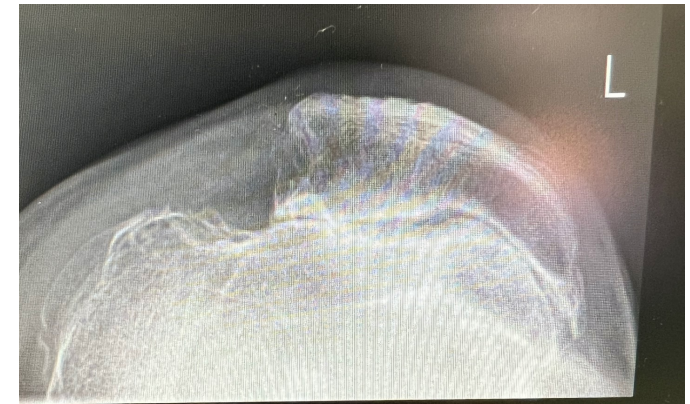
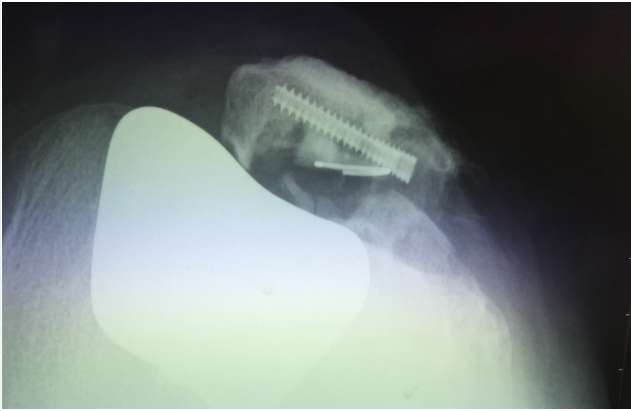


The Challenging Patella in TKR

David A Parker FRACS

Advanced Course on Knee Surgery

Val D'Iserre 2025



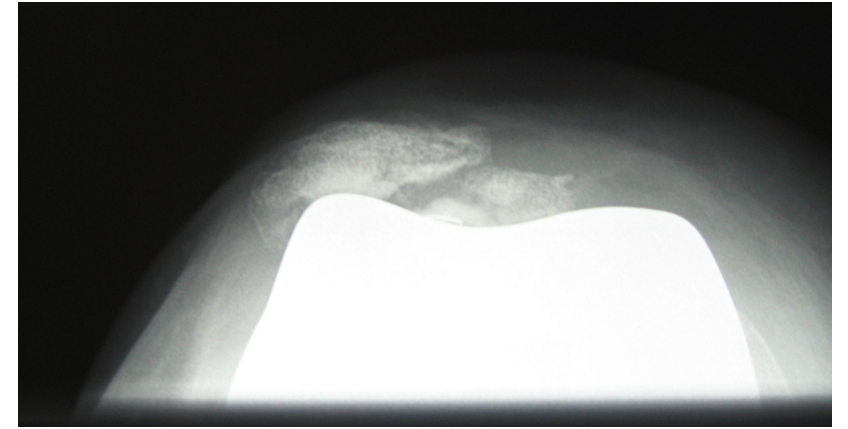
Declaration of Interest

The author has the following disclosures:

- editorial board of: *AJSM, JISAKOS, AP-SMART Journal, OJSM*
- hold shares in: *Personalised Surgery, Ganymed Robotics*
- received royalties from: *Smith & Nephew*
- done consulting work for: *Smith & Nephew*
- given paid presentations for: *Arthrex, Smith & Nephew*
- received institutional support from: *Smith & Nephew, Zimmer, Corin, Arthrex*

The Challenging Patella

- Shape
 - Thin
 - Size (Small)
 - Post traumatic deformity
- Position
 - Baja } Covered
 - Subluxation / Dislocation } Later
- Revision (Bone Loss)



Patellar Complications in TKR

Patellofemoral complications

- Was a main cause for revision
 - *Brick GW, Scott RD. The patellofemoral component of total knee arthroplasty. Clin Orthop. 1988;231:163–178.*
- With improved prosthetic designs and better surgical technique, reoperations for PF complications are becoming less frequent



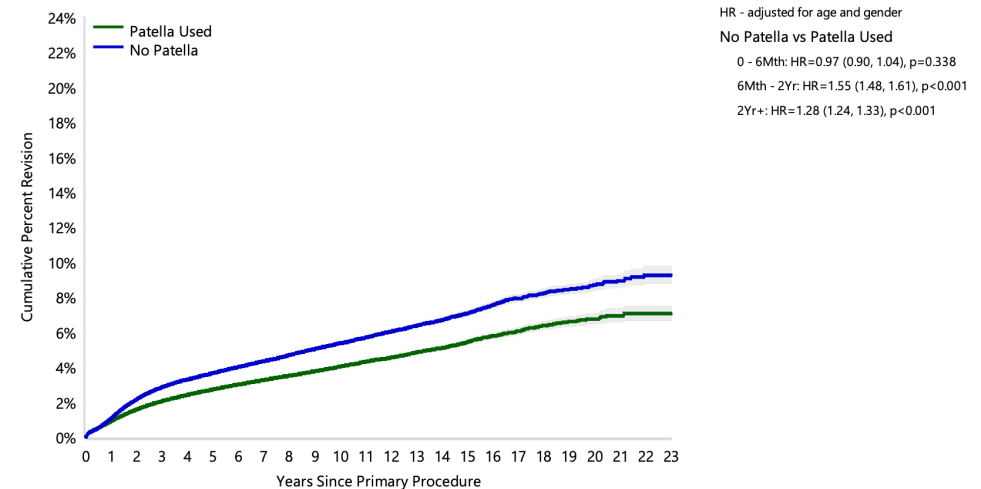
Australian National Joint Registry

Table KT13 Primary Total Knee Replacement by Reason for Revision (Primary Diagnosis OA)

Reason for Revision	Number	Percent
Infection	6740	27.9
Loosening	5134	21.3
Instability	2501	10.4
Pain	1733	7.5
Patella Erosion	1751	7.3
Patellofemoral Pain	1585	6.6
Arthrofibrosis	1343	4.2
Fracture	938	3.9
Malalignment	505	2.1
Wear Tibial Insert	334	1.4
Lysis	275	1.1
Incorrect Sizing	223	0.9
Metal Related Pathology	96	0.4
Other	1233	5.1
TOTAL	24126	100.0

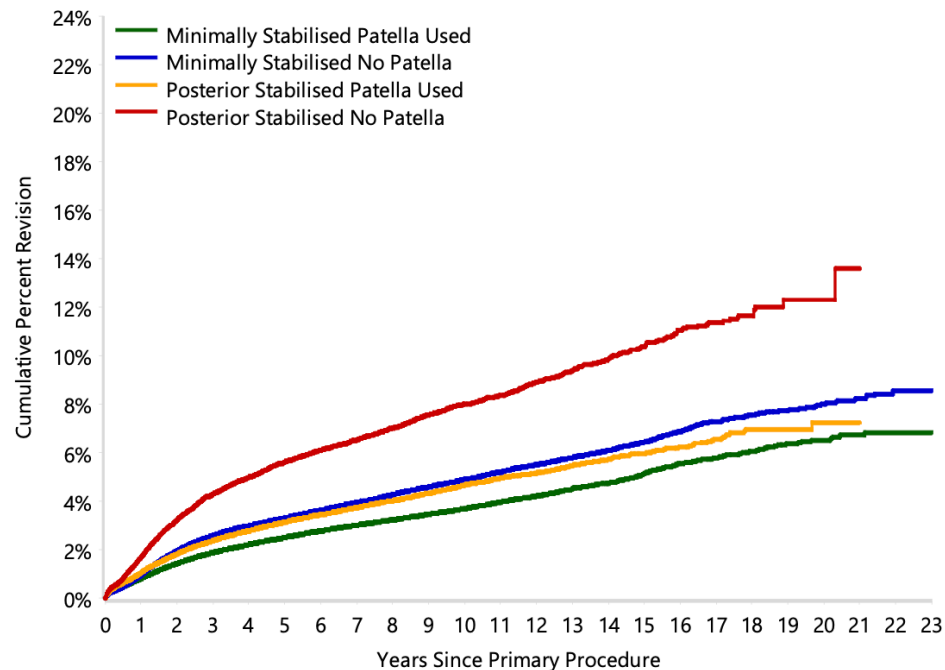
Note: Restricted to modern prostheses

Figure KT31 Cumulative Percent Revision of Primary Total Knee Replacement by Patella Component Usage (Primary Diagnosis OA)



Australian Joint Registry

Figure KT33 Cumulative Percent Revision of Primary Total Knee Replacement by Stability and Patella Component Usage (Primary Diagnosis OA)



HR - adjusted for age and gender

Minimally Stabilised Patella Used
vs Minimally Stabilised No Patella

0 - 3Mth: HR=1.07 (0.98, 1.18), p=0.124

3Mth - 6Mth: HR=0.92 (0.81, 1.04), p=0.183

6Mth - 1.5Yr: HR=0.66 (0.62, 0.70), p<0.001

1.5Yr - 2Yr: HR=0.65 (0.59, 0.71), p<0.001

2Yr - 3.5Yr: HR=0.74 (0.69, 0.79), p<0.001

3.5Yr+: HR=0.84 (0.80, 0.88), p<0.001

Minimally Stabilised Patella Used
vs Posterior Stabilised Patella Used

0 - 6Mth: HR=0.81 (0.75, 0.88), p<0.001

6Mth - 9Mth: HR=0.81 (0.72, 0.92), p<0.001

9Mth - 2.5Yr: HR=0.76 (0.72, 0.80), p<0.001

2.5Yr+: HR=0.85 (0.81, 0.90), p<0.001

Minimally Stabilised No Patella
vs Posterior Stabilised No Patella

Entire Period: HR=0.61 (0.58, 0.64), p<0.001

Posterior Stabilised Patella Used
vs Posterior Stabilised No Patella

Entire Period: HR=0.58 (0.55, 0.61), p<0.001



2019

Patellar complications following total knee arthroplasty: a review of the current literature

Angelos Assiotis¹ · Kendrick To² · Rhidian Morgan-Jones³ · Ioannis P. Pongas⁴ · Wasim Khan²

- Aseptic loosening most common complication
- Fracture
- Instability
- Patellar clunk

Factors Affecting the Risk of Aseptic Patellar Complications in Primary TKA Performed with Cemented All-Polyethylene Patellar Resurfacing

2021

Afton K. Limberg, BS, Meagan E. Tibbo, MD, Matthieu Ollivier, MD, Nattapol Tammachote, MD, MS, Matthew P. Abdel, MD, and Daniel J. Berry, MD

Investigation performed at the Mayo Clinic, Rochester, Minnesota

- 27,192 primary TKR
- 97.3% survivorship free of patella reoperation at 20 years
- Risk factors for any aseptic patellar complication:
 - Male gender
 - Age <65yo
 - BMI > 30
 - Implantation prior to 2000

The Thin Patella / Bone Loss / Defects



ELSEVIER

Contents lists available at [ScienceDirect](#)

The Journal of Arthroplasty

journal homepage: www.arthroplastyjournal.org



2021

Basic Science

Biomechanical Study of Patellar Component Fixation with Varying Degrees of Bone Loss



Cameron M. Beck, MS ^a, Brian I. Nwannunu, MD, MS ^b, Kari J. Teigen, MPH ^c,
Russell A. Wagner, MD ^{a, b, *}

^a Texas College of Osteopathic Medicine, University of North Texas Health Science Center, Fort Worth, TX

^b Department of Orthopaedic Surgery, John Peter Smith Hospital, Fort Worth, TX

^c Office of Clinical Research, John Peter Smith Hospital, Fort Worth, TX

- Cadaveric study
- Cemented all poly patellar components
- Drill holes enlarged to 12mm in experimental group
- No difference in biomechanical shear strength

Primary Resurfacing

- Patella <20mm thickness with 6.2mm button
- versus
- Patella >20mm thickness with 8mm button
- 54 patients each group – matched
- Native thickness restored in each group
- No complications

Original Article

Knee Surg Relat Res 2018;30(2):153-160
<https://doi.org/10.5792/ksrr.17.097>
pISSN 2234-0726 · eISSN 2234-2451

KSRR
Knee Surgery & Related Research

Safety and Efficacy of 6.2 mm Patellar Button in Resurfacing Less than 20 mm Thin Patella: A Matched Pair Analysis

Anoop Jhurani, MD, Piyush Agarwal, MD, Mukesh Aswal, MD, Purvi Saxena, and Nidhi Singh
Department of Orthopedics, Joint Replacement Surgery Research Unit, Fortis Escorts Hospital, Jaipur, India

2018

Primary Resurfacing



Contents lists available at [ScienceDirect](#)

The Journal of Arthroplasty

journal homepage: www.arthroplastyjournal.org



AAHKS Award Paper

AAHKS Surgical Techniques & Technologies Award: Resurfacing the Thin Native Patella: Is It Safe?



Jacob M. Wilson, MD, Mikaela H. Sullivan, MD, Mark W. Pagnano, MD, Robert T. Trousdale, MD*

Department of Orthopedic Surgery, Mayo Clinic, Rochester, Minnesota

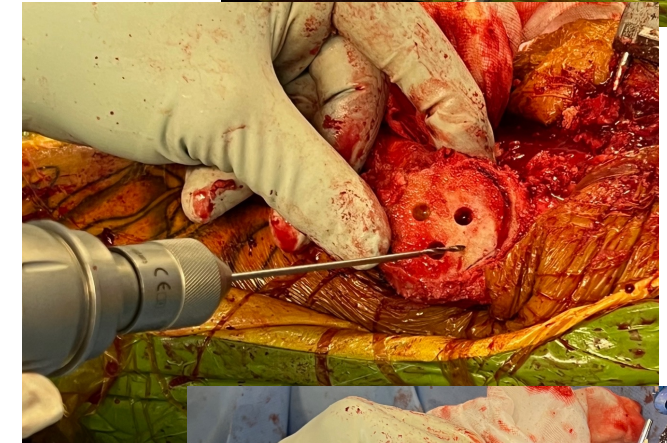
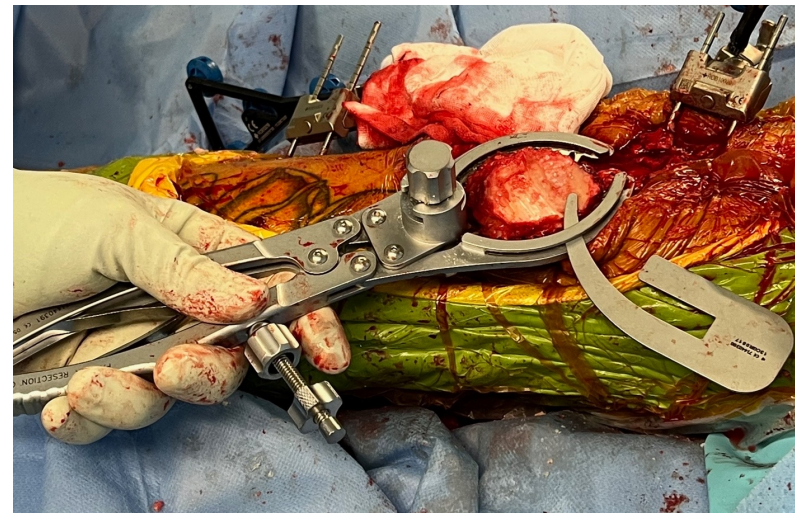
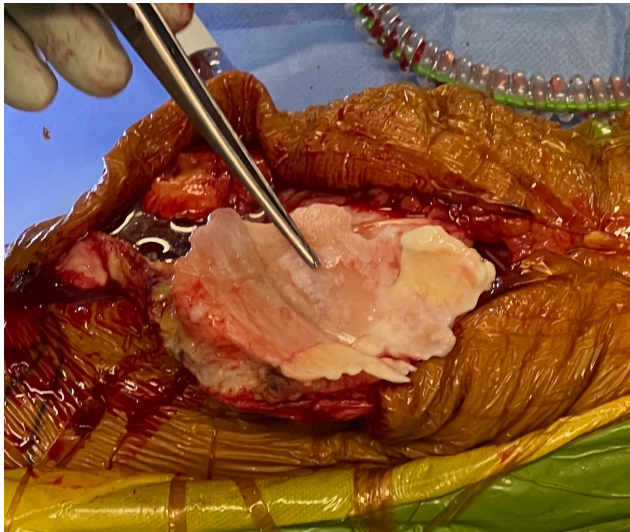
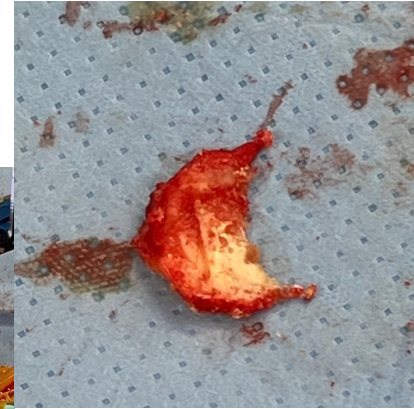
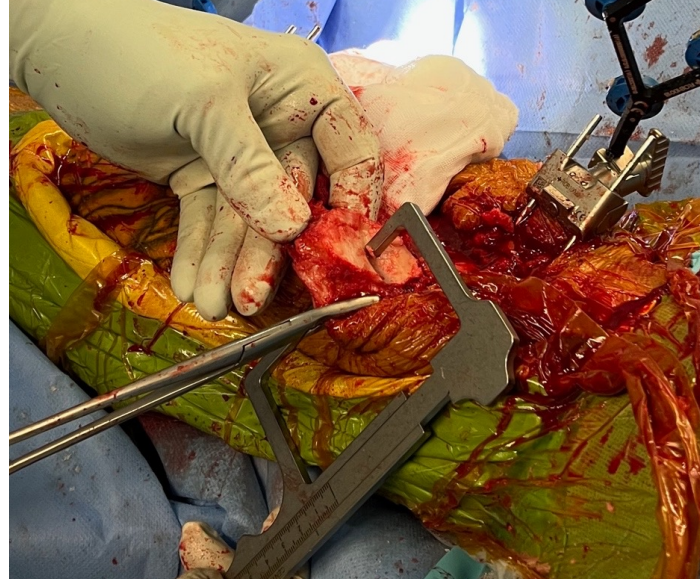
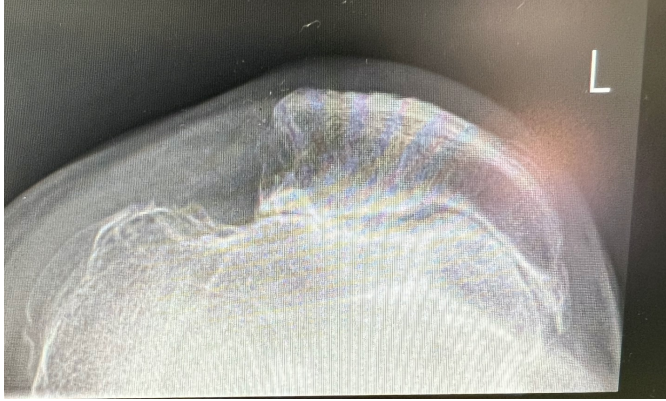


2023

- 200 patients with pre-resection thickness <19mm
- Average 18mm / Range 12 – 19mm
- 10 years
 - 3 patella revisions
 - 1 aseptic loosening; 2 periprosthetic infection
 - 3 patella fractures managed non-operatively
 - Xrays of non-revised knees well-fixed patellae
- Balance risks against higher risk of revision if thin native patella left unresurfaced



Primary Resurfacing

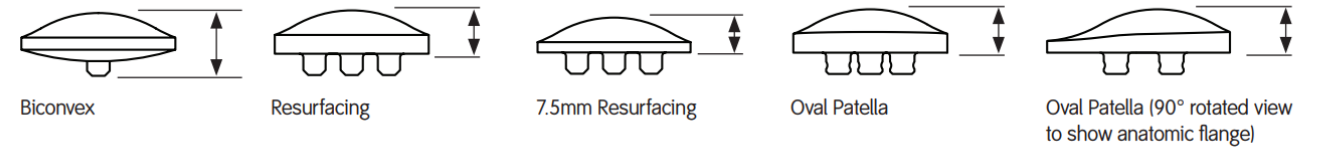


The Small / Dysplastic Patella

Small Patella

- Have a wide range of sizes and styles available

Patellar Dimensions



	Thickness (mm)	Diameter				
Biconvex	13	23	26	29	32	
Resurfacing	9*		26	29	32	35
Resurfacing 7.5mm**	7.5		26	29	32	35



Biconvex

Round Resurfacing

Oval Resurfacing

Patellas



Oval Resurfacing



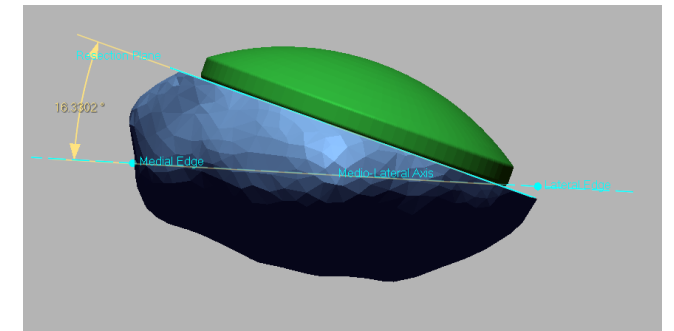
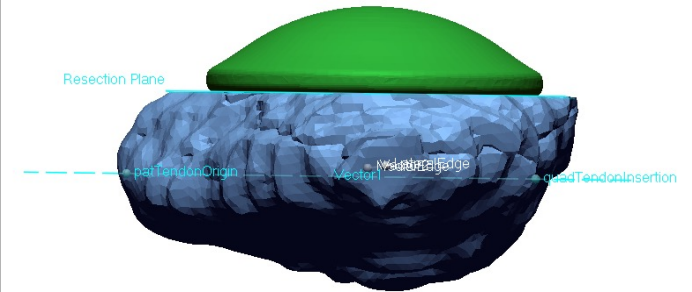
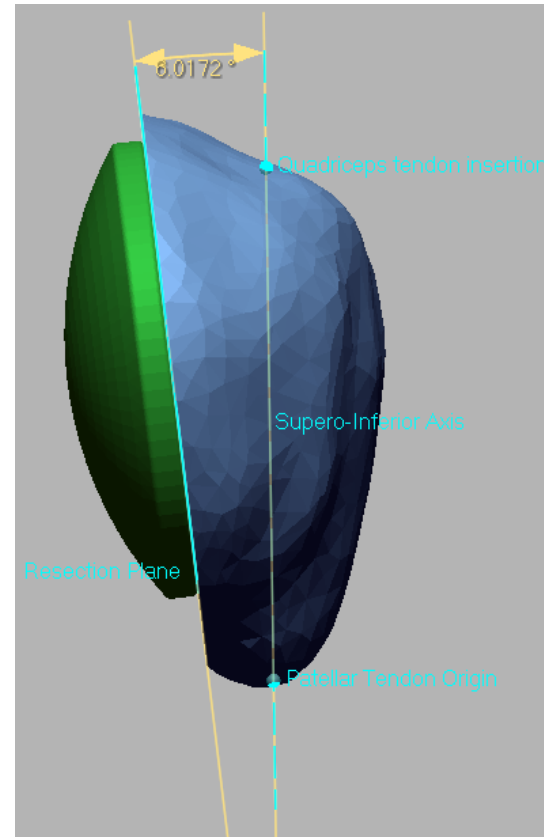
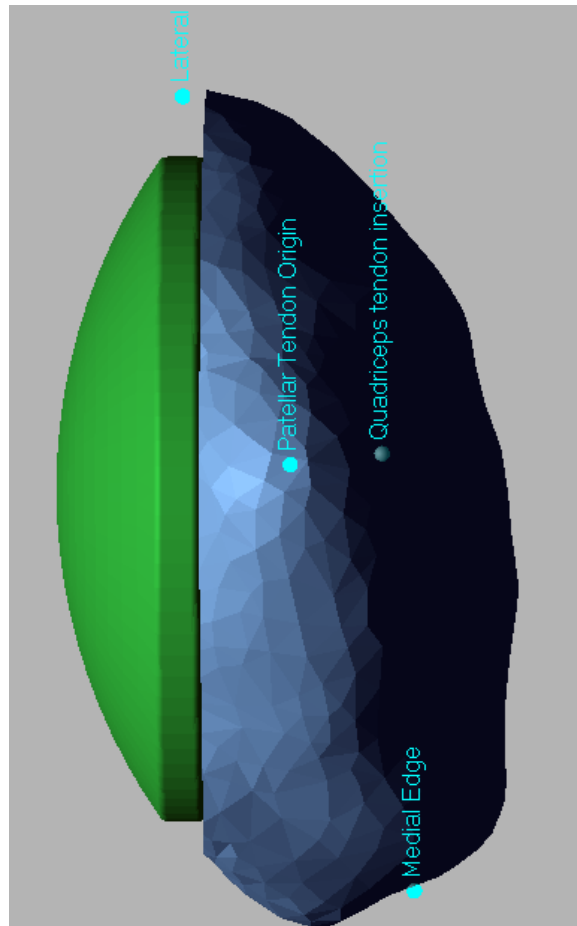
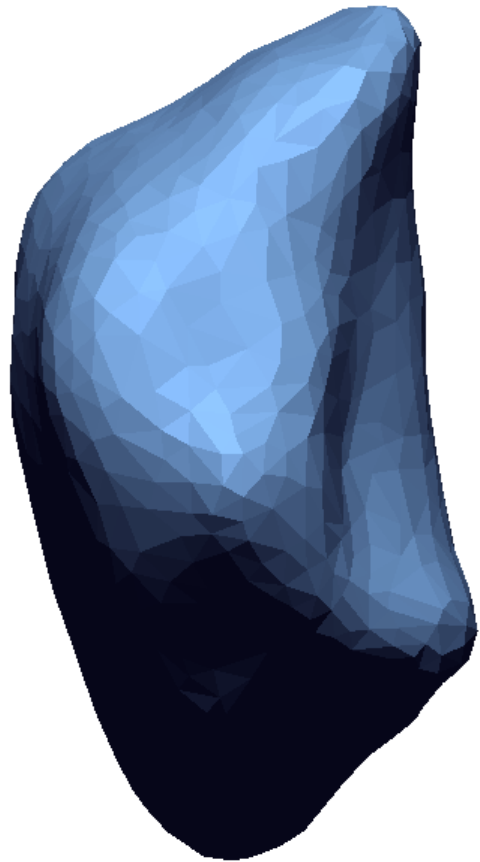
Round Resurfacing



Biconvex

Available in 9mm and 13mm thicknesses

Dysplastic Patella: 3D Planning? Custom Implants?



Post Patellar Fracture

Outcomes After Total Knee Arthroplasty in Patients With a History of Patella Fracture: A Propensity Score–Matched Analysis

2024

Brian P. McCormick, MD 

Sean B. Sequeira, MD

Mark D. Hasenauer, MD

Robert P. McKinstry, MD

Frank R. Ebert, MD

Henry R. Boucher, MD

ABSTRACT

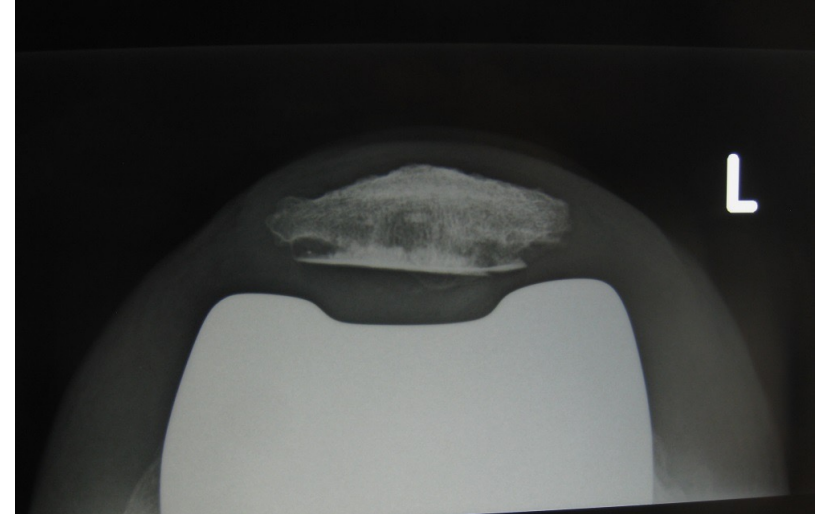
Background: Posttraumatic osteoarthritis is a common indication for total knee arthroplasty (TKA). The purpose of this study was to evaluate the association between a history of patella fracture and postoperative

- 8,519 patients with previous patellar fracture (propensity matched)
- Patients with history of patellar fracture have higher incidence of:
 - Periprosthetic Joint Infection
 - Revision Surgery
 - Dislocation
 - Stiffness
 - Wound Disruption

Revision TKA

Patellar bone loss

- Patellar bone loss is not part of most defect classification systems
- May be a problem in revision surgery



Patellar bone loss

- Bone deficiency is usually central, resulting in a concave defect
- The amount and vascularity of remaining patellar bone determines the feasibility of placing a new patellar implant
- Occasionally leave unresurfaced




Management Options

Management of the Deficient Patella in Revision Total Knee Arthroplasty

Ryan M. Garcia MD, Matthew J. Kraay MS, MD,
Patricia A. Conroy-Smith RN, Victor M. Goldberg MD

2008

- Revision onlay if $>10\text{mm}$
- Cemented all polyethylene biconvex component
- Patellar bone grafting & augmentation
- Patellar resection arthroplasty
- Gullwing Osteotomy
- Tantalum (Trabecular Metal) prosthesis
- Extensor Mechanism Allograft
- Patellectomy

 A commentary by Shivi Duggal, MD, MBA, MPH, is linked to the online version of this article at jbjs.org.

Long-Term Results of Patellar Bone-Grafting for Severe Patellar Bone Loss During Revision Total Knee Arthroplasty

2019

Matthew P. Abdel, MD, Stephen M. Petis, MD, FRCSC, Michael J. Taunton, MD, Kevin I. Perry, MD, David G. Lewallen, MD, and Arlen D. Hanssen, MD

Investigation performed at the Department of Orthopedic Surgery, Mayo Clinic, Rochester, Minnesota

- Revision TKR
- 93 cases of bone grafting for severe patellar bone loss
- Thickness increased from mean 7mm to 25mm
- Survivorship free of patellar revision 96% at 10 years
- Initial vs Final Xray thickness: 22 → 19mm
- Improved AKP

“Durable and reliable option when standard patellar resurfacing is not possible”

Indications

- Severe cavitary or segmental defects
- Unsupportive rim of bone
- Bone stock <10mm

Technique

- Debride and burr
- Autograft or Allograft chips
- Local soft tissue flap or allograft



Revision for Infection

- 2 stage revision surgery for PPII using articulating spacer
- Patellar component removed
 - Compare resurfacing vs leaving unresurfaced
- Patellar component replacement:
 - Fewer fractures
 - Less patellar displacement
 - Improved ROM
 - No increase in infection after stage 2
 - More patients refused stage 2



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The Journal of Arthroplasty

journal homepage: www.arthroplastyjournal.org

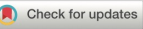


Proceedings of the Knee Society 2023

Decreased Patellar Fractures and Subluxation With Patellar Component Replacement at Stage-One Spacer

Joshua P. Rainey, MD , Brenna E. Blackburn, PhD , Zachary J. Moore, BS , Michael J. Archibeck, MD , Christopher E. Pelt, MD , Lucas A. Anderson, MD , Jeremy M. Gililland, MD *

Department of Orthopaedic Surgery, University of Utah, Salt Lake City, Utah



2024



The
(Knee)
Institute

Sydney
Orthopaedic
Research
Institute

Gullwing Osteotomy

- Convert thin concave cortical shell into V-shaped patella remnant
- Improve patella tracking
- Significant improvements reported
- Limited literature

Gull-Wing Osteotomy for the Treatment of the Deficient Patella in Revision Total Knee Arthroplasty

Gregg R. Klein, MD,*† Harlan B. Levine, MD,*† John F. Ambrose, MD,‡
Helena C. Lamothe, BS,*† and Mark A. Hartzband, MD *†

Clin Orthop Relat Res
DOI 10.1007/s11999-015-4363-1

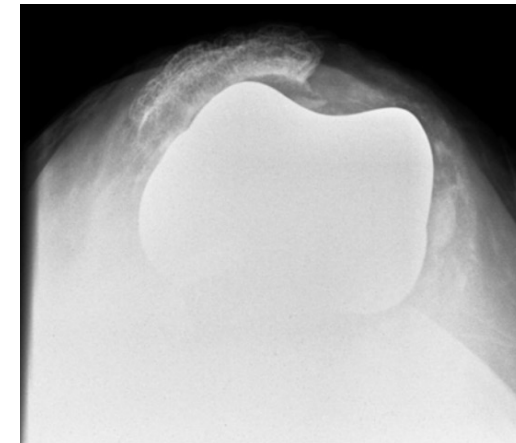
Clinical Orthopaedics
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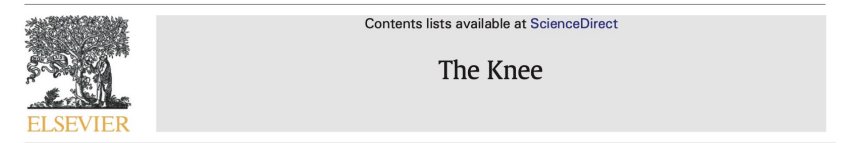
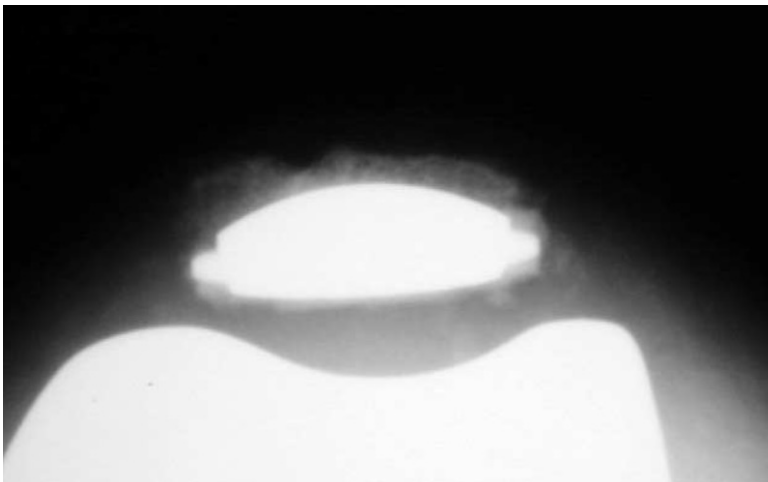
What Is the Role for Patelloplasty With Gullwing Osteotomy in Revision TKA?

Jeremy M. Gililand MD, Presley Swann MD, Christopher E. Pelt MD,
Jill Erickson PA, Nadia Hamad MSc, ATC, Christopher L. Peters MD



Trabecular Metal Patella

- Severe bony deficiency
- Better results when residual bone present
 - Good results reported
 - >50% bony contact
- High rate of loosening if just soft tissue



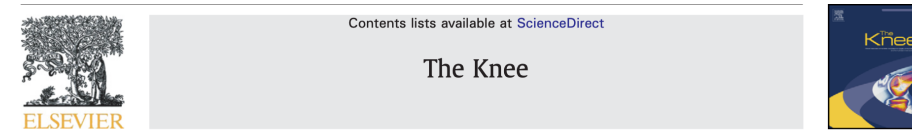
Case report

Trabecular Metal Patella — Is it really doomed to fail in the totally patellar-deficient knee? A case report of patellar reconstruction with a novel technique

Shashi Kumar Nanjayan ^{a,*}, Shashi Kumar Nanjayan ^a, Timothy Wilton ^b

Use of a Trabecular Metal Patella for Marked Patella Bone Loss During Revision Total Knee Arthroplasty

Charles L. Nelson, MD,* Jess H. Lonner, MD,† Ashkan Lahiji, MD,*†
Jane Kim, BS,* and Paul A. Lotke, MD*



Trabecular metal patella in total knee arthroplasty with patella bone deficiency

D. Tigani ^{*}, P. Trentani, F. Trentani, I. Andreoli, G. Sabbioni, N. Del Piccolo

VII Department of Orthopaedic Surgery, University of Bologna, Rizzoli Orthopaedic Institute, Bologna, Via Pupilli 1, 40136, Bologna, Italy

CLINICAL ORTHOPAEDICS AND RELATED RESEARCH
Number 452, pp. 166–170
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Porous Tantalum Patellar Augmentation

The Importance of Residual Bone Stock

Michael D. Ries, MD^{*}; Adam Cabalo, MD^{*}; Kevin J. Bozic, MD^{*}; and Martin Anderson, MD[†]



Biconvex Patella

- Moderate to severe central bony deficiency
- Intact peripheral cortical rim
- 5 – 10 mm thick



Biconvex

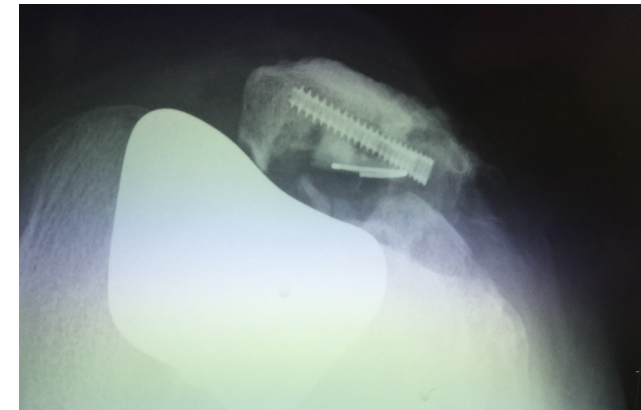
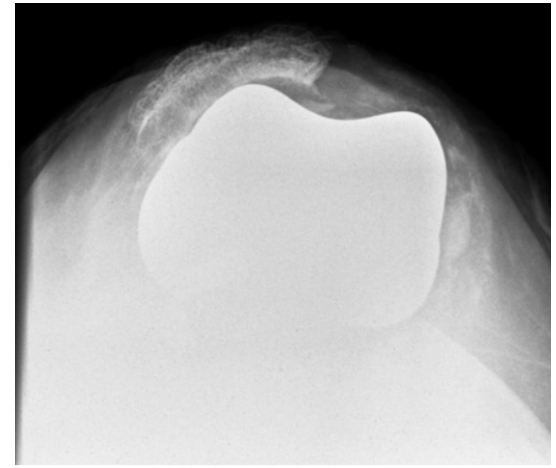


Biconvex

	Thickness (mm)	Diameter				
Biconvex	13	23	26	29	32	
Resurfacing	9*		26	29	32	35
Resurfacing 7.5mm**	7.5		26	29	32	35

Conclusions

- Patellar resurfacing
 - Reduces revision rate +/- clinical improvements
- Most patellae can be resurfaced in a primary setting
 - Careful technique
 - Preoperative planning and range of options as needed
- Revision scenario
 - Leave alone if stable and minimal wear
 - Multiple techniques from reconstruction to salvage



If you're familiar with the options available then a satisfactory solution can be achieved in the majority of cases

Thank You





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2025



MUNICH
GERMANY

June 8-11

WELCOME

See you in Munich!

2025

isakos.com/2025 • [#ISAKOS2025](https://twitter.com/ISAKOS2025)