.⁴ The distinct disadvantage of this osteotomy is that anteroposterior height of the patella is not restored.
4. ***Screw and Cement Augmentation.*** In a manner similar to management of small tibial bone defects, use of a screw with cement augmentation has been described for management of selected segmental patellar bone defects.⁶ A similar alternative to this technique uses crossed transcortical K-wires that span the central patellar bone defect which in turn are supportive of the bone cement and implanted all polyethylene patellar component.
5. ***Transcortical Wiring.*** A novel approach, using a standard 3-pegged all polyethylene patellar component has been described.¹⁵ In this series of 28 patients (30 knees), all patellae were <8mm. After preparation of the patellar bony bed, three 24-gauge wires are secured around the 3 pegs of the polyethylene patellar component. These wires are then placed through 3 corresponding holes of the anterior cortex of the patella so that bone cement placed into the interval between the patella and patellar component can be adequately compressed and cured by tension tightening of the wires on the anterior patellar surface. These authors recommend careful contouring and in setting of these wires to a postoperative patellar fracture. The main disadvantage of this technique is that the average patellar construct height was <15mm.
6. ***Small Structural Allograft and Screw.*** This technique describes the fashioning of a small structural allograft to fit into the patellar defect which is then fixed with one or more small cortical screws.¹⁶ A standard all polyethylene is then cemented into this composite.

7. ***Impaction Cancellous Grafting***. A simple surgical procedure in which a tissue flap is secured to the remaining patellar rim or surrounding soft-tissue to contain cancellous bone graft inserted into the patellar bone defect.⁵ This procedure imparts the potential for restoring patellar bone stock, facilitates patellar tracking, restores patellar composite thickness, and improves quadriceps leverage, and is cosmetically appealing. Although originally described in only 9 patients in 2001, this experience has been recently been updated to 93 cases with 96% survivorship at an average of 8 years follow-up.
8. ***Three-Pegged Porous Metal Monoblock Patella***. A recent application of this 3-D printed titanium component has been to prepare a flat dorsal surface as is best possible, and then prepare three holes into the anterior cortex of the patellar remnant to receive the patellar fixation lugs. (private communication, Victor Krebs, 2016). In most cases these fixation lugs protrude through the anterior cortex by several millimeters. In general, this approach produces an anterior patellofemoral height of less than 20mm.
9. ***Porous Metal Augmentation Baseplate***. This component was designed to specifically address severe patellar bone loss and correspondingly reconstruct the anteroposterior patellar height.⁷ The dome-shaped porous metal baseplate is opposed to a prepared patellar shell and sewn with interrupted sutures into extensor mechanism and surrounding soft tissues. A polyethylene component then cemented onto baseplate. Benefits include good reconstitution of patellar composite thickness. Pole fractures have been observed in some cases at early clinical follow-up.⁷ Although original investigators attempted to utilize this into soft tissue only⁹, these authors and others have emphasized the need for adequate patellar bone stock when using this implant.¹⁴ The primary disadvantage of this implant is cost.⁴

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Tips and Tricks to Save You During Revision Total Knee Arthroplasties

Instructional Course Lecture

March

2026 **Optimizing**

Stem Fixation

Brian P.
Chalmers, M.D.

Historically, the primary purpose of stems during revision TKR was to offload and reduce interface stresses of damaged bone in the distal femur or proximal tibia, bypass bone defects, provide additional prosthetic surface for fixation and long-term durability, as well as facilitate overall mechanical alignment. With the advent and increased utilization of metaphyseal biological fixation, the role of stems and indications for cemented or cementless stems has changed significantly.

When deciding whether stems should be cemented or press-fit, it is clear that there is not a simple answer as there are clear advantages and disadvantages of each approach and the distinction between these options has been minimized when used with concomitant metaphyseal fixation (ie. metaphyseal sleeves or cones).

Cementless Stems. Diaphyseal filling stems are helpful in establishing overall limb alignment in most cases and are also easier to remove if necessary. Some canal deformities cannot be accommodated easily with cementless systems and in some circumstances may cause limb malalignment. Cementless stems provide initial stress bypass but provide very little long-term fixation and have more potential for end-of-stem pain. In general, the indications for cementless stems are the presence of good diaphyseal bone with a canal geometry that allows press-fit stems. When there is moderate metaphyseal bone loss, the concomitant use of metaphyseal sleeves is suggested.

Cemented Stems. These stems do offload stresses and provide excellent long-term fixation. The technique of cementing stems allows for more latitude in accommodating canal deformities but due to the lack of canal filling have more potential for limb malalignment. If removal is required,²

removal is usually more difficult and associated with more bone loss than with cementless stems. Cementing short or longer stems designed for cementation (smooth and tapered), facilitates easier removal. Cemented stems are ideal for large diaphyses and canals that do not accommodate a pressfit stem and under these circumstances can be combined with impaction grafting of the canal with associated cementation. In general, the shortest stem deemed appropriate should be used when cementing.

Technical Tips and Caveats

1. When using cemented stems, do not cement stems that have been designed for cementless application as this markedly complicates implant extraction when necessary. Rather, the use of tapered straight stems designed for cementation facilitates stem removal.
2. When using cementless stems with metaphyseal cementation, avoid the use of cement above the level of stem curvature or stem offset and couplers as this also markedly complicates implant removal.

Historically, the choice between the use of stem type has been due to training philosophy and the implant design being used although it is clear that there is a literature bias to use cemented stems in more difficult cases. As such, it has been extremely difficult to prove superiority with either construct. Currently, the use of biologic metaphyseal fixation is recommended for revision knee replacements with moderate or severe bone loss and the choice of whether to use cementless or cemented stem fixation remains highly dependent upon prosthesis choice and training philosophy.³

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Exposures in Revision Total Knee Arthroplasty

Tips and Tricks to Save You During Revision Total Knee
Arthroplasties: Video-Based Demonstrations

AAOS Annual
Meeting 2026

R. Michael Meneghini, MD
CEO - Indiana Joint Replacement
Institute Professor of Clinical Orthopaedic
Surgery Indiana University School of
Medicine

Key principles of exposure in revision total knee arthroplasty (TKA):

- ☐ Skin incisions
- ☐ **Protect extensor mechanism**
- ☐ Adequate osseous exposure
- ☐ Progression from simple to complex

Several reasons can lead to increased case complexity:

- ☐ Arthrofibrosis
- ☐ Patella infera
- ☐ Reimplantation
- ☐ Severe Deformity
- ☐ Obesity / large muscular males
- ☐ Osteoporotic bone

Surgical Exposures

Quadriceps snip [1]

- Apex extension of arthrotomy
- Oblique proximal/lateral
- Patella eversion/ knee flexion
- Usual capsular repair / rehab
- Good clinical results:
 - ☐ 10 revisions & 6 primary TKA
 - ☐ HSS scores = 10 excellent
 - ☐ 7° average postop extension loss
 - ☐ no strength difference with contralateral

MCL slide – Can be considered an extension of the standard medial exposure utilizing the continuity of the medial scar and medial collateral ligament continuity. Progress

further around the proximal tibia with gradual external rotation. MCL integrity is typically maintained without the need for a hinge device.

Banana Peel – Described by Hofmann et al and involves peeling the medial patella tendon insertion from the tibial tubercle and is typically combined with a quadriceps snip.[2] The continuity of the extensor mechanism is maintained through the lateral hinge of soft tissue.

- 98 revision TKAs with stemmed components
- Minimum 2-year clinical follow up
- Exposure with banana peel technique combined with quadriceps snip
- No cases of extensor mechanism failure or inability to extend leg fully via telephone call with all patients

Extensile Exposures

V-Y Turndown: Of historical significance only and not commonly used in practice

Medial Femoral Peel [3]

- Usually during reimplantation for infection
- Permits determination of surgical epicondylar axis
- Can be used laterally
- Rehab unaltered

Medial Epicondylar Osteotomy [4]

- Varus & severe flexion deformity
- Good posterior access
- Suture repair of fragment
- Unaltered rehab
- **Beware with osteoporotic** bone or cavitory femoral bone deficiency
- Anatomic repair is difficult
- Anchor sutures through condyle into the intercondylar cement

Tibial Tubercle Osteotomy [5]

- Typical Indications:
 - ❑ Tubercle malposition
 - ❑ Severe patellar ligament contracture

❑ Difficult tibial stem extraction

– Clinical Results:

- ❑ 26 primary/ 110 revision
- ❑ long osseous segment and preserve lateral tissue attachments
- ❑ wire fixation
- ❑ unaltered rehab
- ❑ 2 partial fractures
- ❑ 3 painful wires
- ❑ no nonunions

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Articulating Spacers and Dowels: What Are the Options?

Tips and Tricks to Save You During Revision Total Knee Arthroplasties:

Video-Based Demonstrations

AAOS Annual Meeting

2026

R. Michael Meneghini, MD
CEO - Indiana Joint Replacement
Institute Professor of Clinical Orthopaedic
Surgery Indiana University School of
Medicine

2-Stage Resection Principles

- ☐ Thorough debridement
 - Complete synovectomy
 - Non-viable bone must be removed
 - Must address posterior capsule
 - ALL cement removed
- ☐ Local delivery of high-dose antibiotics
 - Organism directed if able
- ☐ Prepare soft-tissue envelope for subsequent reimplantation
 - Static vs. Articulating

Antibiotic Spacer Types

- ☐ Static versus Articulating Spacers [1]
 - Equivalent infection eradication and complication rates
 - Articulating spacers: > ROM after reimplantation
- ☐ Static spacers may be required in certain situations:
 - Bone, ligament loss
 - extensor mechanism disruption

Articulating Spacer Types: Currently no evidence for one particular type

1. Sterilized CoCr femoral implant / all-poly tibia
2. Abx cement molded femur / all-poly tibia
3. Abx cement molded femur AND tibia
4. Pre-formed antibiotic articulating spacers

High-Dose Antibiotic-Impregnated Cement Intramedullary Dowels

Available evidence suggests about 40% of intramedullary (IM) canals are infected at the time of resection total knee arthroplasty (TKA). Subsequently, standard practice is to place high-dose antibiotic loaded cement dowels in IM canals to assist in eradicating infection.

Study evaluated treatment success rates with and without the use of IM dowels in two-stage reimplantation for infected TKA (*AAHKS Annual Meeting 2018*).

- ☐ 111 consecutive two-stage resection and reimplantation TKAs
- ☐ McPherson's Staging System was used to categorize each patient and use of IM dowels was documented.

- ❑ Clinical success was defined as no repeat resection before reimplantation and no recurrent infection within 6 months of reimplantation

Regardless of spacer type, patients with IM dowels had lower success rates (39%) than without IM dowels (61%) ($p = 0.036$). However, in patients with articulating spacers, higher success rates were observed with IM dowels (93%) compared to without (88%), although not statistically significant. Static spacers with IM dowels had the lowest success rate (56%) presumably due to

these challenging patients being categorized as McPherson Stage III-B/C (chronic infection/poor host). Success rates for all McPherson Stage III-B/C with articulating spacers were 100% for articulating spacers with IM dowels compared to 81% in articulating spacers without dowels ($p=0.172$).

Traditional Indications for Static Spacers (versus articulating spacers):

- Massive Bone Loss
- Extensor mechanism disruption
- Collateral ligament disruption
- Soft tissue compromise

Static Spacer Issues

- ❑ **Must have immobilization**
- ❑ Casting labor and resource intensive
- ❑ Can cause skin breakdown
- ❑ **Can lead to further bone loss due to motion at cement-bone interface**
- ❑ Stresses must be transmitted somewhere

Pre-Formed Articulating Spacers Have Expanded Our Use of Articulating Spacers in Complex Scenarios

- ❑ Conformity provides sagittal plane stability
- ❑ **Preferable interface for motion, rather than at bone implant interface which can cause bone destruction**
- ❑ Our preference in severe bone loss and extensor mechanism disruption

– **Relative indication is intact medial MCL**

”sleeve” References

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2026 AAOS ICL #141

Tips and Tricks to Save You During Revision TKAs: Video-Based Demonstrations

Component Removal: It Is An Art!

Scott M. Sporer, MD

**Professor Orthopaedic
Surgery RUSH University
Medical Center**

- I. Goals of TKA Component Removal
 - A. Preservation of bone stock for upcoming revision TKA
 - B. Avoid fracture
- II. Exposure
 - A. This is not minimally Invasive surgery
 - B. Protect Extensor Mechanism
 - C. Quad Snip, Tibial Tubercle Osteotomy
 - D. Sublux rather than evert patella
 - E. Tibial External rotation
- III. Bone Stock Preservation
 - A. Exposure of bone, cement, prosthesis interfaces
 - B. Tedious prosthesis removal
 - C. Complete interface disruption
 - D. If osteolysis, early revision (x-rays underestimate bone loss)
- IV. TKA Component Removal
 - A. Removal of modular polyethylene liner for better exposure to femoral and tibial component
 - B. Initially divide the prosthesis-cement interface
 - C. Then remove cement under direct vision
- V. Cement Removal

- A. “Divide & Conquer”
 - 1. Divide into small sections before removal
 - 2. Easier to remove cement under tension
- B. Beware of thick cement
 - 1. Thin with high speed burr
 - 2. Then section & remove cement with cement osteotomes

VI. Femoral Component Removal:

- A. Addressing the femoral fixation
 - 1. Pencil tip burrs – best for exposing the periphery
 - 2. Small micro-sagittal saw
 - 3. Reciprocating saw with one-sided thin blade
 - 4. Gigli saw
 - 5. Flexible osteotomes
- B. Addressing the Femoral Notch
 - 1. Curved osteotomes optimal
- C. Addressing the Posterior Femoral Condyles
 - 1. “I always use curved osteotomes” many times, there is posterior femoralcondylar osteolysis that allows easy access
- D. Extractor Device for Femoral Component
 - 1. Many companies have their own extractors and insertors
 - 2. Universal devices available
- E. Femoral Stem and Sleeve Extraction
 - 1. Disengage femoral component from stem
 - 2. Use pencil tip burr to attack the bone-prosthesis interface
 - Know the extent of coating on the device
 - 3. May need to perform a lateral osteotomy
 - 4. Have a distal femoral replacement available

VII. Tibial Component Removal

- A. Curettes – clean interfaces of soft tissue

B. Reciprocating Saw

1. “stay on metal” side of the cement-metal interface to preserve bone
2. For all polyethylene tibial components, can cut across the peg

C. Osteotome

1. Stack osteotomes to help lever out the tibial component

D. Posterolateral corner requires optimal exposure

E. Tibial inserter instrument can help place tibial tray cement under tension

VIII. Patellar Component Removal

A. Saw to cut pegs

B. High speed burr to remove fixation pegs

IX. Special Circumstances

A. Previous hardware – contemporary hardware removal kits available

B. Modularity – need to know the specifics of what you are taking out: sleeves/modular stem trays

C. Recognize designs with grit-blasted trays

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2026 AAOS ICL #141

Tips and Tricks to Save You During Revision TKAs: Video-Based

Demonstrations Non-Articulating Spacers: When and How I

Use Them

**Scott M. Sporer,
M.D. Professor
Orthopaedic Surgery
RUSH University Medical
Center**

- I. Rationale for using non-articulating spacer in first stage of two stage reimplantation
 - A. Avoids exposure of metal
 - B. Avoids bone loss from abrasion from the cement of the articulating spacer against frail bone (from motion)
 - C. Avoids fracture of remaining bone
 - 1. tibial tubercle avulsion
 - 2. tibial or femoral periprosthetic fracture
 - D. “Quiets” inflamed soft tissues (by not allowing motion)
 - E. Can use in cases with massive bone loss
 - F. Can be used in soft tissue management (Rotational flaps, free flaps)
- II. Technique
 - A. Multiple antibiotic beads, Femoral Dowel: Avoid technique that could allow spacer migration and compromise extensor mechanism.
 - B. Average antibiotic dose: 3 grams Vancomycin/3.6 grams Tobramycin (modify if renal insufficiency). Consider type of polymethacrylate (more viscous $\Rightarrow$ greater systemic levels)
 - C. Mix powder into liquid. May require additional monomer.

- D. Construct dowels for femoral and tibial canal:
 - 1. Use beveled nozzle, perform this step before starting case
 - 2. Cement over Steiman pin or RUSH rod
- E. Use leg positioner that allows extension or laminar spreaders to maximize gap between remaining femur and tibia.
- F. Don't run out of cement!! (may require 3-4 packs of cement)
- G. L-Shaped Spacer or Antibiotic Puck

2

- 1. prevents dislocation
- 2. allows space between quad and femur

- H. Close wound while cement is setting with distraction of leg
- I. Immobilizing cast, especially if brace can't control immobilization and in non-compliant patients (another option: external fixator)

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