

Does TKA after fracture increase morbidity?

Literature review

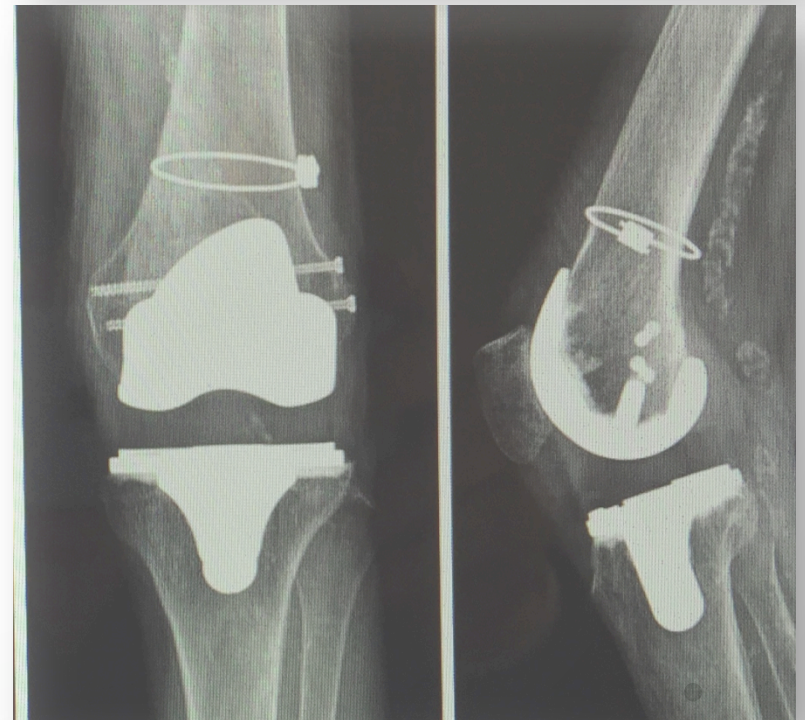
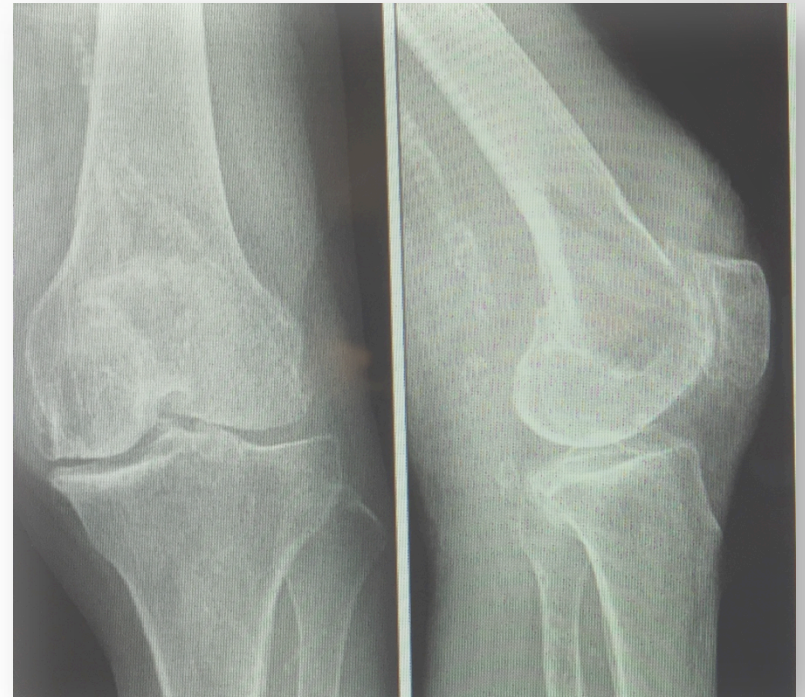
JEAN LOUIS PRUDHON



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Fracture around the knee

different issues

- TKA to treat acute knee fracture
 - Young patient ORIF
 - Old patient fix or replace
- TKA after knee fracture
 - Femur
 - Tibia

Peri prosthetic fractures excluded



Part 1

- TKA to treat acute fractures



TKA to treat acute fractures



Distal femoral fractures treated by hinged total knee replacement in elderly patients

J Bone Joint Surg [Br]
2006;88-B:1065-70.

P. Appleton,
M. Moran,
S. Houshian,
C. M. Robinson

*From The New Royal
Infirmary of
Edinburgh,
Edinburgh, Scotland*

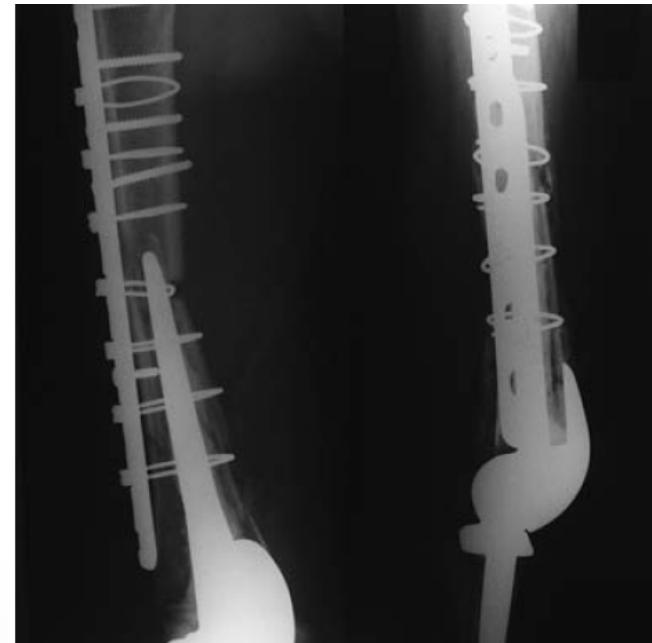
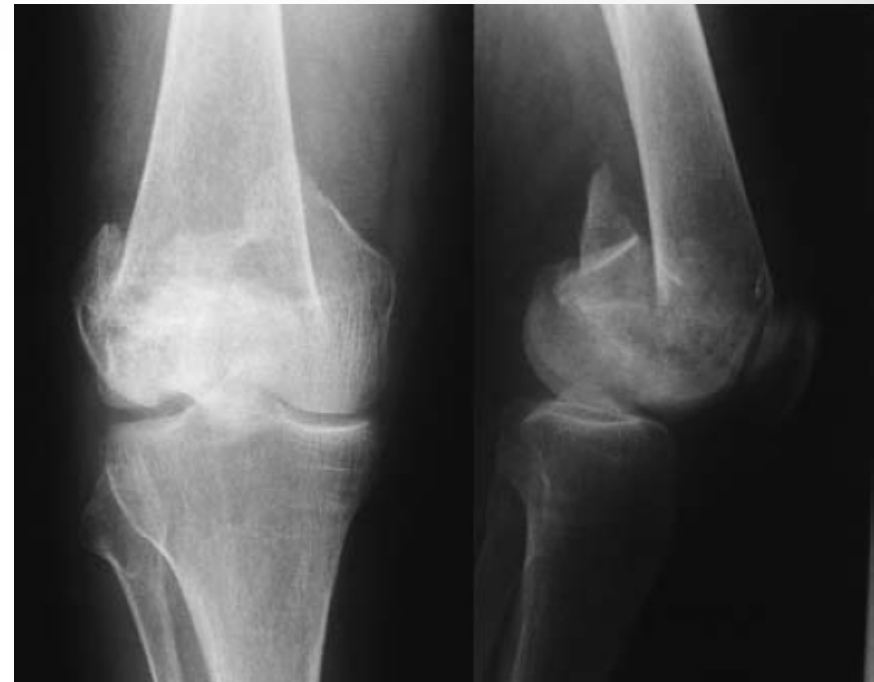
Although the use of constrained cemented arthroplasty to treat distal femoral fractures in elderly patients has some practical advantages over the use of techniques of fixation, concerns as to a high rate of loosening after implantation of these prostheses has raised doubts about their use. We evaluated the results of hinged total knee replacement in the treatment of 54 fractures in 52 patients with a mean age of 82 years (55 to 98), who were socially dependent and poorly mobile.

Within the first year after implantation 22 of the 54 patients had died, six had undergone a further operation and two required a revision of the prosthesis. The subsequent rate of further surgery and revision was low.

A constrained knee prosthesis offers a useful alternative treatment to internal fixation in selected elderly patients with these fractures, and has a high probability of surviving as long as the patient into whom it has been implanted.

Peri-prosthetic fracture within the first three months after surgery was the most common and most serious early post-operative complication. Despite the small numbers of patients involved, the presence of a hip implant appeared to be associated with an increased risk of this occurrence,

Figure 1a – Anteroposterior and lateral radiographs of an 83-year-old woman who fell sustaining an AO type 33-C distal femoral metaphyseal fracture with displacement. Figure 1b – Since she was relatively immobile, the fracture was initially treated by a Stanmore hinged knee replacement. She fell again six weeks later sustaining a peri-prosthetic fracture at the tip of the stemmed femoral component. Figure 1c – The fracture was treated by open reduction and plate fixation with cerclage wiring. Although her peri-prosthetic fracture subsequently healed, she died 14 months later.



TKA to treat acute fractures

Injury. 2011 Nov;42(11):1368-71.

Acute primary total knee arthroplasty for peri-articular knee fractures in patients over 65 years of age. [Malviya A1](#), [Reed MR](#), [Partington PF](#).

- series of 15 proximal tibial and 11 distal femoral fractures treated with total knee arthroplasty at over mean follow-up period of 38.8 months. The mean age of the patients was 80 years.
- Good clinical results were achieved with fracture healing, sound fixation and well-aligned flexible knees.
- Analogous to arthroplasty for hip fractures, this technique should be considered as a treatment option in elderly peri-articular knee fractures with osteoporosis and/or osteoarthritis.

TKA to treat acute fractures

- Orthop Traumatol Surg Res. 2011 Oct;97(6 Suppl):**Primary total knee arthroplasty in the management of epiphyseal fracture around the knee.**

[Parratte S](#), [Bonnevialle P](#), [Pietu G](#), [Saragaglia D](#), [Cherrier B](#), [Lafosse JM](#).

- « During the immediate postoperative period, six patients (23%) reported a general complication and four patients (15%) a local arthroplasty-related complication. At last follow-up (mean 16.2 months), the overall final Parker score was 6.3 (a mean decrease of 1.7) and the mean IKS knee score was 82 points for a mean function score of 54 points. »

TKA to treat acute fractures

Knee Surg Relat Res. 2013 Sep; 25(3): 141–146.

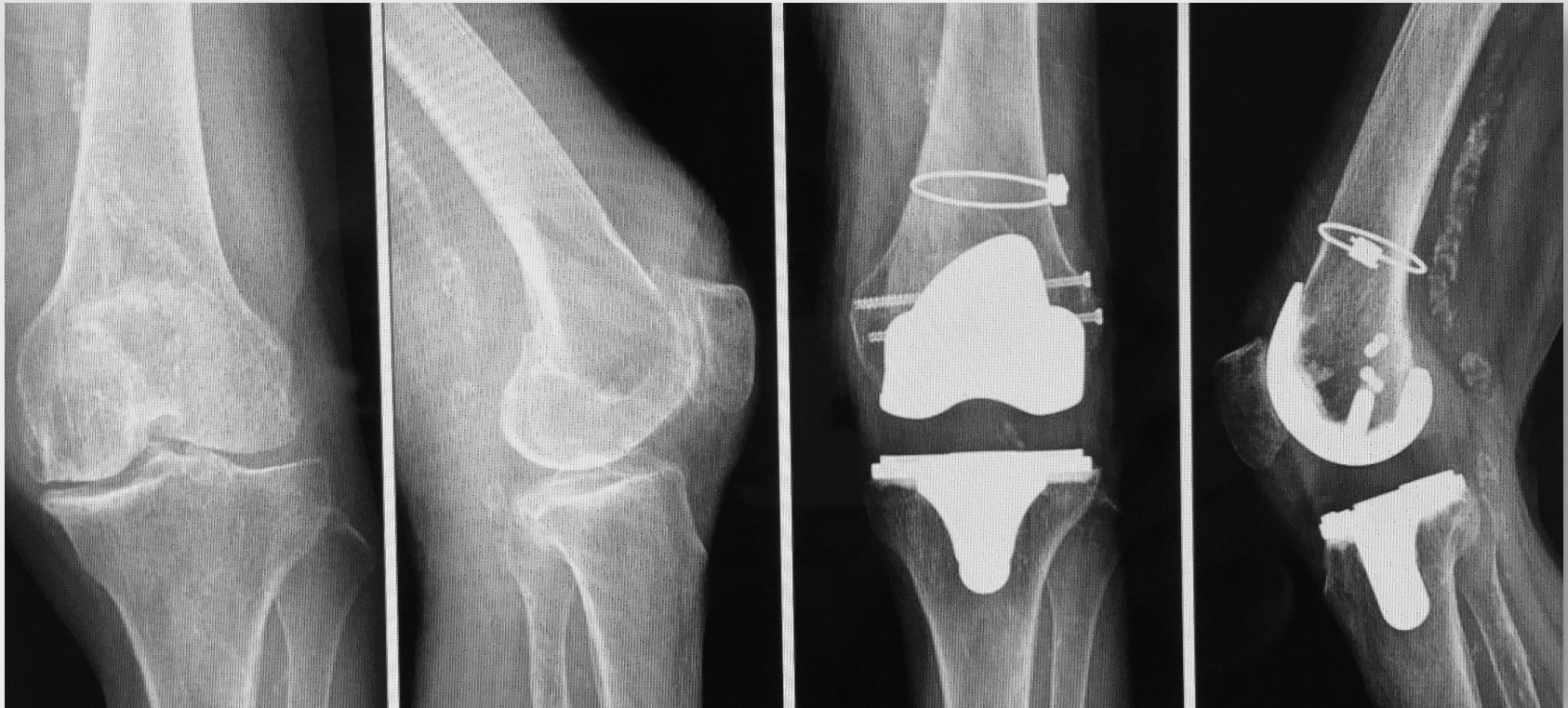
Published online 2013 Aug 29.

Primary Total Knee Arthroplasty for Simple Distal Femoral Fractures in Elderly Patients with Knee Osteoarthritis

[Nam-Yong Choi](#), MD,¹ [Jong-Min Sohn](#), MD,² [Sung-Gil Cho](#), MD,¹
[Seung-Chan Kim](#), MD,³ and [Yong In](#), MD³

Eight displaced distal femoral fractures in 8 patients were treated with TKA using the Medial Pivot prosthesis and internal fixation.

The mean follow-up period was 49 months (range, 17 to 62 months). There were no cases of infection or perioperative death. All fractures united and the mean time to radiographic union was 15 weeks



Stem is used according to stability after trial implantation



Acute fracture summary

- Old population
- Fragility fracture
- Low energy trauma
- Complications are linked to the poor status of the patient (comorbidities osteoporosis, sarcopenia)
- Similar to hip fracture

Part 2

- TKA after knee fracture



TKA after knee fractures

Orthop Rev. 1990 Jul;19(7):614-20.

Total knee replacement after fractures about the knee.

[Roffi RP1, Merritt PO.](#)

Abstract

We reviewed 17 cases of posttraumatic arthritis after fractures about the knee. All patients underwent total knee replacement; one had a distal femoral osteotomy to correct a deformity prior to arthroplasty. Thirteen patients had a minimum one-year follow-up, with an average follow-up of 27 months (range, one to four years). Of these, eight were considered to have a successful clinical result. All five patients with unsuccessful results had major intraoperative and/or postoperative complications. In malunions of intra-articular fractures of the proximal tibia, the important technical consideration for planned total knee replacement is preoperative tilt of the tibial plateau in the antero-posterior (AP) and lateral radiographic views. Tibial plateau tilt should be recognized during preoperative planning, and intraoperative adjustments are required. In malunions of extra-articular fractures of the distal femur or proximal tibia, a varus or valgus deformity is an important consideration. Prearthroplasty osteotomy may be considered in a patient with a significant bony deformity above or below the joint line. Incisions should be carefully planned, especially when a previous lateral distal femoral approach has been performed. The results may resemble revision rather than primary arthroplasty.

2002

TKA after knee fractures



The Knee 9 (2002) 267–274



www.elsevier.com/locate/knee

Total knee arthroplasty following prior distal femoral fracture

Elias C. Papadopoulos^a, Javad Parvizi^b, Choon H. Lai^c, David G. Lewallen^{b,*}

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Accepted 1 April 2002

Conclusions: Significant improvement in function and relief of pain is seen in the vast majority of patients with previous distal femoral fractures undergoing subsequent TKA. However, these patients are at increased risk for restricted motion and perioperative complications following TKA. Special efforts to preserve the vascularity of the skin and subcutaneous tissues, restore limb alignment, ensure correct component positioning, and achieve soft tissue balance may help minimize the problems identified in this study.

TKA after knee fractures

J Bone Joint Surg Am. 2001 Aug;83-A(8):1144-8.

Total knee arthroplasty after open reduction and internal fixation of fractures of the tibial plateau: a minimum five-year follow-up study.

[Saleh KJ](#)¹, [Sherman P](#), [Katkin P](#), [Windsor R](#), [Haas S](#), [Laskin R](#), [Sculco T](#).

15 cases mean age 56 yo (37-68)

There was a high rate of infection (three patients), patellar tendon disruption (two patients), and postoperative secondary procedures (three patients required closed manipulation).

On the basis of our results, we concluded that total knee arthroplasty after open reduction and internal fixation of a fracture of the tibial plateau decreases pain and improves knee function, but the procedure is technically demanding and is associated with a high failure rate (five of fifteen).

TKA after knee fractures

J Bone Joint Surg Am. 2003 Feb;85-A(2):218-21.

Total knee arthroplasty in patients with a prior fracture of the tibial plateau.

Weiss NG, Parvizi J, Trousdale RT, Bryce RD, Lewallen DG.

The results of sixty-two condylar total knee arthroplasties performed with cement, from 1988 to 1999, in sixty-two patients with a previous fracture of the tibial plateau were reviewed.

There were thirteen reoperations, which included manipulation with the patient under anesthesia (five knees), wound revision (three knees), and component revision (five knees). There were six intraoperative complications (10%). A postoperative complication occurred in sixteen knees (26%).

TKA after knee fractures

J Arthroplasty. 2003 Apr;18(3 Suppl 1):23-6.

Total knee arthroplasty in post-traumatic arthrosis of the knee.

Weiss NG1, Parvizi J, Hanssen AD, Trousdale RT, Lewallen DG.


Abstract

Total knee arthroplasty is an effective method of treatment for the majority of patients with a prior distal femoral or tibial plateau fracture and end-stage arthritis. There is a higher complication rate and overall poorer outcome when compared with routine primary total knee arthroplasty. In patients for whom the goals of optimal limb and implant alignment are achieved, the results are comparable with routine primary knee arthroplasty. Patients with suboptimal component positioning or residual deformity have a poorer outcome. The technical challenges encountered can require skills, implant systems, and methods usually reserved for complex revision arthroplasty.

TKA after knee fractures

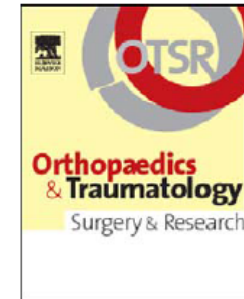
Orthopaedics & Traumatology: Surgery & Research (2010) 96, 849–855



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ORIGINAL ARTICLE

Total knee arthroplasty for osteoarthritis secondary to extra-articular malunions

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The French Hip and Knee Society (S.F.H.G.)¹

Introduction: Post-traumatic total knee arthroplasty for extra-articular malunion requires correction of the deformity, either through asymmetrical bone resection (possibly inducing ligaments imbalance) or osteotomy at the time of arthroplasty. We report the results of a continuous multicenter, retrospective series of 78 patients (18 implants with osteotomy) with a mean 4 years of follow-up. The hypothesis is that the selected procedure requires to be based on the deformity's location and severity.

Patients: With a mean age of 63 years (younger in the osteotomy group), 38 patients had femoral malunion, 36 had tibial malunion, and four had a combined malunion. There were 70 frontal deformities (48 varus and 22 valgus) and 10 rotational deformities, often diaphyseal, four of which more than 20°. Twelve patients had a history of infection; eight had frontal laxity greater than 10°, and 15 a limited range of motion in flexion. In 70 cases, semi- or nonconstrained implants were used, and in eight cases more constrained implants, including four hinge prostheses.

Results: We observed two deep infections, one case of avulsion of the extensor mechanism, and two cases of aseptic loosening with femoral malunion and varus deformity. Two osteotomies resulted in nonunion, one with internal fixation devices mobilization requiring revision using extension rods. The function and pain scores were significantly improved. The mobility improvements were moderate but did not compromise the surgical procedure main objective. The preoperative hip-knee angle was corrected with both techniques. Only the function score gain was greater for the isolated arthroplasty procedures.

TKA after knee fractures

MÉMOIRE ORIGINAL

Prothèse totale du genou sur cal vicieux intra-articulaire[☆]

Total knee replacement following intra-articular malunion

S. Parratte^a, P. Boyer^b, P. Piriou^c, J.-N. Argenson^a,
G. Deschamps^d, P. Massin^{b,*}, la SFHG

Retrospective multicentric series

74 patients mean age 63 +/-14

40 tibial fracture / 20 femur / 12 patella / F+T 2

Complication rate >20%

Acceptation définitive le : 15 avril 2011

aré,

TKA after knee fractures



Contents lists available at [ScienceDirect](#)

The Knee



Post traumatic knee arthritis: Navigated total knee replacement without hardware removal



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^b Orthopaedic Department, Royal Melbourne Hospital, Parkville, Victoria, Australia

^c Bioengineering Department, Politecnico di Milano, 20100 Milan, Italy

^d Clinica Ortopedica, Azienda Ospedaliera di Padova, Via Giustiniani 2, 35123 Padova, Italy

Conclusions: This study demonstrated that post-traumatic knee arthritis following prior distal femoral fracture can be safely managed using a computer navigated TKR without hardware removal. Comparison between this patient group and a matched group with atraumatic arthritis showed similar post-operative results and complication rates.

Level of evidence: III.



Fig. 3. Pre operative long standing radiographs of a post traumatic knee following a supracondylar fracture with a residual varus deformity.



Fig. 4. Post operative long standing radiographs with a well aligned limb maintaining the hardware.

Hardware removal ?

In conclusion we believe based on own experience, that computer navigation allows the surgeon to obtain good reproducible results similar to a routine TKR with a one-stage TKR without hardware removal in post traumatic knee arthritis following prior femoral fracture.

However we do not advocate retention of femoral hardware in all cases. In patients requiring quadriceps release or with symptomatic hardware a two-stage procedure is advisable. In younger patients in particular, hardware removal is recommended prior to TKR even if it is asymptomatic because of the likelihood of future revision surgery perhaps requiring stemmed implants.

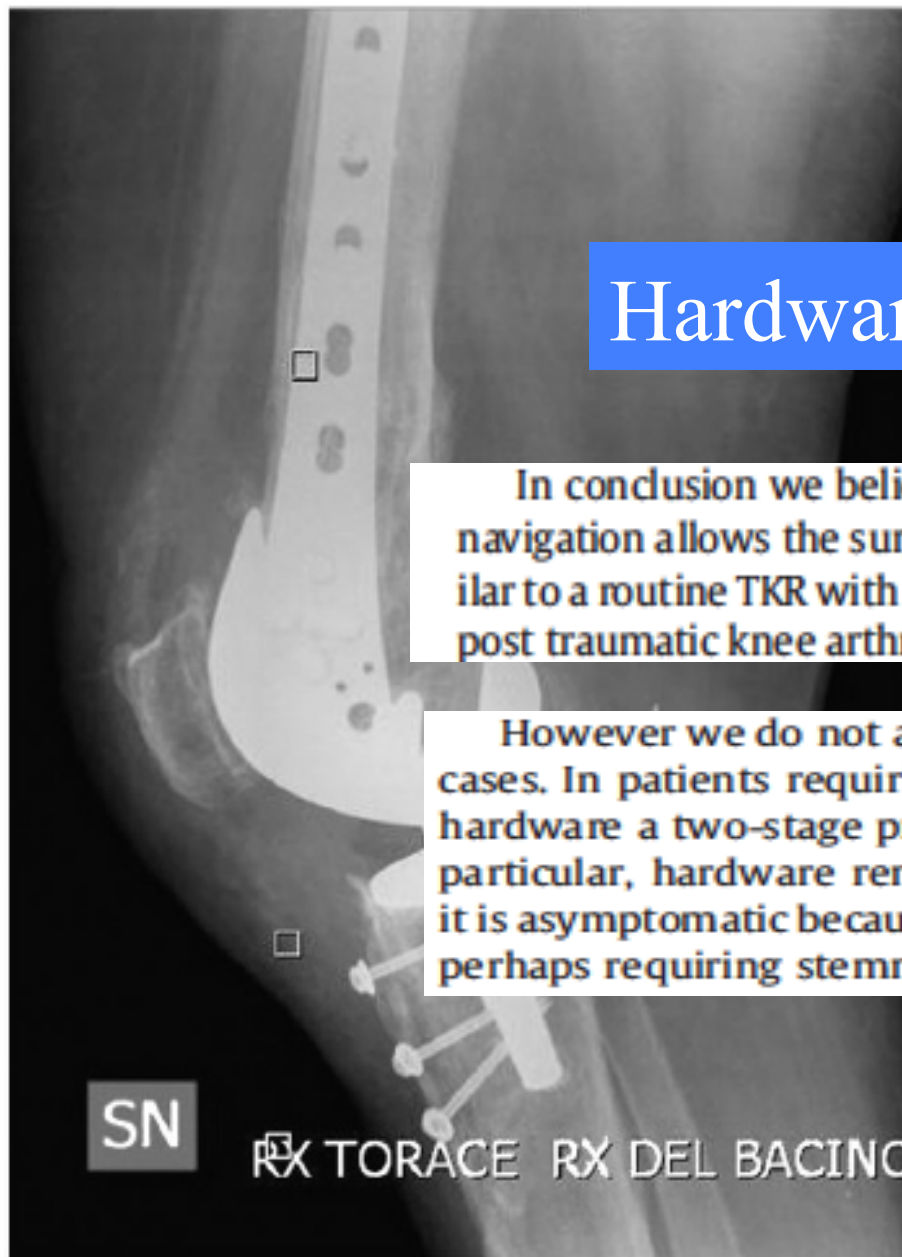


Fig. 5. Post operative lateral radiographs of the knee showing a complete healing of the osteotomized anterior tibial tubercle.

TKA after knee fractures

Injury. 2014 Dec;45 Suppl 6:S98-S104. doi: 10.1016/j.injury.2014.10.031.

Epub 2014 Oct 28.

Total knee replacement in acute and chronic traumatic events.

Benazzo F, Rossi SM, Ghiara M, Zanardi A, Perticarini L, Combi A.

The main issues related to post-traumatic arthritis and the problem of TKR in acute fractures are discussed, and our case series of both groups of patients is presented.

44 cases chronic post traumatic knee
9 complications
3 revisions
6 cases acute fracture around the knee
1 infection

TKA after knee fractures

J Arthroplasty. 2015 Dec;30(12):2170-2. doi: 10.1016/j.arth.2015.06.032. Epub 2015 Jun 20.

Total Knee Arthroplasty in Patients With a Prior Tibial Plateau Fracture: A Long-Term Report at 15 Years.

[Abdel MP](#), [von Roth P](#), [Cross WW](#), [Berry DJ](#) [Trousdale RT](#) [Lewallen DG](#)

Abstract

The goal of the current study was to determine the 15-year outcomes of 62 patients who underwent a total knee arthroplasty (TKA) after a prior tibial plateau fracture. Mean age at the index surgical intervention was 63 years. At most recent followup, there were 11 revisions. The 15-year survivorship free from revision for aseptic loosening was 96%. In unrevised cases, the components were radiographically well-fixed. There were a total of 21 complications, 90% of which occurred at <2 years. While patients undergoing TKA after a tibial plateau fracture have an increased rate of complications, the 15-year results indicate that subsequent survivorship is similar to that of patients undergoing TKA for degenerative arthritis if early complications can be avoided.

TKA after knee fractures

The Journal of Arthroplasty 30 (2015) 1328–1332



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The Journal of Arthroplasty

journal homepage: www.arthroplastyjournal.org



Total Knee Arthroplasty for Osteoarthritis Secondary to Fracture of the Tibial Plateau. A Prospective Matched Cohort Study

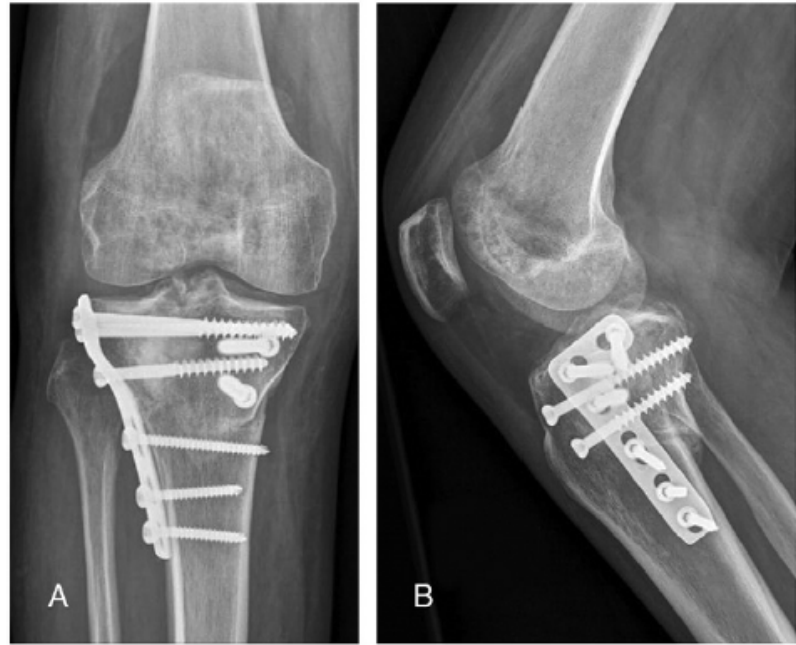
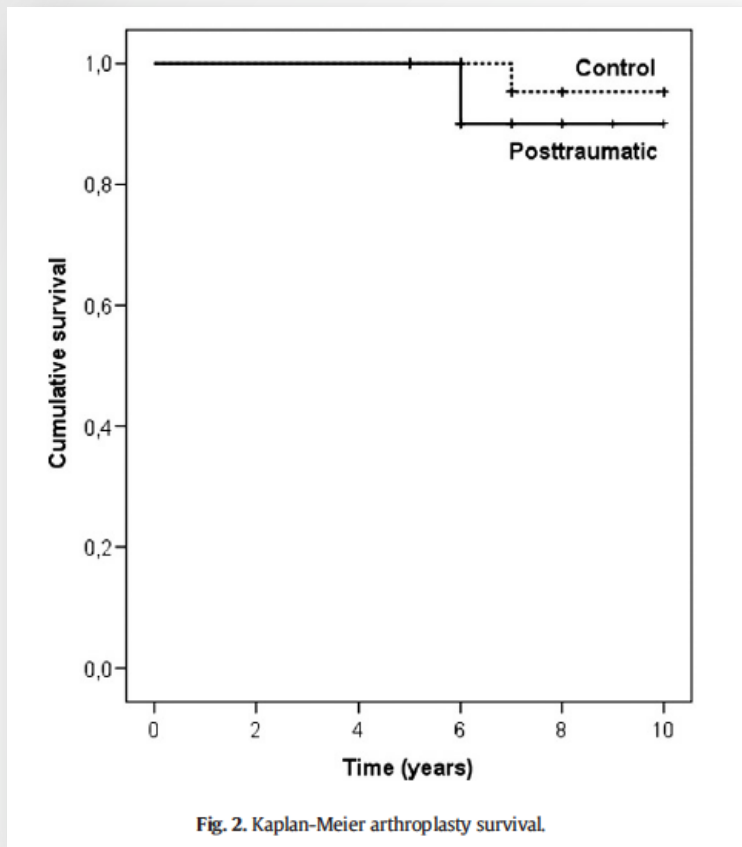


Alejandro Lizaur-Utrilla, MD, PhD ^a, Isabel Collados-Maestre, MD ^a,
Francisco A. Miralles-Muñoz, MD ^a, Fernando A. Lopez-Prats, MD, PhD ^b

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^b Department of Orthopaedic Surgery, Faculty of Medicine, Miguel Hernandez University, Elche, Alicante, Spain

A prospective matched cohort study was performed to compare outcomes of total knee arthroplasties (TKA) between 29 patients with posttraumatic osteoarthritis (POA) after a fracture of tibial plateau and 58 patients underwent routine TKA. Mean follow-up was 6.7 years. There were no significant differences in KSS, WOMAC, SF12 scores or range of motion. In the control group there were no complications. In the posttraumatic group, complications occurred in 4 patients (13.7%) ($P = 0.010$) including partial patellar tendon detachment, superficial infection, skin necrosis, and knee stiffness. Only this last patient required revision for manipulation under anesthesia. Also, there was a revision for tibial aseptic loosening in each group. TKA is an effective treatment for POA after tibial plateau fracture. We recommend the prior removal of hardware, as well as tibial tubercle osteotomy when necessary.



Acta Orthop. 2015 Apr; 86(2): 189–194.

Published online 2015 Mar 25.

Lower function, quality of life, and survival rate after total knee arthroplasty for posttraumatic arthritis than for primary arthritis

[Alexandre Lunebourg](#), [Sebastien Parratte](#), [André Gay](#), [Matthieu Ollivier](#), [Kleber Garcia-Parra](#), [Jean-Noël Argenson](#)

We retrospectively reviewed patients who were operated on at our institution for PTA between 1998 and 2005 (33 knees), and compared them to a matched group of patients who were operated on for PA during the same period (407 knees). Clinical outcomes and postoperative QOL were compared in the 2 groups using Knee Society score (KSS), range of motion (ROM) of the knee, and the knee osteoarthritis outcomes score (KOOS). Implant survival rate was calculated using Kaplan-Meier analysis.

Patients and surgeons should be aware that clinical outcome and implant survival after TKA for PTA are lower than after TKA done for PA

In PTA, surgeons have to deal with technical difficulties including previous scars, possible history of infection, misalignment related to malunion, stiffness, and sometimes ligament imbalance. Thus, performing TKA in PTA is more challenging than in primary osteoarthritis.


Several publications have described the challenges and outcomes after TKA for PTA, with a high rate of complications (from 17% to 57%)

the overall rate of complications was higher in the PTA group than in the PA group ($p < 0.001$).

In summary, even though TKA for PTA can achieve similar net improvements in symptoms and function to those of TKA performed for osteoarthritis, because of the initially poorer status of the PTA TKAs, our study confirms that overall results of TKA performed for PTA are poorer than those of TKA performed for PA.

Part 3

- TKA and mortality



TKA in acute knee fracture

Mortality rate literature
review



11th Annual Report
2014

National Joint Registry
for England, Wales and
Northern Ireland

Surgical data to 31 December 2013



National Hip Fracture
Database (NHFD)
annual report 2015



National audit
of inpatient falls
Audit report 2015



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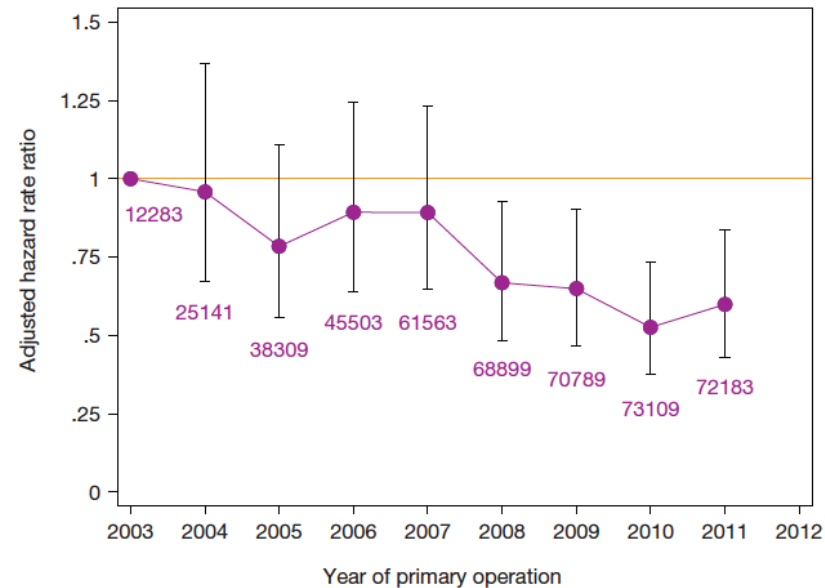
Commissioned by:





The risk of death remains higher in men than women in the same age group in the short, medium and long term after primary knee surgery, and the risk of dying

primaries performed that year.



© National Joint Registry 2014

is an important outcome after knee replacement. Mortality rates decreased dramatically between 2003 and 2011 showing that this common operation is performed in an increasingly safe manner in England and Wales. Interestingly a BMI between 25 and 30 kg/m² was associated with the lowest risk of mortality. This challenges the concept of what is an ideal BMI for our patients who are generally elderly and have osteoarthritis. We have also shown that patients with certain comorbidities are at particular risk of death after knee replacement and thus require particular care in the perioperative period. Our analysis shows

Clin Orthop Relat Res. 2011 Apr;469(4):1188-96

Mortality after distal femur fractures in elderly patients.

[Streubel PN1, Ricci WM, Wong A, Gardner MJ.](#)

Abstract

BACKGROUND:

Hip fractures in the elderly are associated with high 1-year mortality rates, but whether patients with other lower extremity fractures are exposed to a similar mortality risk is not clear.

QUESTIONS/PURPOSES:

We evaluated the mortality of elderly patients after distal femur fractures; determined predictors for mortality; analyzed the effect of surgical delay; and compared survivorship of elderly patients with distal femur fractures with subjects in a matched hip fracture group.

PATIENTS AND METHODS:

We included 92 consecutive patients older than 60 years with low-energy supracondylar femur fractures treated between 1999 and 2009. Patient, fracture, and treatment characteristics were extracted from operative records, charts, and radiographs. Data regarding mortality were obtained from the Social Security Death Index.

RESULTS:

Age-adjusted Charlson Comorbidity Index and a previous TKA were independent predictors for decreased survival. Congestive heart failure, dementia, renal disease, and history of malignant tumor led to shorter survival times. Patients who underwent surgery more than 4 days versus 48 hours after admission had greater 6-month and 1-year mortality risks. No differences in mortality were found comparing patients with native distal femur fractures with patients in a hip fracture control group.

CONCLUSIONS:

Periprosthetic fractures and fractures in patients with dementia, heart failure, advanced renal disease, and metastasis lead to reduced survival. The age-adjusted Charlson Comorbidity Index may serve as a useful tool to predict survival after distal femur fractures. Surgical delay greater than 4 days increases the 6-month and 1-year mortality risks. Mortality after native fractures of the distal femur in the geriatric population is high and similar to mortality after hip fractures.

LEVEL OF EVIDENCE:

Level II, prognostic study. See the guidelines online for a complete description of evidence.

Thank you for your

attention

Does TKA

after fracture

increase

morbidity?

Yes it

does