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M.O.R.E. Journal

SUPPLEMENT

MYKNEE CASE REPORTS

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MyKnee
PATIENT MATCHED TECHNOLOGY
IN KNEE REPLACEMENT

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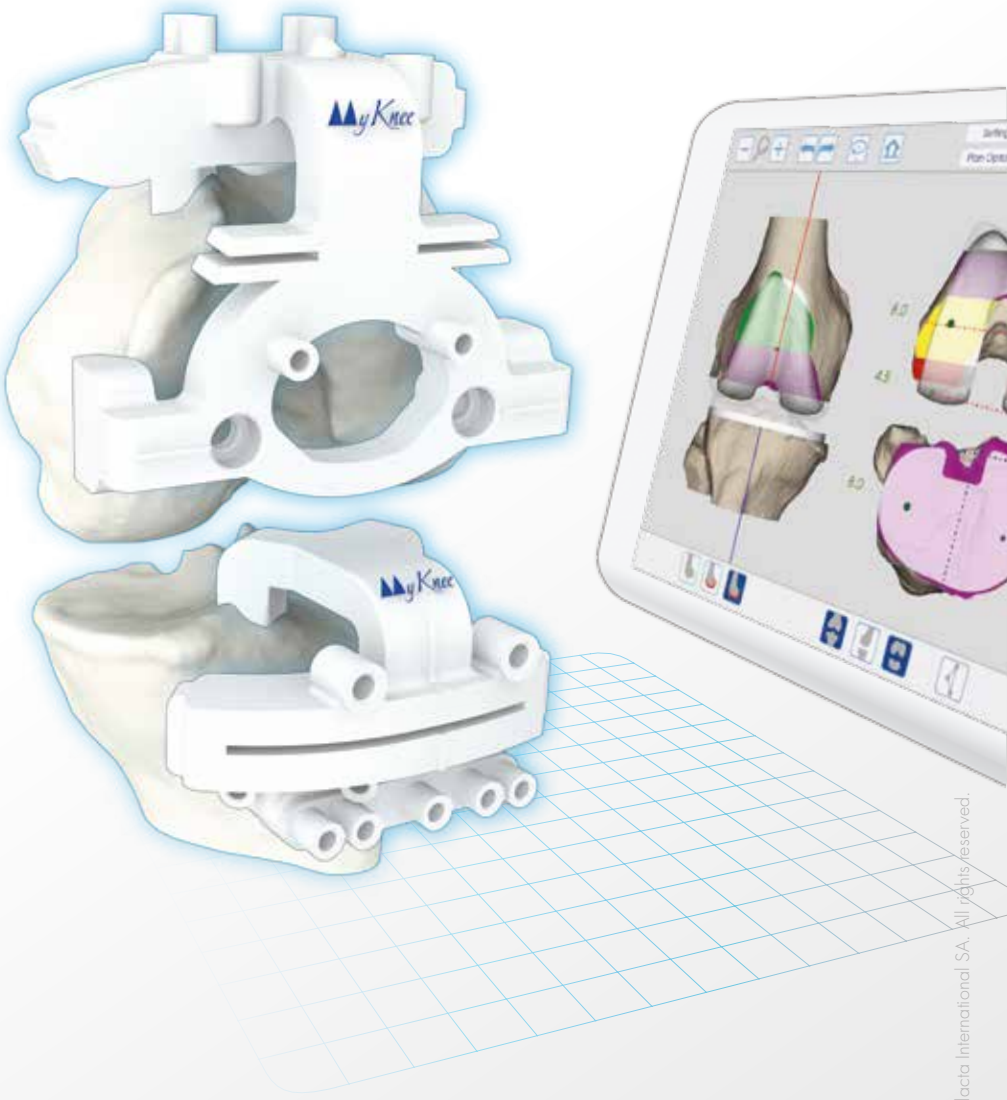

More than
30,000
MyKnee

Designed for you by you!

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Introduction

This document is a collection of MyKnee cases that had a challenging pre-operative condition and aims to demonstrate, through actual cases, the reliability of the MyKnee, patient matched technology.

Developed in 2008, MyKnee is today one of the most successful and most frequently used patient matched technology in TKR all over the world.

MyKnee clinical success and popularity are mainly due to the unique set of benefits that this technology by Medacta can provide: multiple option of imaging technology (CT or MRI), resection blocks not just pin placers, complete in-house technology ensuring the assistance of a personal MyKnee technician and a very short lead time of 3 weeks.

A very interesting opportunity that MyKnee offers to both surgeons and patients is the possibility to address special cases with challenging pre-operative condition.

CT has been proven to be an accurate and straightforward tool to achieve consistent and reproducible results in patient matched technology thanks to clear image processing and limited examination time minimizing potential artefacts. The wide range of CT applications allows MyKnee to address an extensive number of preoperative conditions that are impossible to be faced with MRI technology. Patients with preexisting metal hardware around the joint can be easily addressed with CT-based MyKnee patient matched cutting blocks. MyKnee technicians have been asked countless times to plan monocompartmental knee revisions or primary knee replacements in presence of tibial or femoral plates or screws. Through the MyKnee planning tool, they are able to predict conflicts between the existing hardware and the final implant and to suggest special MyKnee cutting block positioning.

The close interaction between the surgeon and his own personal MyKnee technician is key factor that aids facing complicated pre-operative scenarios. Pre-operative deformities, massive bone loss or severe ligament instability are studied in-depth by the MyKnee technicians using advanced planning tools and discussed with the surgeon to find the optimal surgical strategy to obtain the best result for the patient. Stemmed, augmentable and/or constrained implant positioning can be pre-operatively simulated by MyKnee technicians and submitted to the surgeon for review and approval.

Summary

Medacta International
would like to express its gratitude to the surgeons who provided
the MyKnee cases described in this document.

Feasibility of CT-based patient-specific instrumentation for total knee arthroplasty with pre-existing metallic hardware

TYLER GOLDBERG, MD - North Austin Medical Center, Austin, TX, United States

ABSTRACT

We retrospectively enrolled 9 patients (11 knees) with pre-existing metallic hardware near the knee who underwent total knee arthroplasty (TKA) using computed tomography (CT)-based patient-specific cutting blocks. The instrumentation was successfully used in all cases with no changes to the preoperative plan, intraoperative recuts, or complications. Knee Society Knee scores increased from 43±10 to 84±9 and Function scores improved from 51±13 to 79±8 (both $p<0.01$). Post-operative alignment averaged 179º and all patients were within 3° of neutral. No postoperative complications were reported and no reoperations were performed over a median follow-up period of 15 months (range: 6 to 28 months). This is the first report to demonstrate the feasibility of CT-based patient-specific instrumentation for TKA in patients with pre-existing hardware near the knee. Keywords: computed tomography, cutting block, MyKnee, osteoarthritis, patient-specific, total knee arthroplasty.

Total Knee arthroplasty remains the treatment of choice for treatment of end-stage disabling arthritis. This procedure is highly successful in restoring function, reducing pain, and improving quality of life. Multiple studies have shown that restoration of anatomical alignment directly correlate with the longevity of the implant. To this end, multiple techniques have been devised to implant the total knee prosthesis.

Recently, Patient-Specific Instrumentation (PSI) has been introduced as a "new" method for performing a TKA. PSI utilizes a pre-operative Computed Tomography (CT) scan or Magnetic Resonance Imaging (MRI) scan to 3-dimensionally reconstruct the lower extremity. Bone resections, implant rotation, and sizing are all determined pre-operatively and custom-fit "jigs" are made to be used for the surgery to achieve the desired result.

MRI-based PSI technology has several contraindications: implanted spinal cord stimulators, cardiac pacemakers, and ipsilateral metallic hardware in the limb to be studied for PSI for example. Ipsilateral hardware is contraindicated due to the metallic artifact created by the scan would render the imaging useless for planning. Theoretically, CT-based PSI does not have such artifact and therefore can be used in this situation. The purpose of the present retrospective study was to determine the feasibility, safety, and accuracy of CT-based PSI in this specific group of patients.

Over 600,000 Americans undergo total knee arthroplasty (TKA) for end-stage knee osteoarthritis (OA) each year[1]. Total knee arthroplasty is generally considered safe and clinically effective in ameliorating pain and restoring joint function[2]. Conventional TKA utilizes extensive use of visual landmarks and manually aligned instrumentation in an attempt to restore a neutral mechanical axis. Component placement reliability and accuracy is critically important to achieving maximal prosthesis survival and satisfactory clinical outcomes. However, the most commonly cited reasons for TKA revision are related to surgical technique errors[3]. Significant postoperative malalignment of the hip-knee-ankle (HKA) angle generally reduces prosthesis longevity due to abnormal stresses at the bearing surfaces. Even in experienced centers, conventional TKA can result in malalignment in 25-40% of cases[4-7]. A varus or valgus deviation ≤3° from neutral is generally considered an acceptable "safe zone" whereas malalignment >3° in either direction is associated with chronic postoperative pain, higher component failure rates, and lower survival rates[8-10].

Computer-assisted surgery (CAS) was introduced over a decade ago as a means to increase surgical precision during TKA. CAS results in neutral postsurgical alignment in approximately 90% of cases, reducing the risk of malalignment by approximately 50% compared to conventional TKA[11]. However, CAS has not been widely adopted due to high expense, long procedure times, unacceptable complication rates including pin loosening and bone fracture, and a protracted surgeon learning curve, all with no discernible improvement in patient outcomes compared to conventional TKA[12, 13].

Three-dimensional (3D) reconstructions of preoperative computed tomography (CT) or magnetic resonance imaging (MRI) scans have recently been used to develop "patient-specific" instrumentation (PSI) to be used during TKA. Bone resection location, implant rotation and position, and implant sizes are pre-planned with PSI, thereby eliminating the need for intramedullary or extramedullary guides. Theoretical benefits of PSI include increased surgical efficiency, lower instrument burden in the operating room, improved accuracy, less blood loss, superior surgical outcomes, and improved prosthesis survival. However, results from published studies using PSI for TKA report mixed outcomes[14]. The reason for these discrepancies is unknown, but may be due to the tremendous variation in imaging protocols (combinations of CT, MRI, and/or radiographs of the knee and/or leg) and instruments (positioning pins used with conventional cutting blocks or customized cutting blocks) that are used among different manufacturers of PSI.

Patients with existing metal implants near the knee joint are contraindicated for PSI technologies that utilize MRI since the spatial encoding mechanisms are often severely compromised, resulting in image degradation and imprecise model reconstructions[15-18]. CT-based protocols are not subject to the same metal artifact and, therefore, can be used for patients with existing metal at or near the knee. No known studies have been conducted with PSI-based TKA in patients with existing metal instrumentation. We present a retrospective case series that evaluates the clinical utility of a novel, patient-matched technology based on 3D CT reconstructions in patients undergoing TKA with pre-existing metal implants near the knee.

MATERIALS METHODS

The current study was initiated following institutional review board approval. All primary TKA's performed by the senior author were reviewed between November, 2010 and July, 2012 to find patients with ipsilateral hardware about the knee prior to their surgery. Nine patients (11 TKA's) were identified. Demographic data, knee Range of Motion (ROM), Knee Society Scores (KSS), and long-standing radiographic alignment were assessed for all patients. Data were analyzed using Predictive Analytics Software (v. 18, SPSS, Inc., Chicago, IL, USA). Continuous data were reported as mean and standard deviation and categorical data were reported as frequencies and percentages. Longitudinal changes in KSS, knee range of motion, and HKA angle were assessed with the Wilcoxon signed rank test. Statistical significance was set at $p<0.05$.

ID	Gender	Age	BMI	Hardware Description	KSS-Knee	KSS-Function	ROM (°)	HKA (°)*
1	F	61	29.6	SS screws	47	60	80	-10.5
2	M	54	31.7	SS staple	46	60	100	-7.5
3	M	63	38.4	SS brackets & screws	27	30	110	-7.0
3	-	-	-	SS brackets & screws	27	30	110	-5.0
4	M	52	23.0	SS screw	55	50	100	-2.5
5	M	49	34.5	SS screw & staple	46	70	95	-6.0
6	F	52	30.2	Titanium nail	36	45	105	+4.5
7	F	54	33.9	SS staple	35	50	95	-7.0
8	F	54	38.4	SS staple	53	50	115	0
8	-	-	-	SS staple	52	50	110	0
9	F	44	28.7	SS screw	52	70	110	-1.5

BMI: body mass index; **HKA**: hip-knee-ankle; **KSS**: Knee Society Score; **ROM**: range of motion; **SS**: stainless steel; *(-) varus (+) valgus

Tab. 1 - Individual patient characteristics.

Variable	Values	Min - Max
Patients, *n*	9	
Knees, *n*	11	
Side (left, right), *n*	5,6	
Female Gender, *n (%)*	5 (56)	
Age, *yr, mean ± SD*	54 ± 6	44 – 63
Body Mass Index, *kg/m², mean ± SD*	32 ± 5	23 – 38
Range of Motion, *°, mean ± SD*	103 ± 10	80 – 115
Flexion	105 ± 9	85 – 115
Extension	2 ± 3	0 – 5
KSS Knee, *mean ± SD*	43 ± 10	27 – 55
KSS Function, *mean ± SD*	51 ± 13	30 – 70
Malalignment*, *°, mean ± SD*	5 ± 3	0 – 11
Alignment Category*		
Neutral (±3°), *n (%)*	4 (36)	
Varus (<–3°), *n (%)*	6 (55)	
Valgus (>+3°), *n (%)*	1 (9)	

*Defined as absolute deviation from neutral.

Tab. 2 - Baseline patient characteristics.

All patients underwent MyKnee (Medacta International) CT PSI utilizing the Medacta GMK total knee. A proprietary CT protocol of the hip, knee, and ankle that standardizes lower extremity rotation is performed and the images were electronically transferred to Medacta International, Inc. (San Pietro, Switzerland). The lower extremity is three-dimensionally reconstructed using proprietary algorithms and the surgical plan is developed. Surgical planning included selection of femoral/tibial implant size, depths of femoral/tibial resections, femoral rotation, and femoral/tibial angles based on reconstructions as well as surgeon preferences. Once the plan is approved by the surgeon, the custom cutting blocks are manufactured and delivered to the hospital for operative use.

All knees were approached via a medial parapatellar approach. Care was taken to preserve the osteophytes within in the knee as the PSI jigs utilize the "positive topography" of the bony landmarks for registration. All knees were performed with a femur first technique. The soft tissue overlying the bony contact areas for the PSI jig was removed. The femoral jig (Fig. 1a) was then registered to bone in similar fashion to the reference model supplied with the jig. Once placed, it was secured with smooth pins. Additionally, rotation pins were drilled setting the femoral rotation. Rotation, depths of resection, and flexion of the distal femoral resection were verified and the resection was performed through the jig itself. The jig was removed and a standard 4-in-1 cutting block was placed over the preset rotation pins and the remaining femoral resections were performed in routine fashion.

The tibia was exposed in routine fashion. Soft tissue overlying the contact areas for the resection jig was meticulously cleaned. The tibial jig (Fig. 1b) was next registered in similar fashion to the femur. Once slope, rotation, and depth of resection were verified, the bone was resected directly through the jig itself.

A

B

Fig. 1 - (a) Femoral and (b) tibial MyKnee® cutting blocks.

Hardware was removed only if it was necessary for implantation of the knee prosthesis. Soft tissue balancing, final bone preparation, and patella resurfacing were performed in routine fashion. The tourniquet was released after prosthesis implantation and during cement polymerization.
Patients were followed through hospital discharge and returned for visits at 6 weeks and annually thereafter. Patient outcomes included Knee Society Scores (KSS)[19], which were rated as Excellent (80-100), Good (70-79), Fair (60-69), and Poor (0-59)[20], and knee range of motion. Postoperative alignment was assessed with standing long leg anteroposterior radiographs.

An independent clinical research firm (Hill Country Clinical Research, Austin, TX, USA) performed the review of patient files, assessed patients for inclusion/exclusion criteria, and selected the patients to be included in this analysis. Data were analyzed using Predictive Analytics Software (v. 18, SPSS, Inc., Chicago, IL, USA). Continuous data were reported as mean and standard deviation and categorical data were reported as frequencies and percentages. Longitudinal changes in KSS, knee range of motion, and HKA angle were assessed with the Wilcoxon signed rank test. Statistical significance was set at $p<0.05$.

RESULTS

11 TKAs in 9 patients were identified for inclusion into the study. Two patients underwent bilateral-staged TKA's separated by3 to 5 months between procedures. Significant varus or valgus deformity (>3° from neutral) was identified in 7 of 11 knees before surgery. There were 5 female patients and 4 male patients with an average age of 54 (range 44 - 63) and body mass index of 32 (range 23 - 38). Preo-operative mean Range of Motion (ROM) was 103° (range 80° - 115°). hardware consisted of staples (5), plates with screws (3), ACL interference screws (3), and an intramedullary rod (1). All hardware was stainless steel with the exception of one patient with a titanium rod. KSS Pain scores measured 43 (range 27 - 55) and KSS Function scores were 51 (range 30 - 70). Pre-operative alignment of patients revealed 6 patients (55%) with varus deformity, 4 neutral (36%), and 1 patient (9%) with valgus deformity. Average radiographic deformity was 5° (range 0° - 11°).
No changes to the preoperative plan were made by the senior author. Hardware removal was performed only when required for clearance of the TKA prosthesis - 4 of 11 knees in this series. One patient had two staples removed and three patients had screws removed. Mean tourniquet time was 36±8 minutes. Blood loss was 150 cc for all cases. No intraoperative recuts were required and no complications were noted. Patients were routinely discharged from the hospital on the third postoperative day.

Follow-up
At the 6-week follow-up visit, knee ROM was comparable to pre-treatment levels. Knee flexion (105±9° to 105±11°, p=1.0) and extension were unchanged (2±3° to 3±3°, p=0.26), yielding a total knee ROM of 103±10° at pre-treatment and 101±13° at 6 weeks (p=0.82).

All patients reported significant improvements in KSS Knee and Function scores at latest follow-up. KSS Knee scores increased from 43±10 to 84±9 and Function scores similarly improved from 51±13 to 79±8. Both KSS subscore changes were statistically significant at $p<0.01$ (Figure 2). The number of knees classified as Excellent or Good based on KSS score increased from 0 to 10 (91%) for Knee ($p<0.01$) and from 2 (18%) to 10 (91%) for Function ($p<0.01$) (Table 3).

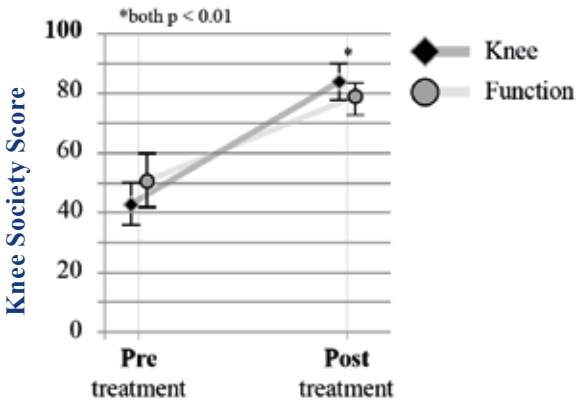

Fig. 2 - Knee Society Score following TKA. Values are median ± range.

KSS Class	Pre	Post	P-value*
Knee			
Excellent	0	8	
Good	0	2	<0.01
Fair	0	1	
Poor	11	0	
Function			
Excellent	0	8	
Good	2	2	<0.01
Fair	2	1	
Poor	7	0	

*Wilcoxon signed ranks test.

Tab. 3 - Change in Knee Society Score classification following Total Knee Arthroplasty with MyKnee Patient-Specific Instrumentation.

Preoperatively, 8 knees demonstrated a varus deformity ranging from 1.5° to 10.5°, 1 knee had a valgus deformity of 4.5º, and 2 knees were neutral. The absolute magnitude of HKA malalignment decreased from 4.7±3.4° (range: 0 to 10.5°) at pre-treatment to 1.0±1.0° (range: 0 to 3.0°). Postoperative HKA alignment was within 3° of neutral in all cases and within 2° in 10 of 11 cases (Figure 3). The patient with 3° postoperative varus alignment presented with the largest pre-treatment deformity, 10.5° varus.

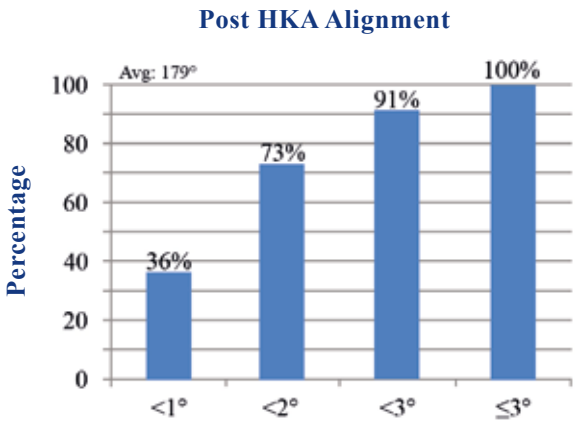

Fig. 3 - Hip-Knee-Ankle Alignment following TKA. Improvement in absolute hip-knee-ankle alignment was statistically significant at p<0.01.

No postoperative complications were reported and no reoperations were undertaken for any reason over a median follow-up period of 15 months (range: 6 to 28 months).

DISCUSSION

This retrospective case series demonstrated the feasibility, safety, and accuracy of CT-based PSI in patients undergoing TKA with pre-existing metal hardware near the knee. All cases were executed exactly as planned and alignment within 3° of neutral was achieved in every patient. Koch, et. al previously reported 90% of cases with a postoperative mechanical axis within 3° of neutral using the same technology[21]. Additionally, these data are at least comparable[15] and, in most cases, superior[17, 18, 22], to the widely disparate alignment outcomes observed in studies with other PSI technologies[15].

As stated previously, PSI utilizes multiple imaging modalities depending on the image acquisition algorithm used. MRI, CT, long-standing X-ray, short-standing X-ray, or combination are used in the various companies protocols for the technology. It is our opinion the CT-based imaging protocol for has several advantages over other imaging protocols that may translate to superior clinical and radiographic outcomes[23]. First, CT provides superior imaging quality over MRI, particularly at the femorotibial boundaries and identification of the bony joint line. It is well documented that MRI only estimates cartilage thickness, does not visualize the bony anatomy as well as CT reconstruction and thus identification of the joint line is difficult. This can result in reconstruction errors, cutting block mismatch, and lack of accuracy. Bone models generated from MRI scans are less accurate with more distorting artifact versus those constructed from CT[23]. Some authors have reported frequent intraoperative changes to the pre-determined PSI plan utilizing MRI-based protocols[24].
MRI is contraindicated for patients with pacemakers and presents significant challenges for obese or claustrophobic patients. Perhaps most applicable to the current series, MRI is not appropriate for patients with metal implants near the knee joint. In fact, these patients have historically been excluded from clinical trials of PSI given the pronounced image distortion with MRI in the presence of metal The present study clearly demonstrates efficacy of the CT-based PSI technology even in clear contraindication to MRI-based PSI.
Several comparative studies of PSI vs. conventional TKA reported minimal blood loss, shorter operative time, shorter tourniquet time, and fewer instrument trays used with PSI[25-27]. Indeed, the mean tourniquet time in the current series was 36 minutes, which suggests improved surgical efficiency. Additionally, shorter tourniquet times

portend a lower postoperative complication rate[28]. Although these inherent procedural efficiencies may potentially lower hospital costs, this benefit may be offset by imaging and block construction costs. Cost effectiveness data for PSI during TKA are currently unavailable.

A limitation of CT-based PSI is patient exposure to ionizing radiation. However, a CT scan of the knee with scout scans of the hip and ankle exposes the patient to no more radiation than a traditional long-leg x-ray. Despite the small number of patients and lack of a control group in this retrospective case series, it represents the only study to investigate the feasibility of PSI in patients with existing hardware near the knee. Additional follow-up in these patients is required to assess prosthesis survival, long-term clinical outcomes, and cost effectiveness. Importantly, the results presented in this report are specific only to the MyKnee® PSI system; more data is needed to assess efficacy of other CT-based PSI systems.

CONCLUSION

CT-based PSI using MyKnee® PSI is feasible, safe, and accurate in patients undergoing TKA with pre-existing metal hardware near the knee.

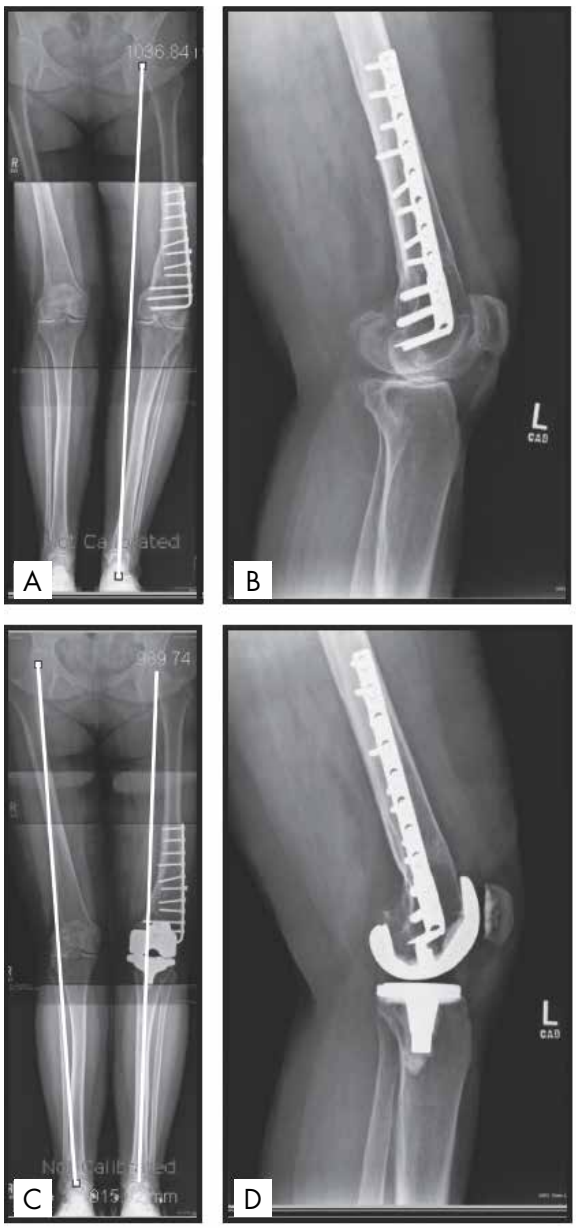

Fig. 4 - Patient presented s/p distal femoral varus osteotomy complicated by a fall, which broke the plate and required revision surgery. Preoperative imaging demonstrated significant left leg varus (a) with a stainless steel plate and screws in the distal femur (b). Postoperative imaging demonstrated excellent restoration of the mechanical axis (c) with no removal of existing hardware required (d).

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DECLARATION OF INTEREST

TDG is a consultant for and receives royalties from Medacta. LEM and JEB received financial support from TDG Holdings, Inc. (Austin, TX, USA). No funds were received for this research.

CASE 1:

Significant Varus Degenerative Joint Disease

TYLER GOLDBERG, MD - North Austin Medical Center, Austin, TX, United States

1. PRE-OPERATIVE

- Patient Details

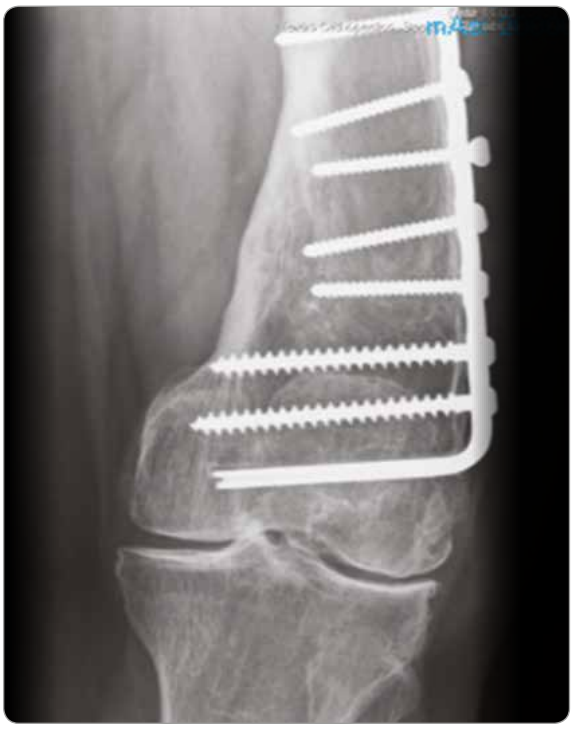
Age	59 years
Sex	Female
Disease	11° varus left knee with distal femoral metal plate.

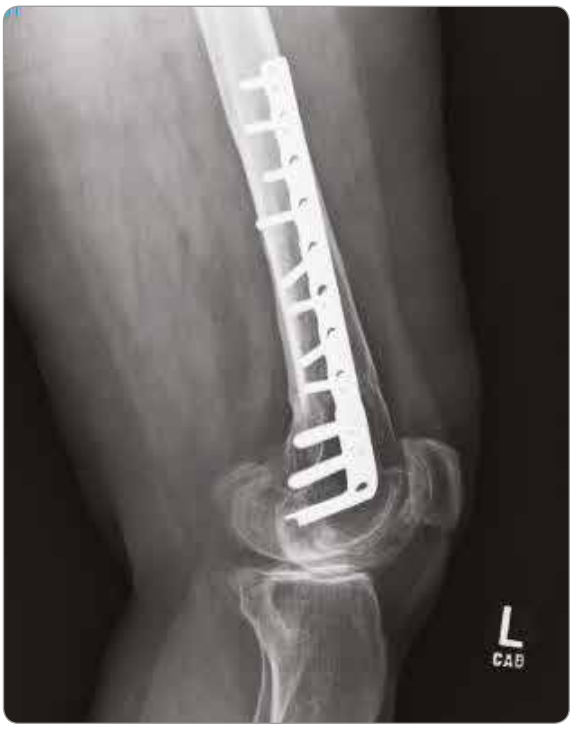
The patient had a history of Degenerative Joint Disease in the left knee. In 1998 was treated with distal femoral varus osteotomy (DFVO) to correct the alignment in the coronal plane. The planning was developed by the MyKnee team in cooperation with the surgeon. They were able to correct the deformity and restore the motion without removing the plate.

- Pre-operative Data [°]

HKA	169.5
Femur Valgus (from bone)	16.0
Tibia Varus (from bone)	2.5
Tibia Posterior Slope	8.5
Femoral Rotation (Epicondyles vs Posterior Condyles)	2.0

- Pre-operative CT Scan



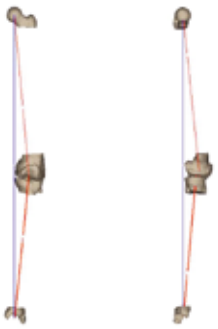


MyKnee CT BASED REV.0 – 29-Oct-2010

MyKnee Surgical Planning Report

CASE CODE	A_STC_LTK_TG_21061951
SURGEON	Tyler Goldberg
SURGERY DATE	12 Nov 2010
SURGICAL APPROACH	Medial

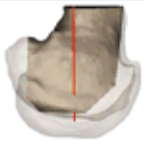
LONG AXIS VIEW



PREOPERATIVE DATA [°]	
HKA	169.5
Femur Varus (from bone)	16.0
Tibia Valgus (from bone)	2.5
Tibia Posterior Slope	8.5
Epic Axis vs Post Cond	2.0

LEFT TOTAL KNEE	**DEFAULT**	**CHANGED**
Femoral Implant Size	4	
Tibial Implant Size	3	

FEMUR

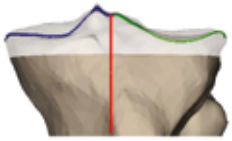


FEMORAL RESECTIONS [mm]	**DEFAULT**	**CHANGED**
Lateral Posterior Cut	6.0	
Medial Posterior Cut	8.0	
Lateral Distal Cut	13.0	
Medial Distal Cut	2.0	
FEMORAL ANGLES [°]		
Varus	2.0	
Flexum	2.0	
ROTATION[°]		
External Rotation vs. epicondyles	0.0	

Warning!

This case is based on CT data! All measurements are shown from bone and do not include any cartilage thickness.

TIBIA



TIBIAL RESECTIONS [mm]	**DEFAULT**	**CHANGED**
Lateral Tibial Cut	6.0	
Medial Tibial Cut	8.0	
TIBIAL ANGLES [°]		
Valgus	0.0	
Posterior Slope	3.0	

Warning!

This case is based on CT data! All measurements are shown from bone and do not include any cartilage thickness.

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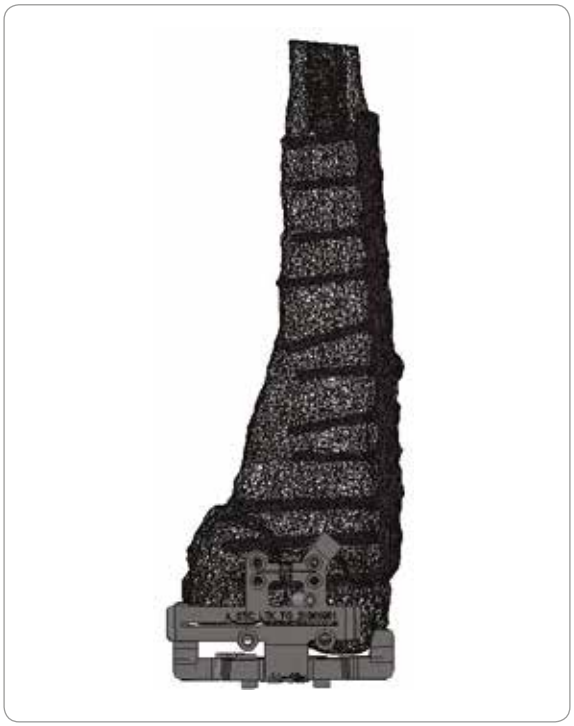
CASE 1: Significant Varus Degenerative Joint Disease

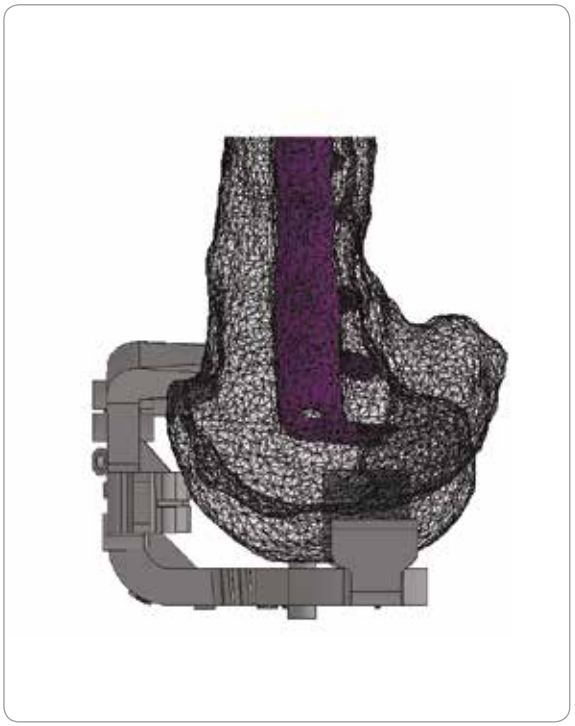
2. MYKNEE ANALYSIS

The patient's HKA measured 169°, with a tibial valgus of 2.5° and a femur varus of 16°. Without leaving any residual varus on the femur, the proposed resections for the implantation of GMK Primary were:

Lateral posterior cut	6.0 mm
Medial posterior cut	8.0 mm
Lateral distal cut	15.0 mm
Medial distal cut	2.0 mm

The surgeon decided to have a residual varus of 2°, in order to decrease the distal lateral resection, maintaining the proposed distal medial resection and the posterior resections. In accordance with the MyKnee team, the surgeon planned the tibia at 0°. Below the planning of femoral cutting block positioning; any impingement with the femoral plate was prevented.



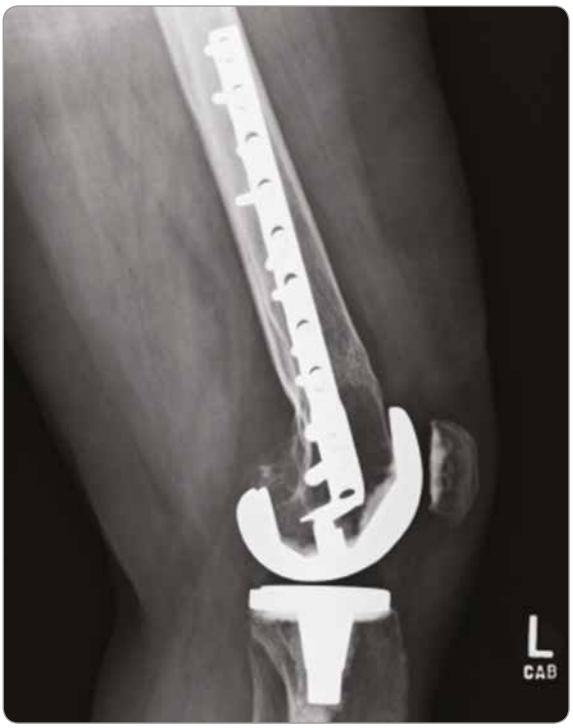


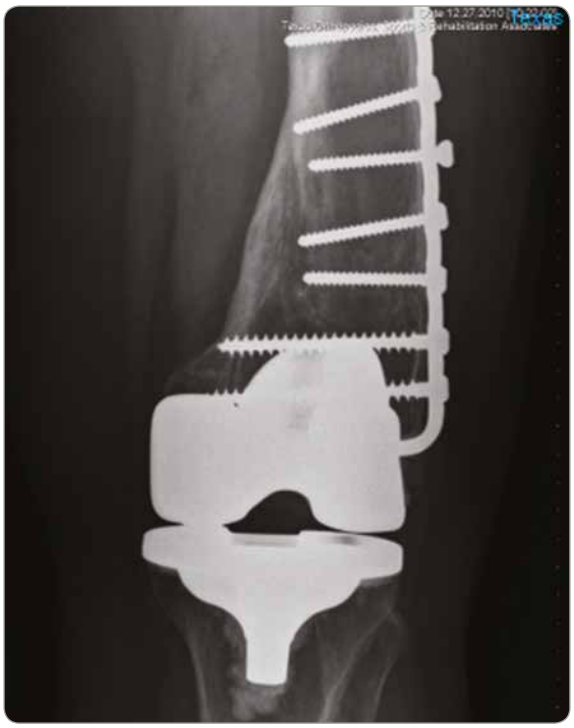
3. POST-OPERATIVE

The patient hospital stay was 3 days only and, 6 weeks after the surgery, the Range of motion of the operated knee was 5°-105°. Advancement to WBAT by 2 weeks and off pain meds by 4 weeks. The patient was very happy with alignment. The surgeon found the MyKnee technology perfect for this specific case. The CT-based MyKnee cutting blocks allowed for an excellent reconstruction of the joint, without being hindered by the presence of the femoral plate, that could be left in place during and after the surgery. The MyKnee pre-operative planning helped the surgeon to accurately study the implant positioning, ensuring a very satisfactory outcome. He was able to correct the deformity and restore the motion without removing the plate.

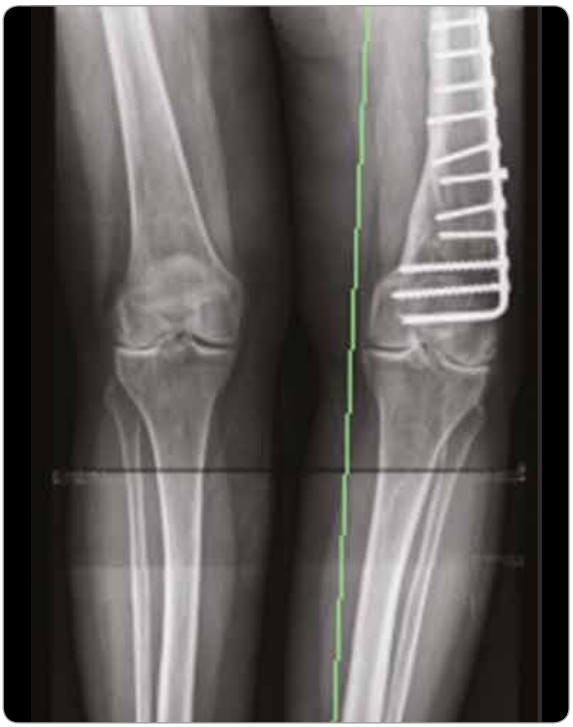
TYLER GOLDBERG, MD - North Austin Medical Center, Austin, TX, United States

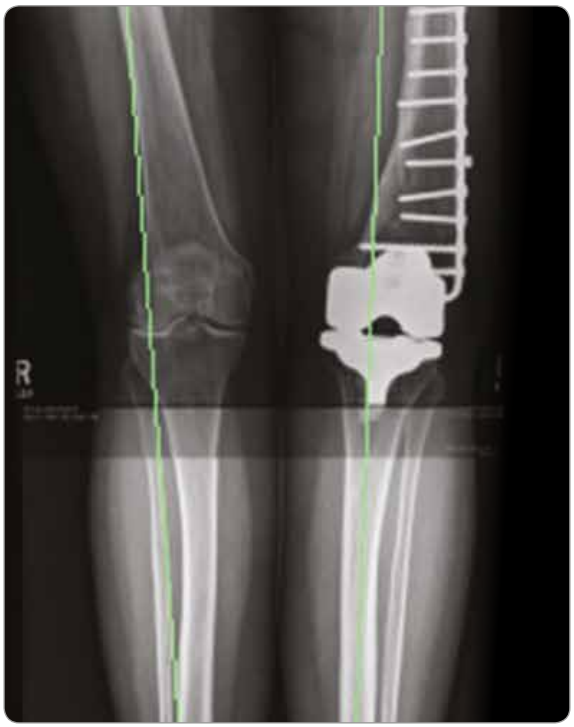
- Post-operative CT Scan





- Pre-operative vs post-operative mechanical alignment





CASE 2:

Significant Valgus Degenerative Joint Disease

MARIO WALLNER, MD - LKH Wolfsberg, Wolfsberg, Austria

1. PRE-OPERATIVE

- Patient Details

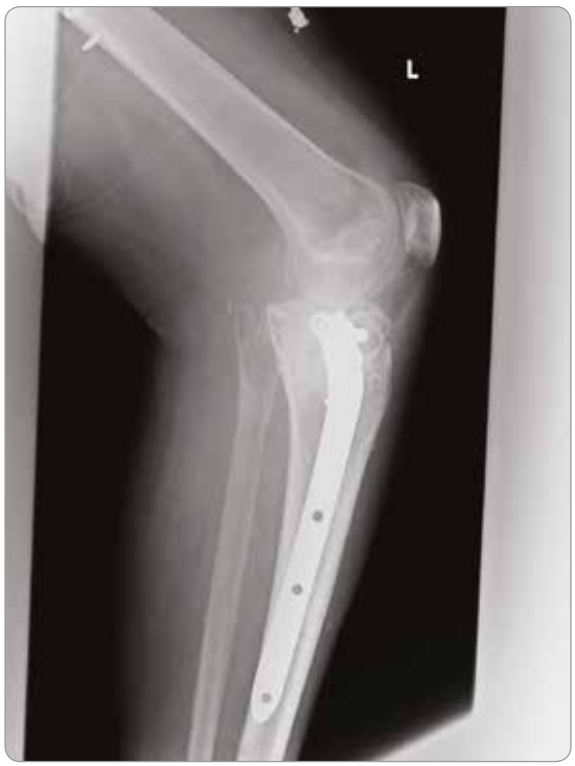
Age	61 years
Sex	Male
Disease	11° valgus left knee with plate with screws on the lateral side of the tibia.

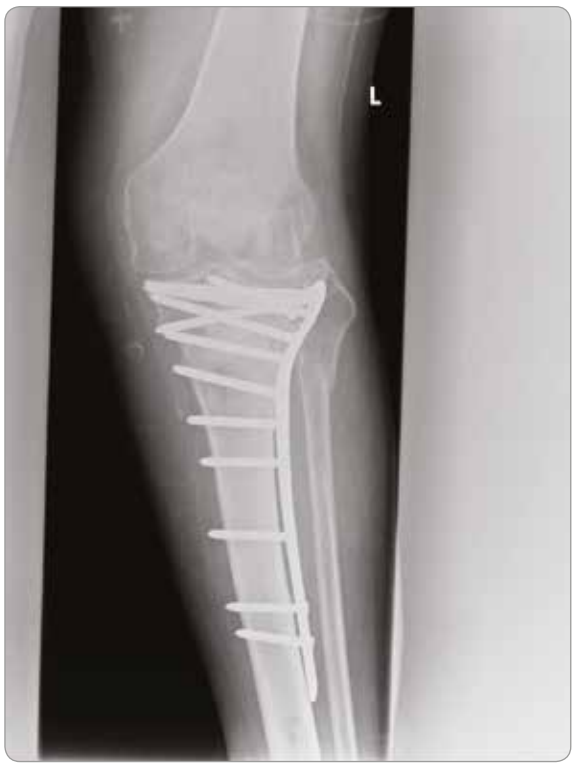
The patient had a history of Degenerative Joint Disease in the left knee. The planning was developed by the MyKnee team in cooperation with the surgeon to restore the mechanical alignment of the affected limb. The removal of the tibial plate and the screws has been deemed necessary to perform the tibial resection and position the tibial baseplate.

- Pre-operative Data [°]

HKA	191.5
Femur Valgus (from bone)	3.5
Tibia Varus (from bone)	11.5
Tibia Posterior Slope	4.0
Femoral Rotation (Epicondyles vs Posterior Condyles)	2.5

- Pre-operative CT Scan



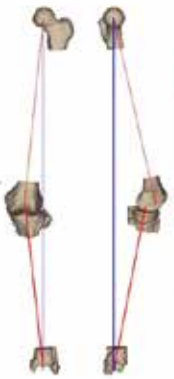


MyKnee CT BASED REV.1 – 24-Nov-2014

MyKnee Surgical Planning Report

CASE CODE	A_KUR_LTK_MW_12041953
SURGEON	Mario Wallner
SURGERY DATE	16 Dec 2014
SURGICAL APPROACH	Medial
PRODUCT	GMK Primary
CUTTING BLOCKS	LBS (Femur) + STD (Tibia)

LONG AXIS



CAUTION

This case is based on CT data:

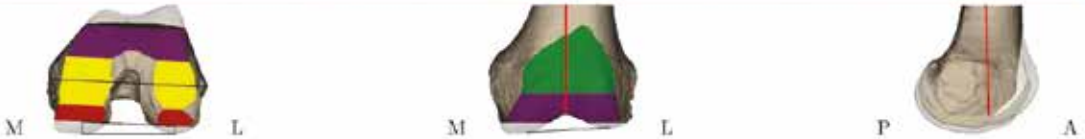
REMOVE FROM THE BONE THE CARTILAGE AND SOFT TISSUES COVERING THE CUTTING BLOCK CONTACT AREAS.

All measurements shown are from the bone and do not include the thickness of the cartilage.

PREOPERATIVE DATA [°]	
HKA	191.5
Femur Valgus (from bone)	3.5
Tibia Valgus (from bone)	11.5
Tibia Posterior Slope	4.0
Epic Axis vs Post Cond	2.5

LEFT TOTAL KNEE	DEFAULT	CHANGED
Femoral Implant Size	6 Narrow	
Tibial Implant Size	5	

FEMUR



FEMORAL RESECTIONS [mm]	DEFAULT	CHANGED	COMMENTS
Lateral Posterior Cut	4.5		
Medial Posterior Cut	7.0		
Lateral Distal Cut	3.0		
Medial Distal Cut	6.0		
FEMORAL ANGLES [°]			
Valgus	0.0		
Flexum	2.0		
ROTATION [°]			
External Rotation vs. epicondyles	0.0		

TIBIA

TIBIAL RESECTIONS [mm]	DEFAULT	CHANGED
Lateral Tibial Cut	1.5	-3.0
Medial Tibial Cut	11.0	5.0
TIBIAL ANGLES [°]		
Valgus	0.0	2.0
Posterior Slope	5.0	3.0

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CASE 2: Significant Valgus Degenerative Joint Disease

2. MYKNEE ANALYSIS

The MyKnee team evaluated the possibility to implant GMK Primary without removing the femoral plate. A simulation of cutting block and prosthesis position was performed to verify whether the plate or the screws could cause any interference during the surgery. An impingement between the standard fixation pins of MyKnee tibial cutting block and the proximal screws of the plate was found.

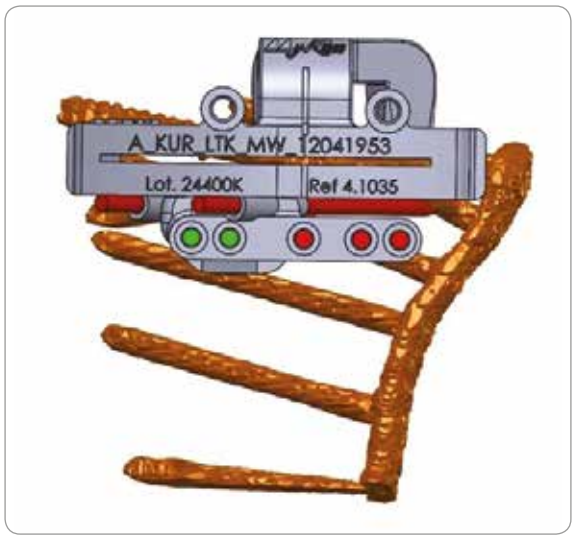
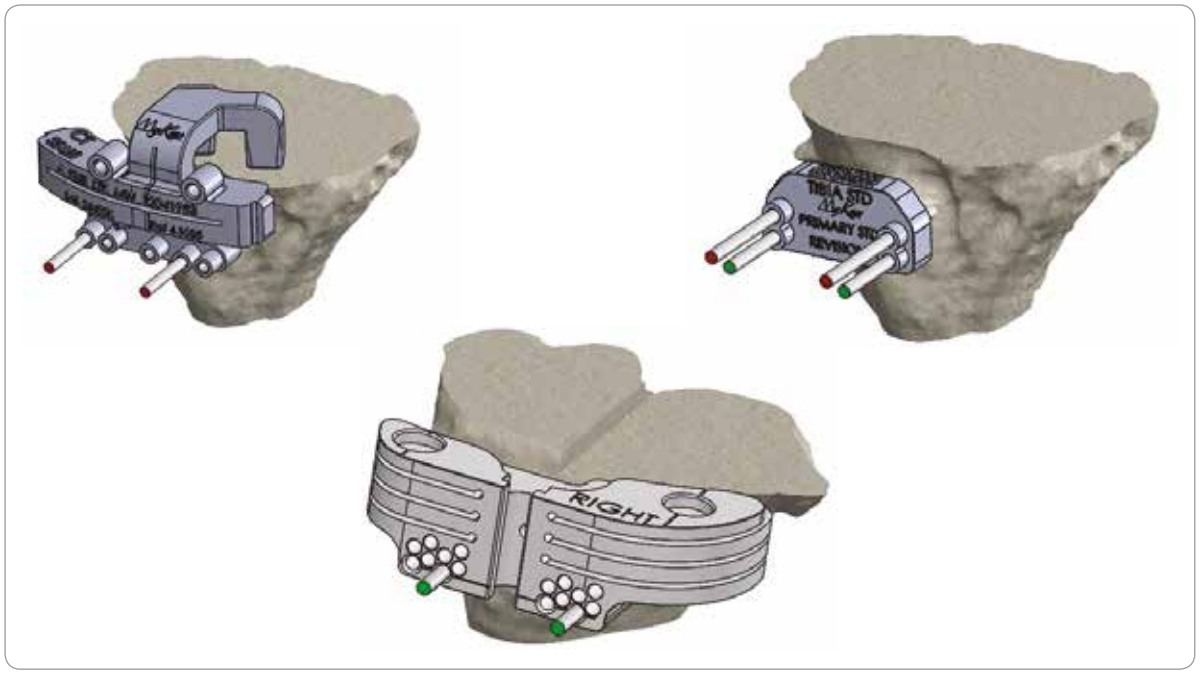


Plate and screws were removed to allow the proximal resection and the positioning of tibial baseplate. Through the accurate MyKnee planning and the easy-to-use Cross-over instrumentation, the implantation of a constrained implant to compensate the high joint instability has been extremely straightforward. A tibial augment was placed in the lateral compartment to compensate the lack of bone after metal plate removal and the surgeon decided to stabilize both tibia and femur using an extension stem.

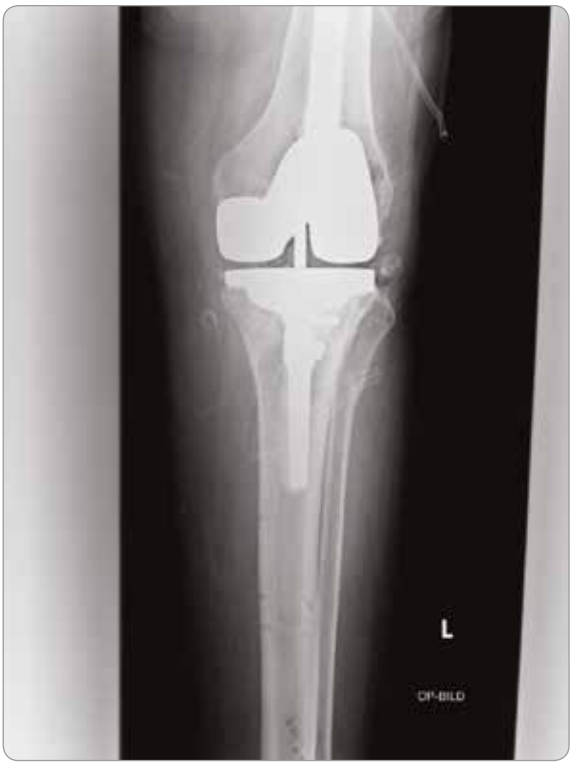


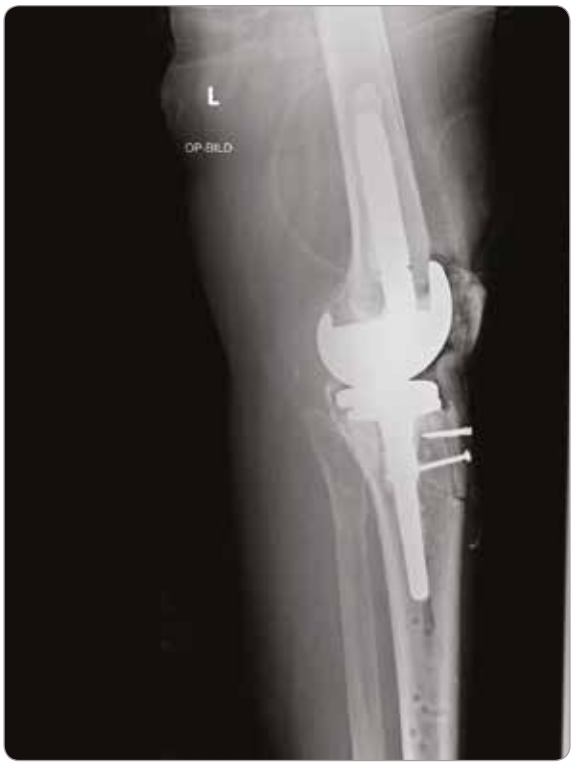
MARIO WALLNER, MD - LKH Wolfsberg, Wolfsberg, Austria

3. POST-OPERATIVE

The modularity of GMK system implants combined with the accuracy of MyKnee technology was really appreciated by the surgeon. This led to great results in terms of joint stability and mechanical alignment.

- Post-operative CT Scan





CASE 3:

Bilateral arthrosis defect

MARKUS PISAN, MD - *Kantonsspital Winterthur, Winterthur, ZH, Switzerland*

1. PRE-OPERATIVE

- Patient Details

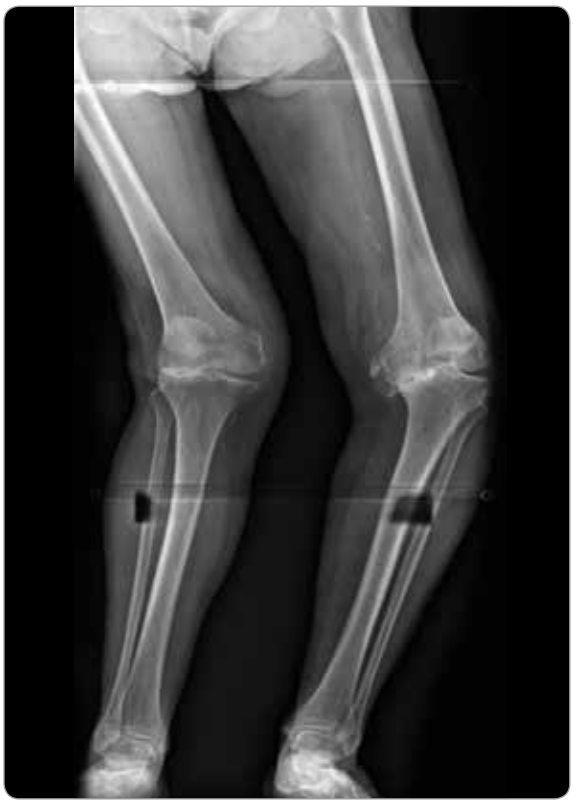
Age	78 years
Sex	Female
Disease	Bilateral arthrosis defect. 10.5° valgus (right knee) 13° varus (left knee)

The surgeon and the MyKnee team planned the positioning of a constrained implant in both the left and the right knee, to recover joints' functioning and stability.

- Pre-operative Data [°]

	Left knee	Right knee
HKA	167.0	190.5
Femur Valgus (from bone)	3.0	10.0
Tibia Varus (from bone)	18.5	7.5
Tibia Posterior Slope	10.0	8.0
Femoral Rotation (Epicondyles vs Posterior Condyles)	4.5	6.5

- Pre-operative CT Scan

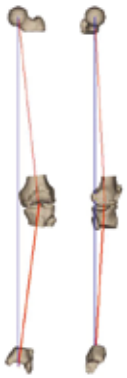


MyKnee CT BASED REV.1 – 23-Jul-2013

MyKnee Surgical Planning Report

CASE CODE	H_STA_LTK_MP_06101935
SURGEON	Markus Pisan
SURGERY DATE	20 Aug 2013
SURGICAL APPROACH	Medial
PRODUCT	GMK Primary
CUTTING BLOCKS	LBS (Femur) + STD (Tibia)

LONG AXIS



CAUTION
This case is based on CT data:

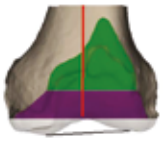
REMOVE FROM THE BONE THE CARTILAGE AND SOFT TISSUES COVERING THE CUTTING BLOCK CONTACT AREAS.

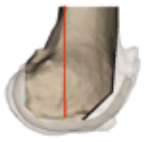
All measurements shown are from the bone and do not include the thickness of the cartilage.

PREOPERATIVE DATA [°]	
HKA	167.0
Femur Valgus (from bone)	3.0
Tibia Varus (from bone)	18.5
Tibia Posterior Slope	10.0
Epic Axis vs Post Cond	4.5

LEFT TOTAL KNEE	DEFAULT	CHANGED
Femoral Implant Size	3	
Tibial Implant Size	3	

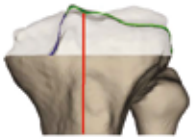
FEMUR

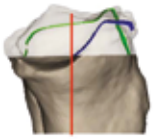




FEMORAL RESECTIONS [mm]	DEFAULT	CHANGED	COMMENTS
Lateral Posterior Cut	7.5	8.5	
Medial Posterior Cut	10.0	11.0	
Lateral Distal Cut	5.5	6.5	
Medial Distal Cut	8.0	9.0	
FEMORAL ANGLES [°]			
Valgus	0.0		
Flexum	3.0	1.0	
ROTATION[°]			
External Rotation vs. post. cond.	3.0		

TIBIA





TIBIAL RESECTIONS [mm]	DEFAULT	CHANGED
Lateral Tibial Cut	13.5	
Medial Tibial Cut	-2.0	
TIBIAL ANGLES [°]		
Valgus	0.0	
Posterior Slope	3.0	1.0

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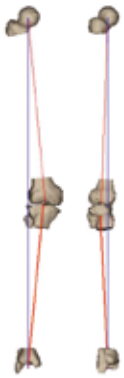
CASE 3: Bilateral arthrosis defect

MyKnee CT BASED REV.1 – 23-Jul-2013

MyKnee Surgical Planning Report

CASE CODE	H_STA_RTK_MP_06101935
SURGEON	Markus Pisan
SURGERY DATE	20 Aug 2013
SURGICAL APPROACH	Medial
PRODUCT	GMK Primary
CUTTING BLOCKS	LBS (Femur) + STD (Tibia)

LONG AXIS



CAUTION
This case is based on CT data:

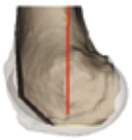
REMOVE FROM THE BONE THE CARTILAGE AND SOFT TISSUES COVERING THE CUTTING BLOCK CONTACT AREAS.

All measurements shown are from the bone and do not include the thickness of the cartilage.

PREOPERATIVE DATA [°]	
HKA	190.5
Femur Valgus (from bone)	10.0
Tibia Valgus (from bone)	7.5
Tibia Posterior Slope	8.0
Epic Axis vs Post Cond	6.5

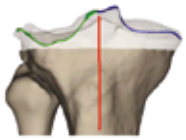
RIGHT TOTAL KNEE	DEFAULT	CHANGED
Femoral Implant Size	3 Narrow	3
Tibial Implant Size	3	

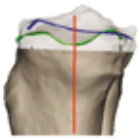
FEMUR



FEMORAL RESECTIONS [mm]	DEFAULT	CHANGED	COMMENTS
Lateral Posterior Cut	6.0	5.5	
Medial Posterior Cut	8.5	8.0	
Lateral Distal Cut	4.5	-2.0	
Medial Distal Cut	10.5	5.0	
FEMORAL ANGLES [°]			
Valgus	1.0	0.0	
Extension	0.5	0.0	
ROTATION[°]			
External Rotation vs. post. cond.	3.0		

TIBIA





TIBIAL RESECTIONS [mm]	DEFAULT	CHANGED
Lateral Tibial Cut	2.0	3.0
Medial Tibial Cut	9.0	
TIBIAL ANGLES [°]		
Valgus	1.0	0.0
Posterior Slope	5.0	2.0

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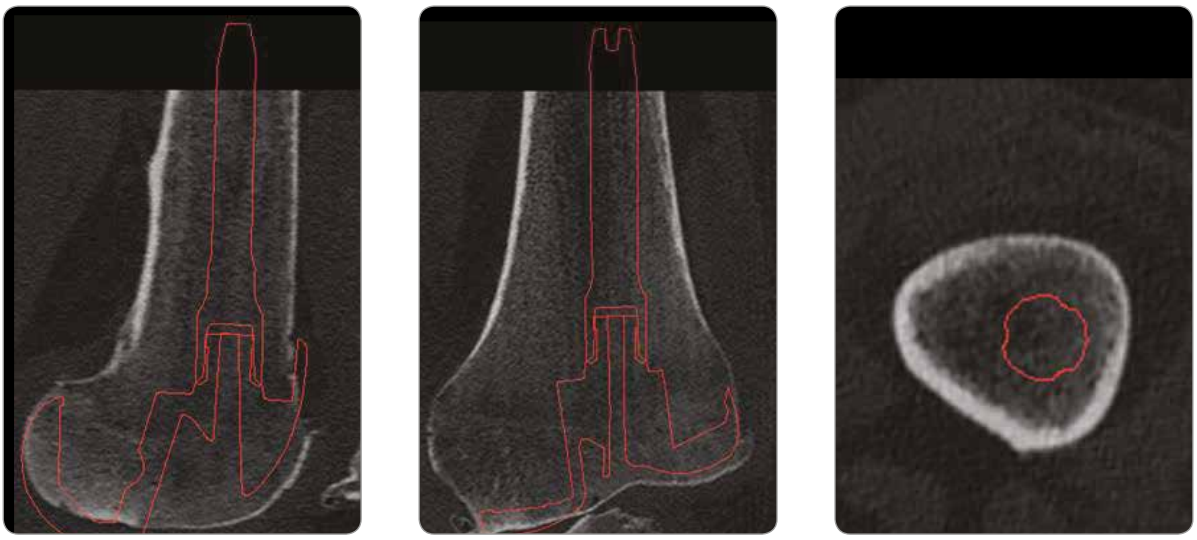
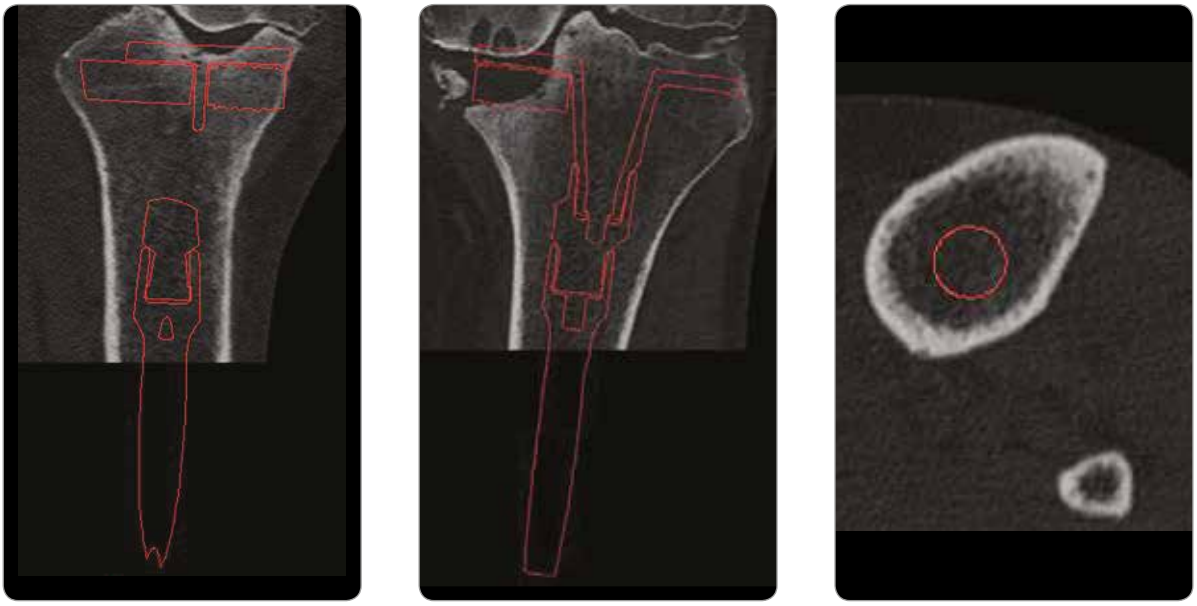
MARKUS PISAN, MD - Kantonsspital Winterthur, Winterthur, ZH, Switzerland

2. MYKNEE ANALYSIS

Left knee: the MyKnee team proposed a stemmed femur for the left knee, with an adapted planning to avoid any cortical impingement of the femoral stem. Below is shown the pre-operative planning of implant positioning in the left femur. The red line represents the MyKnee proposal with a 12 x 65 mm extension stem.

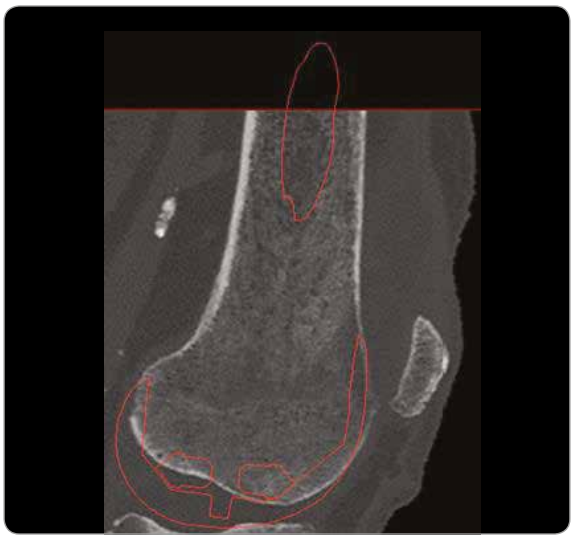


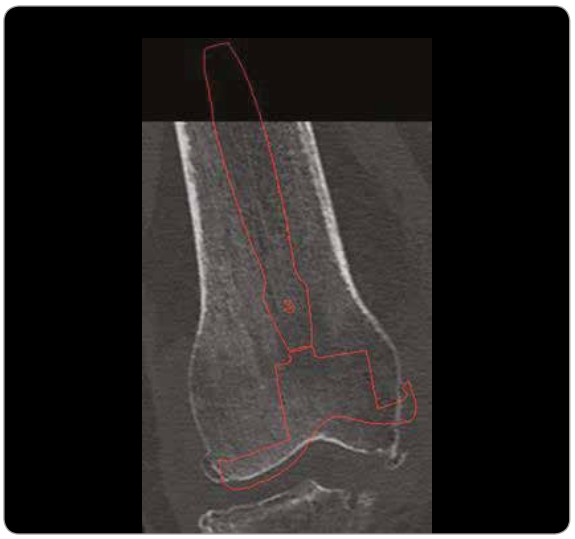
The surgeon accepted the proposed resection values but decided, in collaboration with the MyKnee team, to implant the femoral component without the extension stem. Concerning the left tibia planning, the MyKnee team reduced the slope from 3° to 1° to allow a stem positioning and evaluated the use of 10 mm medial wedge. It was necessary to place the stem as medially as possible (offset of 3 mm), to reduce the risk of contact between the stem and the cortical bone. The following image shows the pre-operative planning of implant positioning in the left tibia. The red line represents the proposed solution with a 10 mm extension stem (offset of 3 mm to medialize the stem).



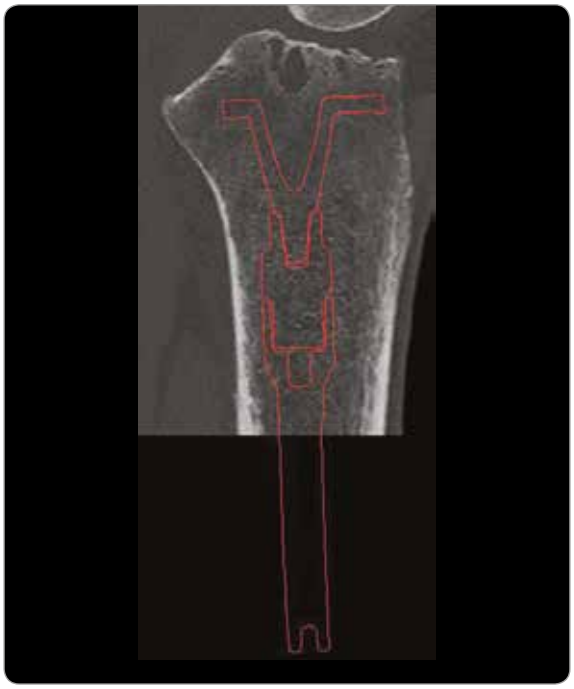
CASE 3: Bilateral arthrosis defect

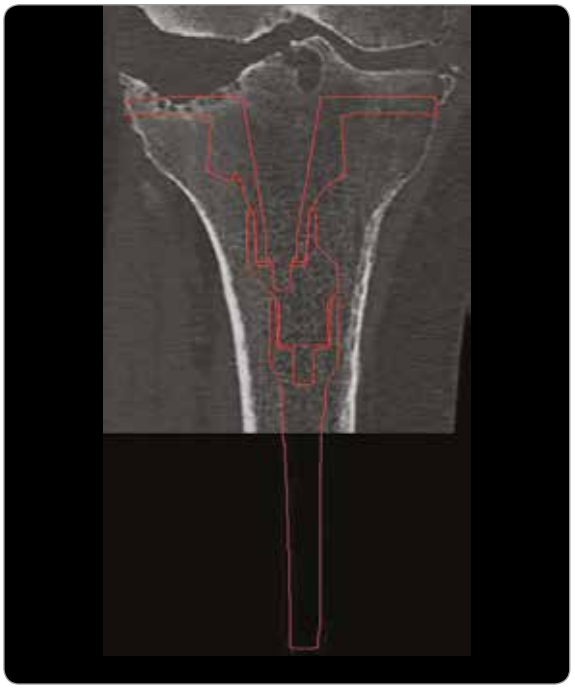
Right knee: during the planning phase of the right knee, the MyKnee technicians have considered the particular morphology of the right femur and thus proposed to implant a distal wedge. In collaboration with the surgeon, they evaluated the possibility to use a 10 mm extension stem to stabilize the femur with a medial offset of 3 mm. In the picture below the red line represents the proposed solution for the right femur (10 mm extension stem with an offset of 3 mm).





The MyKnee team and the surgeon decided to stabilize the tibia with a 10x65 mm extension stem. To reduce the risk of contact between the stem and the cortical bone, the stem was medialized with a 5 mm offset and the slope has been changed from 5° to 2°. The following image shows the proposed solution for the right tibia.





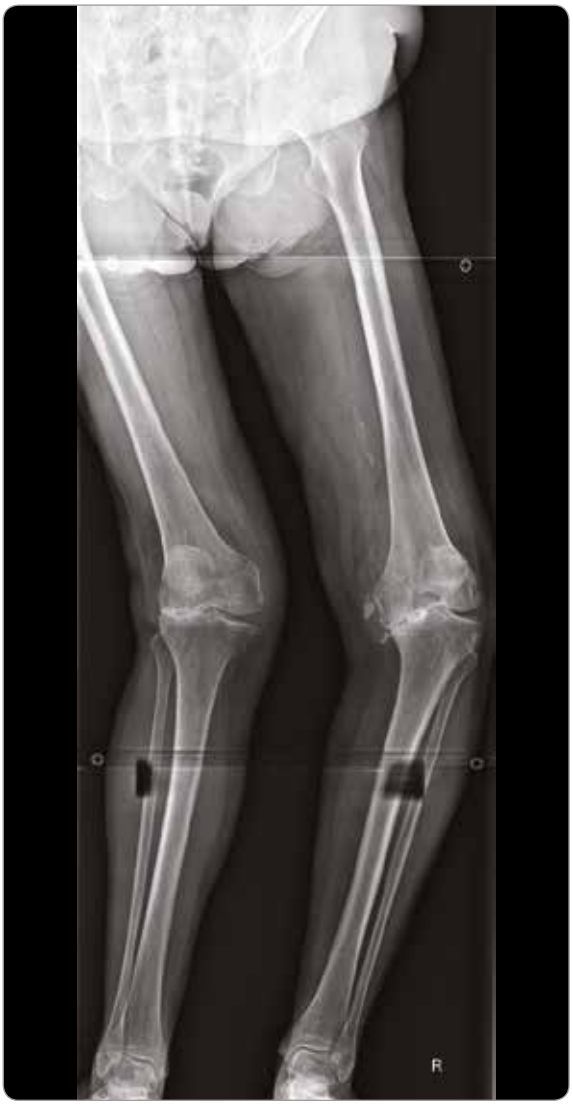
MARKUS PISAN, MD - *Kantonsspital Winterthur, Winterthur, ZH, Switzerland*

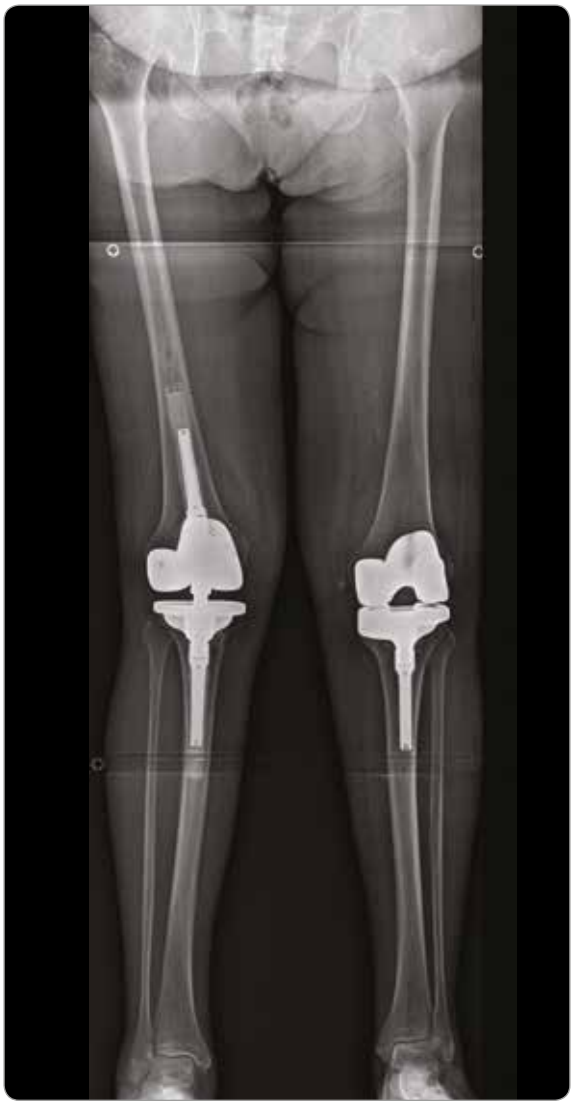
To compensate the laxity of the collateral ligaments, the technicians and the surgeon evaluated the necessity to implant GMK Hinge in the right knee. Thanks to the common internal profile of the femoral components of GMK System, a more constrained implant like GMK Hinge can be positioned starting from MyKnee resections. Special adapters provided with the MyKnee cases, the crossover adapters, allow for a smooth transition from MyKnee cutting block to GMK Hinge finishing instrumentation.

3. POST-OPERATIVE

The surgeon really appreciated the effectiveness of the MyKnee technology. The pre-operative planning allowed to restore the stability and functioning through GMK Primary with tibial extension stem in the left knee and GMK Hinge in the right knee.

- Pre-operative vs post-operative mechanical alignment





CASE 4:

Severe deformity and bone loss

MICHAEL SOLOMON, MD - Prince of Wales Private Hospital, Sydney, Australia

1. PRE-OPERATIVE

- Patient Details

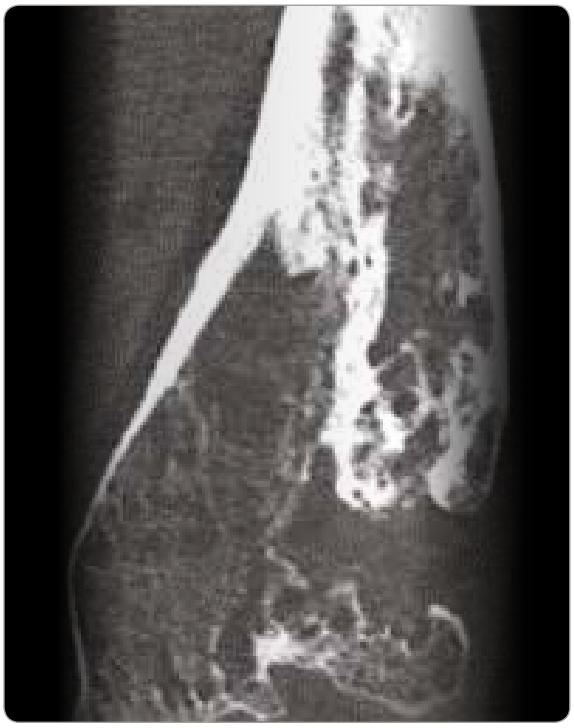
Age	78 years
Sex	Female
Disease	Severe femoral deformity and bone loss in the left knee.

The MyKnee team proposed to the surgeon two different pre-operative plannings. After the evaluation of patient's joint stability and ligament condition, the surgeon decided for a primary implant with a neutral mechanical axis. Thanks to the collaboration between the surgeon and the MyKnee team, a recovery of function and joint stability in a severe case of bone loss was obtained, without the use of an extension stem.

- Pre-operative Data [°]

HKA	179.5
Femur Valgus (from bone)	1.5
Tibia Varus (from bone)	4.5
Tibia Posterior Slope	10.0
Femoral Rotation (Epicondyles vs Posterior Condyles)	5.5

- Pre-operative CT Scan

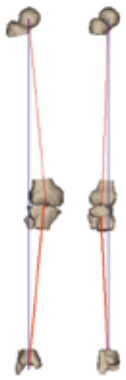


MyKnee CT BASED REV.1 – 23-Jul-2013

MyKnee Surgical Planning Report

CASE CODE	H_STA_RTK_MP_06101935
SURGEON	Markus Pisan
SURGERY DATE	20 Aug 2013
SURGICAL APPROACH	Medial
PRODUCT	GMK Primary
CUTTING BLOCKS	LBS (Femur) + STD (Tibia)

LONG AXIS



CAUTION

This case is based on CT data:

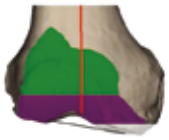
REMOVE FROM THE BONE THE CARTILAGE AND SOFT TISSUES COVERING THE CUTTING BLOCK CONTACT AREAS.

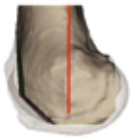
All measurements shown are from the bone and do not include the thickness of the cartilage.

PREOPERATIVE DATA [°]	
HKA	190.5
Femur Valgus (from bone)	10.0
Tibia Valgus (from bone)	7.5
Tibia Posterior Slope	8.0
Epic Axis vs Post Cond	6.5

RIGHT TOTAL KNEE	DEFAULT	CHANGED
Femoral Implant Size	3 Narrow	3
Tibial Implant Size	3	

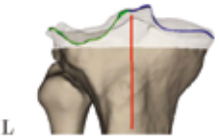
FEMUR

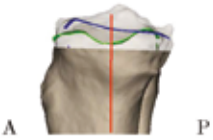




	DEFAULT	CHANGED	COMMENTS
FEMORAL RESECTIONS [mm]			
Lateral Posterior Cut	6.0	5.5	
Medial Posterior Cut	8.5	8.0	
Lateral Distal Cut	4.5	-2.0	
Medial Distal Cut	10.5	5.0	
FEMORAL ANGLES [°]			
Valgus	1.0	0.0	
Extension	0.5	0.0	
ROTATION [°]			
External Rotation vs. post. cond.	3.0		

TIBIA





	DEFAULT	CHANGED
TIBIAL RESECTIONS [mm]		
Lateral Tibial Cut	2.0	3.0
Medial Tibial Cut	9.0	
TIBIAL ANGLES [°]		
Valgus	1.0	0.0
Posterior Slope	5.0	2.0

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CASE 4: Severe deformity and bone loss

2. MYKNEE ANALYSIS

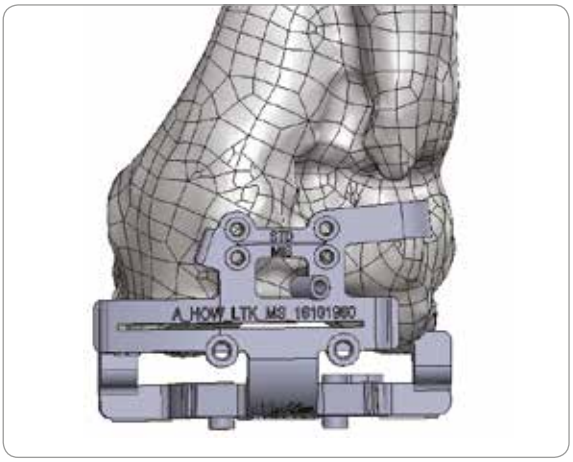
The MyKnee team proposed to the surgeon two possible solutions, to be evaluated by the surgeon according to ligament condition and joint stability.

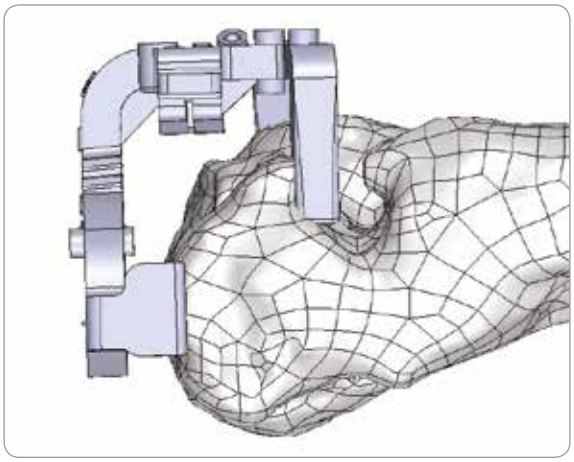
Epiphysis-referenced planning. Usual MyKnee planning, where a primary implant is positioned following the femur mechanical axis and aiming to obtain a post-operative HKA of 180° (no extension stem can be added).

Diaphysis-referenced planning. Planning suitable for a constrained implant with an extension stem. It is developed by simulating the positioning of the stem in the center of the intramedullary canal (following the anatomical axis of the femur). The prosthesis position with this approach results in a residual femoral varus of approximately 5°.

MICHAEL SOLOMON, MD - Prince of Wales Private Hospital, Sydney, Australia

The surgeon, after having analyzed the patient condition, decided to proceed following the first proposal of MyKnee team. He preferred to use GMK Primary with a neutral mechanical axis.
Below is shown the pre-operative planning of femoral cutting block positioning.





3. POST-OPERATIVE

The MyKnee cutting blocks can be accurately positioned on bone even in case of significant bone loss, allowing for a straight forward surgical procedure. The MyKnee planning helped the surgeon to analyze the optimal implant positioning and decide the most suitable implant version, according to the patient condition. The joint functioning and stability were satisfactory.

- Post-operative CT Scan

CASE 5:

Femur fracture: bone loss and abnormal morphology

HANNES JONKER, MD - Potchefstroom MediClinic, Potchefstroom, South Africa

1. PRE-OPERATIVE

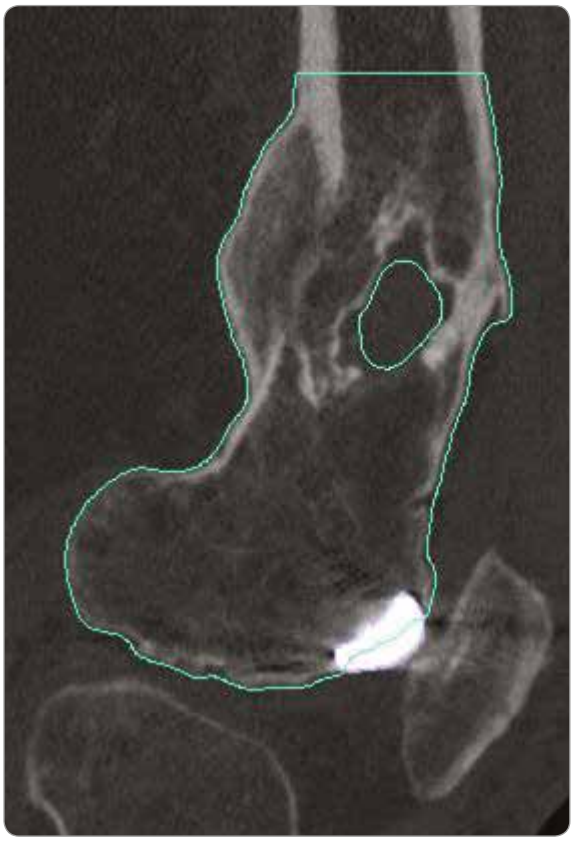
- Patient Details

Age	45 years
Sex	Female
Disease	Femur fracture. 4° varus left knee with severe bone loss and abnormal morphology. Patello-femoral prosthesis in place.

- Pre-operative Data [°]

HKA	176.0
Femur Valgus (from bone)	4.5
Tibia Varus (from bone)	3.0
Tibia Posterior Slope	4.0
Femoral Rotation (Epicondyles vs Posterior Condyles)	5.5

- Pre-operative CT Scan

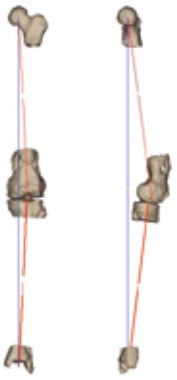


MyKnee CT BASED REV.3 – 12-Sep-2012

MyKnee Surgical Planning Report

LONG AXIS VIEW COMMENTS

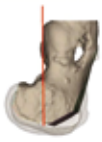
CASE CODE	H_SEQ_LTK_HJ_03051967
SURGEON	Hannes Jonker
SURGERY DATE	02 Oct 2012
SURGICAL APPROACH	Medial
PRODUCT	GMK Primary
CUTTING BLOCKS	LBS (Femur) + STD (Tibia)



PREOPERATIVE DATA [°]	
HKA	176.0
Femur Valgus (from bone)	4.5
Tibia Varus (from bone)	3.0
Tibia Posterior Slope	4.0
Epic Axis vs Post Cond	5.5

LEFT TOTAL KNEE	DEFAULT	CHANGED
Femoral Implant Size	5	
Tibial Implant Size	4	

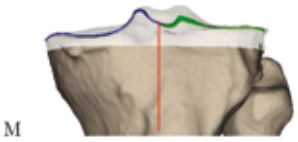
FEMUR

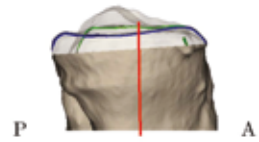


	DEFAULT	CHANGED
FEMORAL RESECTIONS [mm]		
Lateral Posterior Cut	11.0	8.0
Medial Posterior Cut	13.5	8.0
Lateral Distal Cut	7.0	
Medial Distal Cut	11.0	
FEMORAL ANGLES [°]		
Valgus	0.0	
Flexum	10.0	15.0
ROTATION[°]		
External Rotation vs. post. cond.	3.0	0.0

CAUTION
This case is based on CT data! All measurements are shown from bone and do not include any cartilage thickness.

TIBIA





	DEFAULT	CHANGED
TIBIAL RESECTIONS [mm]		
Lateral Tibial Cut	8.0	
Medial Tibial Cut	5.5	
TIBIAL ANGLES [°]		
Valgus	0.0	
Posterior Slope	3.0	4.0

CAUTION
This case is based on CT data! All measurements are shown from bone and do not include any cartilage thickness.

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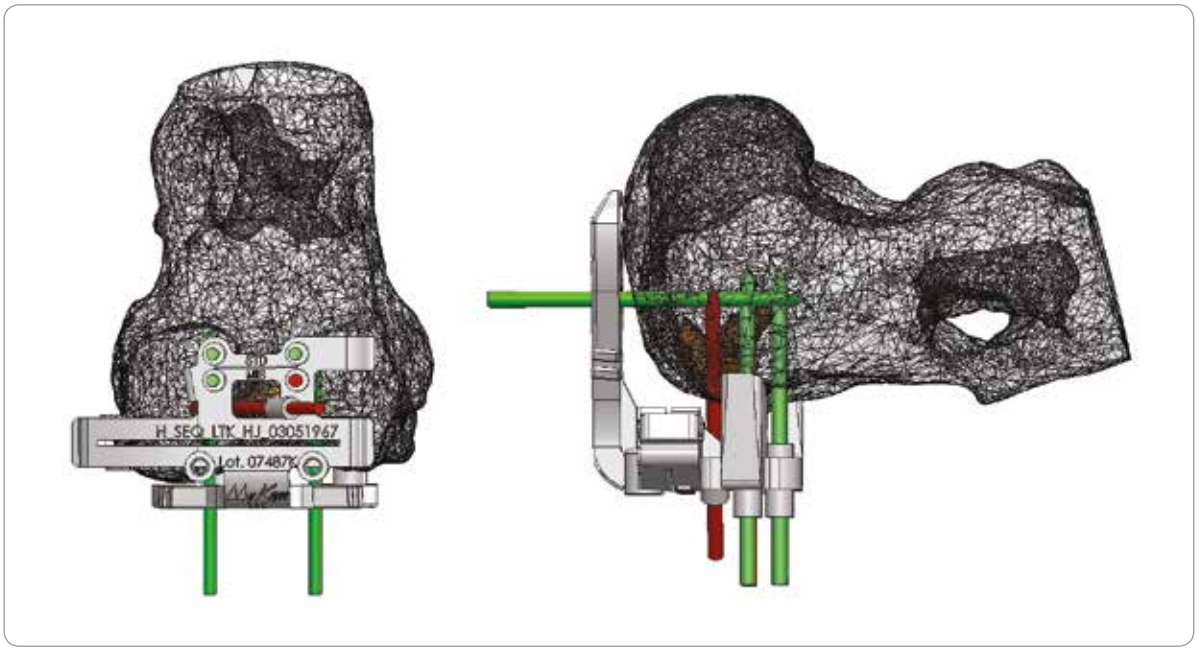
CASE 5: Femur fracture: bone loss and abnormal morphology

2. MYKNEE ANALYSIS

Given the particular morphology of the patient's joint, the MyKnee team proposed to the surgeon a high value of flexum (10°), in order to avoid wide resections and to reduce the risk of notching on the anterior cortex. Besides, the femoral resection values proposed to the surgeon for GMK Primary implant were:

Lateral posterior cut	11.0 mm
Medial posterior cut	13.5 mm
Lateral distal cut	7.0 mm
Medial distal cut	11.0 mm

The analysis of the reconstructed joint revealed that the existing patello-femoral implant of the patient did not interfere with the positioning of the MyKnee femoral cutting blocks, as shown in the image below.



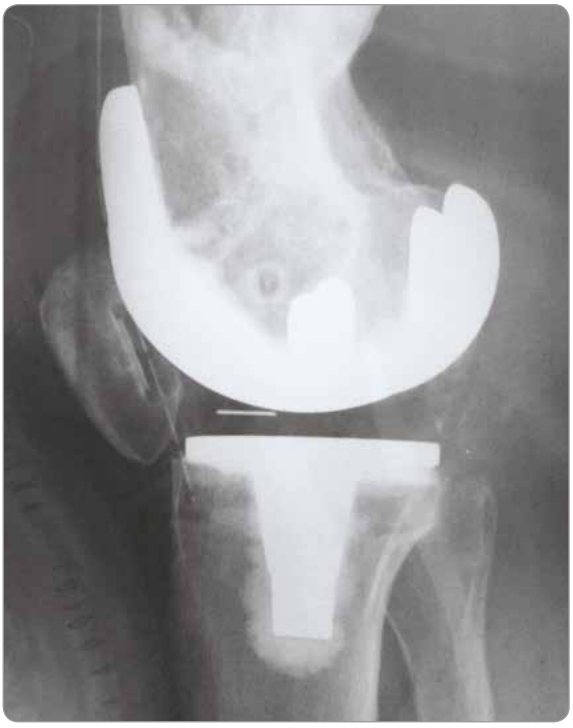
The surgeon reduced both the lateral and medial posterior resections to 8.0 mm and increased the flexum to 15°. Furthermore, the tibial posterior slope planned by the MyKnee was changed from 3° to 4°.

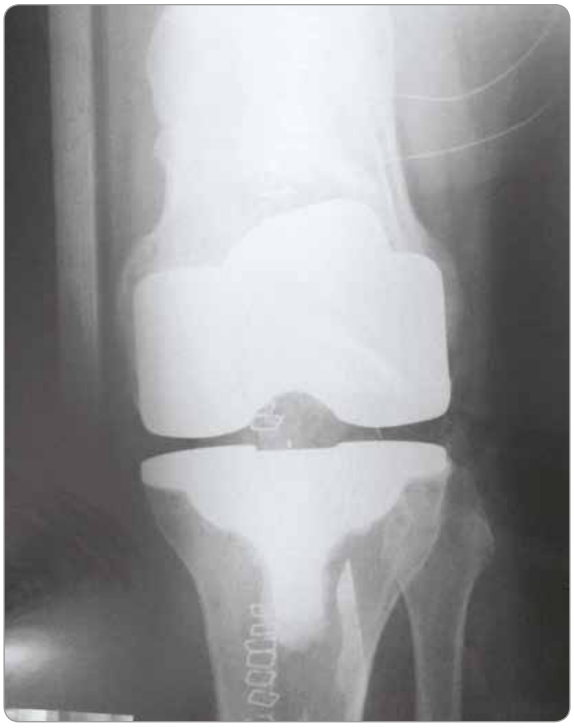
HANNES JONKER, MD - Potchefstroom MediClinic, Potchefstroom, South Africa

3. POST-OPERATIVE

The surgery was successful and the surgeon was fully satisfied with the result obtained through the MyKnee technology. Despite the massive bone loss, the stability of the joint was restored, without using tibial or femoral extension stem. This result comes from the experience of the surgeon and his collaboration with the MyKnee team.

- Post-operative CT Scan





CASE 6:

Particular shape of the femur due to abnormal osteophytes

CYRIL KOMBOT, MD - Hôpital Du Chablais, Monthey, Switzerland

1. PRE-OPERATIVE

- Patient Details

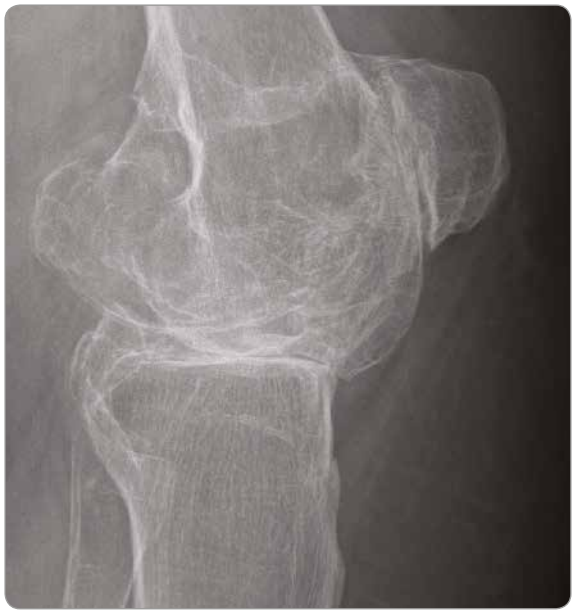
Age	45 years
Sex	Female
Disease	Functional problems to the left knee due to wide osteophytes on the anterior part of the femur.

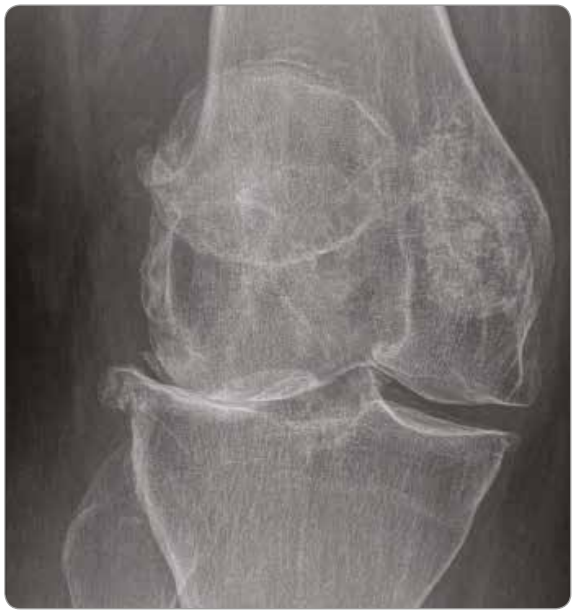
This particular joint morphology did not hinder the use of MyKnee. The collaboration between the MyKnee team and the surgeon allowed to restore the correct function of the joint.

- Pre-operative Data [°]

HKA	186.0
Femur Valgus (from bone)	2.0
Tibia Varus (from bone)	1.5
Tibia Posterior Slope	9.5
Femoral Rotation (Epicondyles vs Posterior Condyles)	6.0

- Pre-operative CT Scan





MyKnee CT BASED REV.0 – 10-Dec-2010

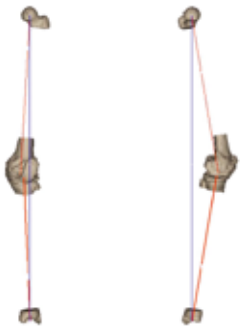
MyKnee Surgical Planning Report

CASE CODE	J_FRI_LTK_CK_23071966
SURGEON	Cyril Kombot
SURGERY DATE	07 Jan 2011
SURGICAL APPROACH	Medial

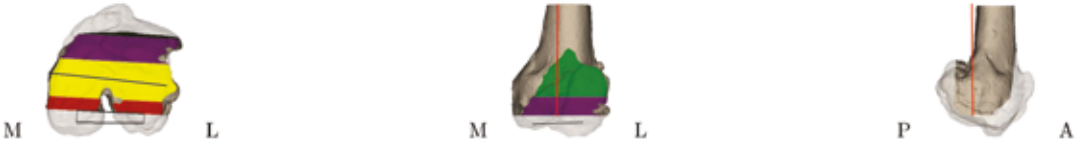
PREOPERATIVE DATA [°]	
HKA	186.5
Femur Valgus (from bone)	2.0
Tibia Valgus (from bone)	1.5
Tibia Posterior Slope	9.5
Epic Axis vs Post Cond	6.0

LEFT TOTAL KNEE	DEFAULT	CHANGED
Femoral Implant Size	6	
Tibial Implant Size	5	

LONG AXIS VIEW



FEMUR



	DEFAULT	CHANGED
FEMORAL RESECTIONS [mm]		
Lateral Posterior Cut	6.5	
Medial Posterior Cut	9.0	
Lateral Distal Cut	7.0	
Medial Distal Cut	9.0	
FEMORAL ANGLES [°]		
Valgus	0.0	
Flexum	3.0	
ROTATION [°]		
External Rotation vs. post. cond.	3.0	

Warning!

This case is based on CT data! All measurements are shown from bone and do not include any cartilage thickness.

TIBIA

	DEFAULT	CHANGED
TIBIAL RESECTIONS [mm]		
Lateral Tibial Cut	7.5	
Medial Tibial Cut	9.0	
TIBIAL ANGLES [°]		
Valgus	0.0	
Posterior Slope	3.0	

Warning!

This case is based on CT data! All measurements are shown from bone and do not include any cartilage thickness.

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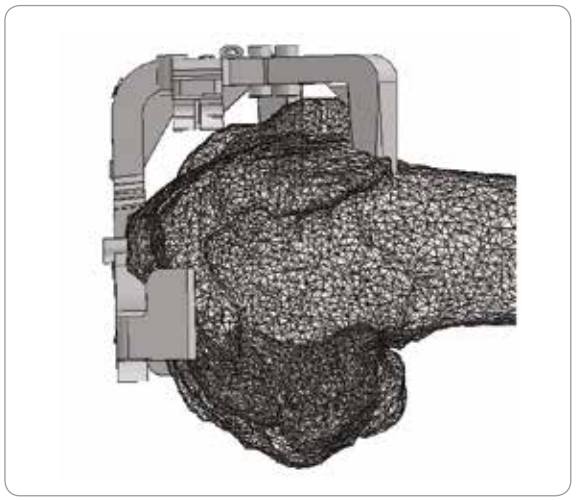
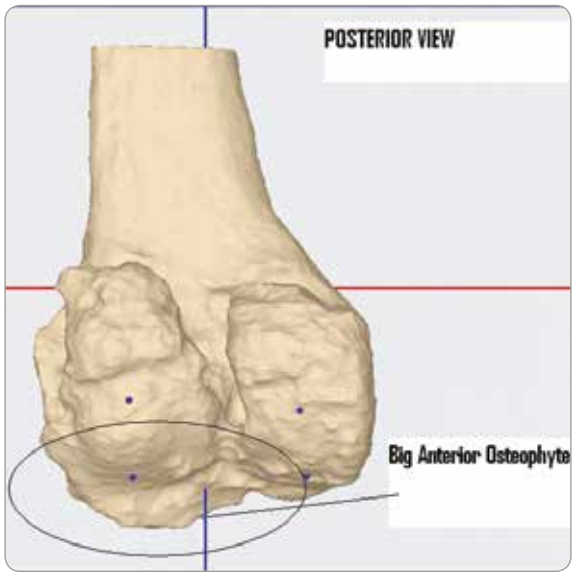
CASE 6: Particular shape of the femur due to abnormal osteophytes

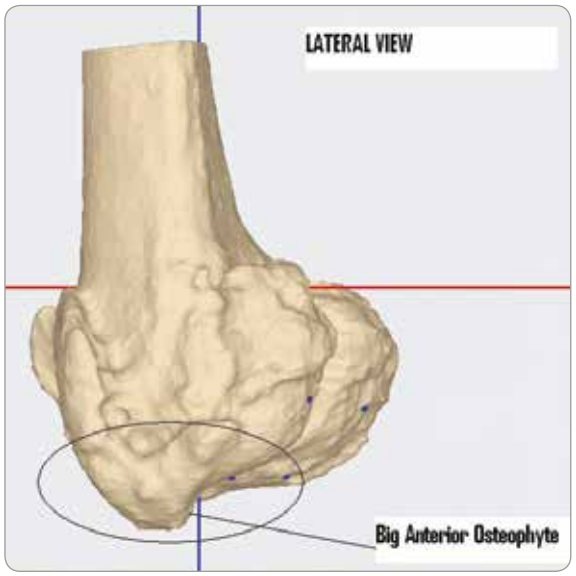
2. MYKNEE ANALYSIS

The MyKnee team and the surgeon evaluated whether the osteophytes interfered with the positioning of the MyKnee cutting block. The following image shows the pre-operative planning of cutting block positioning. The MyKnee block placed on the femur interferes with the anterior osteophyte.



They decided to remove the anterior osteophyte (shown in the picture below) to avoid any impingement while placing the cutting guide.





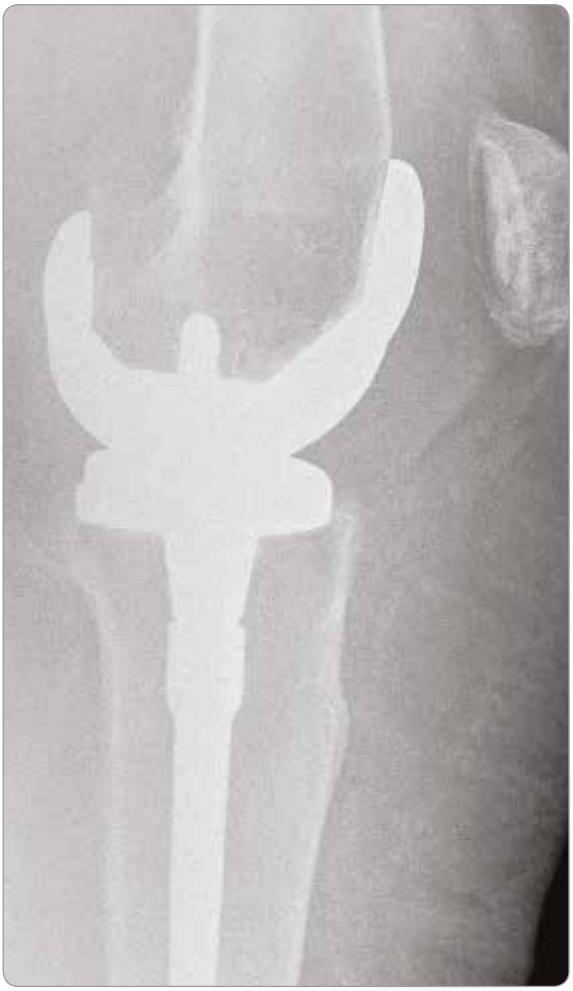
The position of the MyKnee femoral block has been planned avoiding contact with the remaining osteophytes on the bone surface.

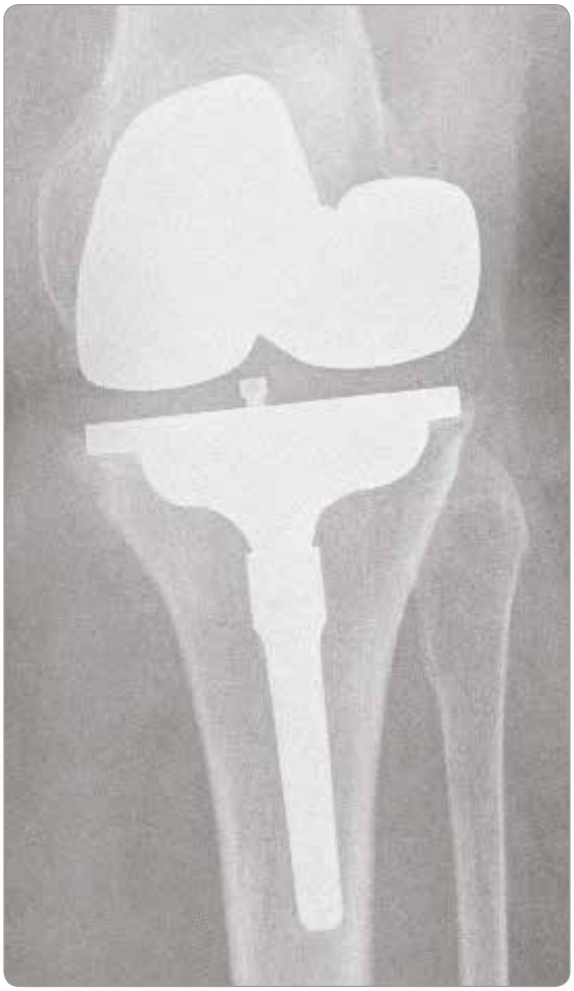
CYRIL KOMBOT, MD - Hôpital Du Chablais, Monthey, Switzerland

3. POST-OPERATIVE

The tibial MyKnee cutting block was positioned on the tibia with the UNI implant in place and used as pin positioner for the GMK Revision metal tibial cutting block, suitable for wedge preparation. The surgeon decided to use GMK Primary implant with tibial extension stem to better stabilize the joint.

- Post-operative CT Scan





CASE 7:

Plate with screws on the medial side of the tibia

TYLER GOLDBERG, MD - North Austin Medical Center, Austin, TX, United States

1. PRE-OPERATIVE

- Patient Details

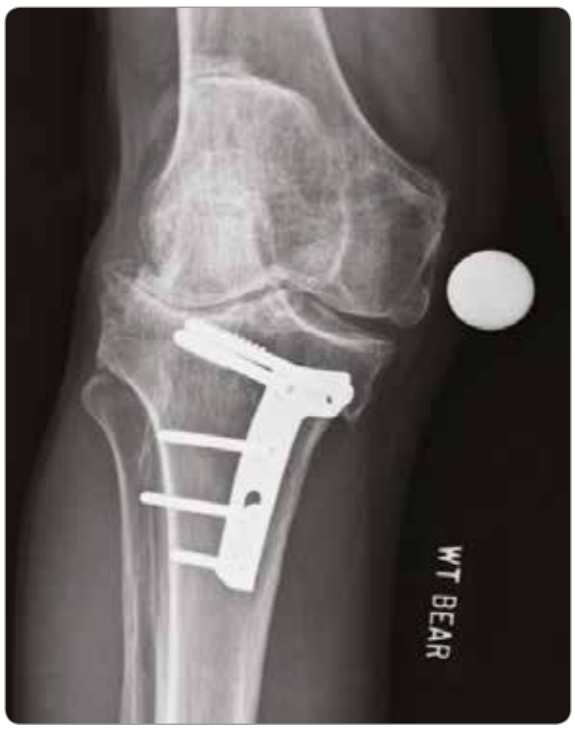
Age	62 years
Sex	Male
Disease	Lateral compartment of the right leg affected by loss of cartilage. Plate with screws on the medial side of the tibia.

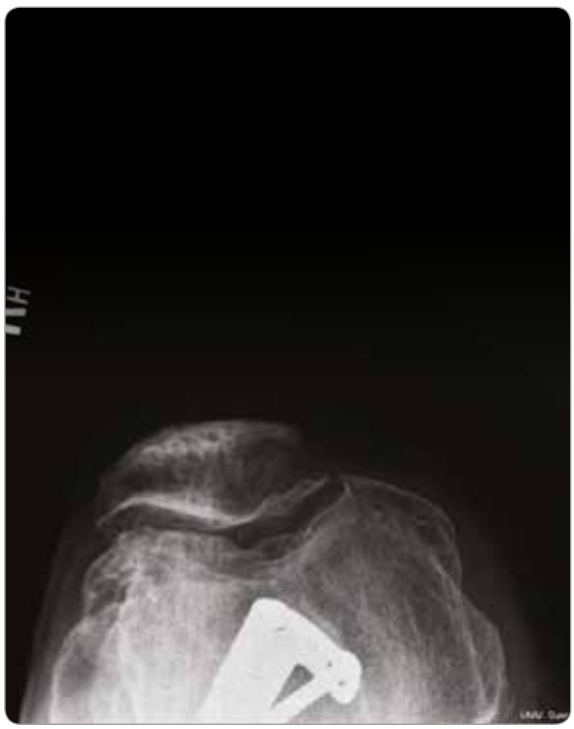
The joint had a history of degenerative disease. The lateral compartment was affected by loss of cartilage. Before the implantation of the prosthesis, the joint was treated with knee scope and then with High Tibial Osteotomy. The patient's pre-operative ROM was 5-100°. The surgeon decided, in collaboration with the MyKnee team, to remove the screws before proceeding with the TKA. The pre-operative planning allowed to position the MyKnee cutting block despite the presence of the plate.

- Pre-operative Data [°]

HKA	185.0
Femur Valgus (from bone)	9.0
Tibia Varus (from bone)	4.5
Tibia Posterior Slope	5.5
Femoral Rotation (Epicondyles vs Posterior Condyles)	4.5

- Pre-operative CT Scan





MyKnee CT BASED REV.0 – 16-Feb-2011

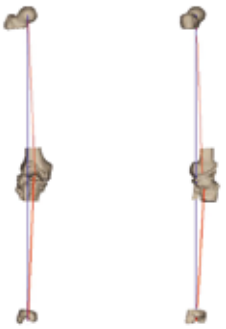
MyKnee Surgical Planning Report

CASE CODE	P_BIX_RTK_TG_30061949
SURGEON	Tyler Goldberg
SURGERY DATE	08 Mar 2011
SURGICAL APPROACH	Medial

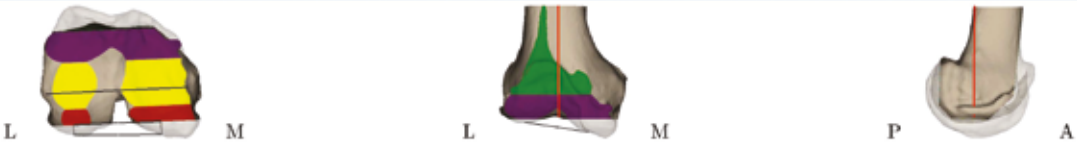
PREOPERATIVE DATA [°]	
HKA	185.0
Femur Valgus (from bone)	9.0
Tibia Varus (from bone)	4.5
Tibia Posterior Slope	5.5
Epic Axis vs Post Cond	2.5

RIGHT TOTAL KNEE	DEFAULT	CHANGED
Femoral Implant Size	6	
Tibial Implant Size	6	

LONG AXIS VIEW



FEMUR



FEMORAL RESECTIONS [mm]	DEFAULT	CHANGED
Lateral Posterior Cut	6.0	
Medial Posterior Cut	8.0	
Lateral Distal Cut	2.5	
Medial Distal Cut	10.0	
FEMORAL ANGLES [°]		
Valgus	0.0	
Flexum	2.0	
ROTATION[°]		
External Rotation vs. epicondyles	0.0	

Warning!

This case is based on CT data! All measurements are shown from bone and do not include any cartilage thickness.

TIBIA

TIBIAL RESECTIONS [mm]	DEFAULT	CHANGED
Lateral Tibial Cut	8.5	
Medial Tibial Cut	4.5	
TIBIAL ANGLES [°]		
Valgus	0.0	
Posterior Slope	4.5	

Warning!

This case is based on CT data! All measurements are shown from bone and do not include any cartilage thickness.

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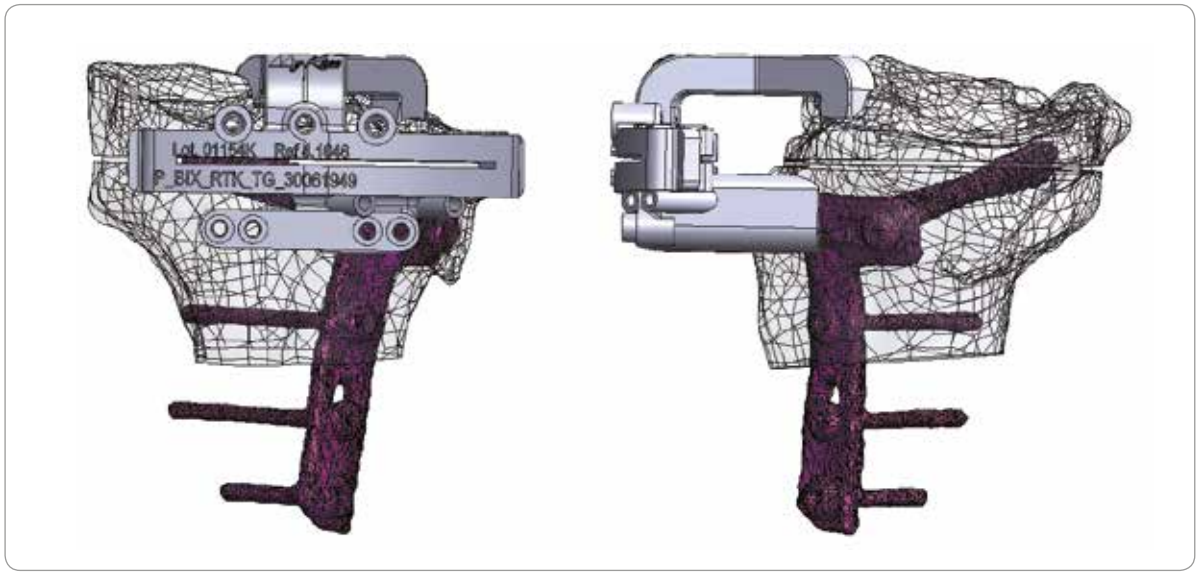
CASE 7: Plate with screws on the medial side of the tibia

2. MYKNEE ANALYSIS

To recover the joint functioning and restore the correct alignment of the mechanical axis, the surgeon and the MyKnee team evaluated to remove the screws avoiding any impingement with the MyKnee block and the implant. The plate was left in situ and the pre-operative planning allowed to fix the MyKnee tibial cutting block to the plate (image below). Furthermore, it was decided to use a Revision stem to by-pass the plate.

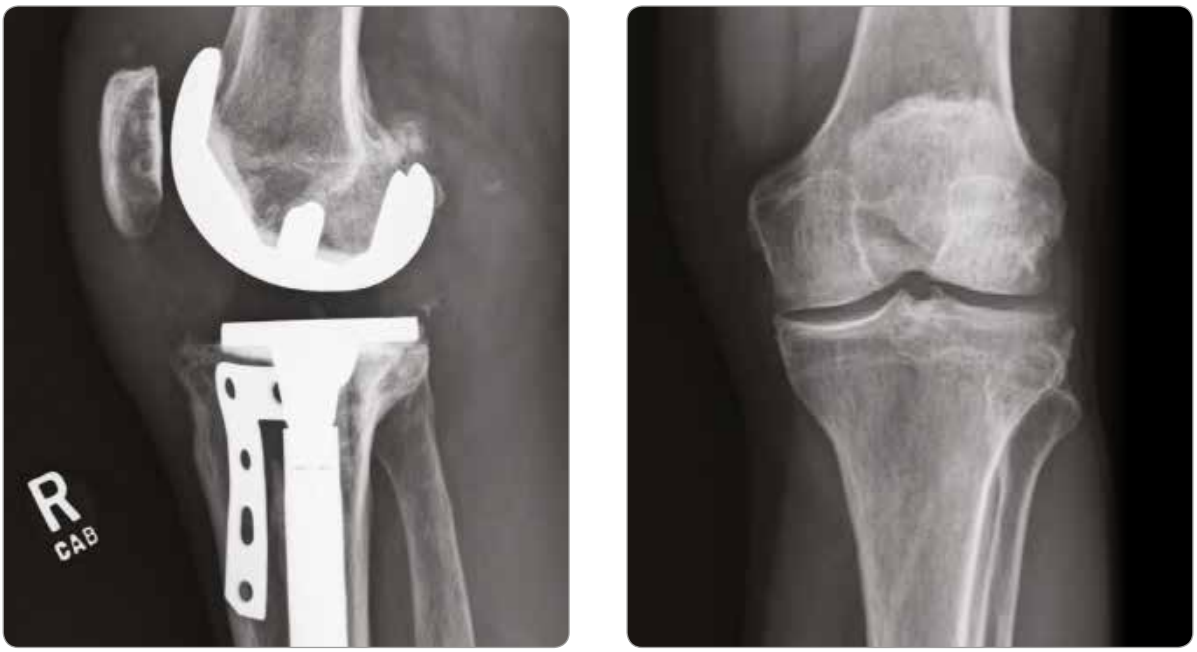


3. POST-OPERATIVE

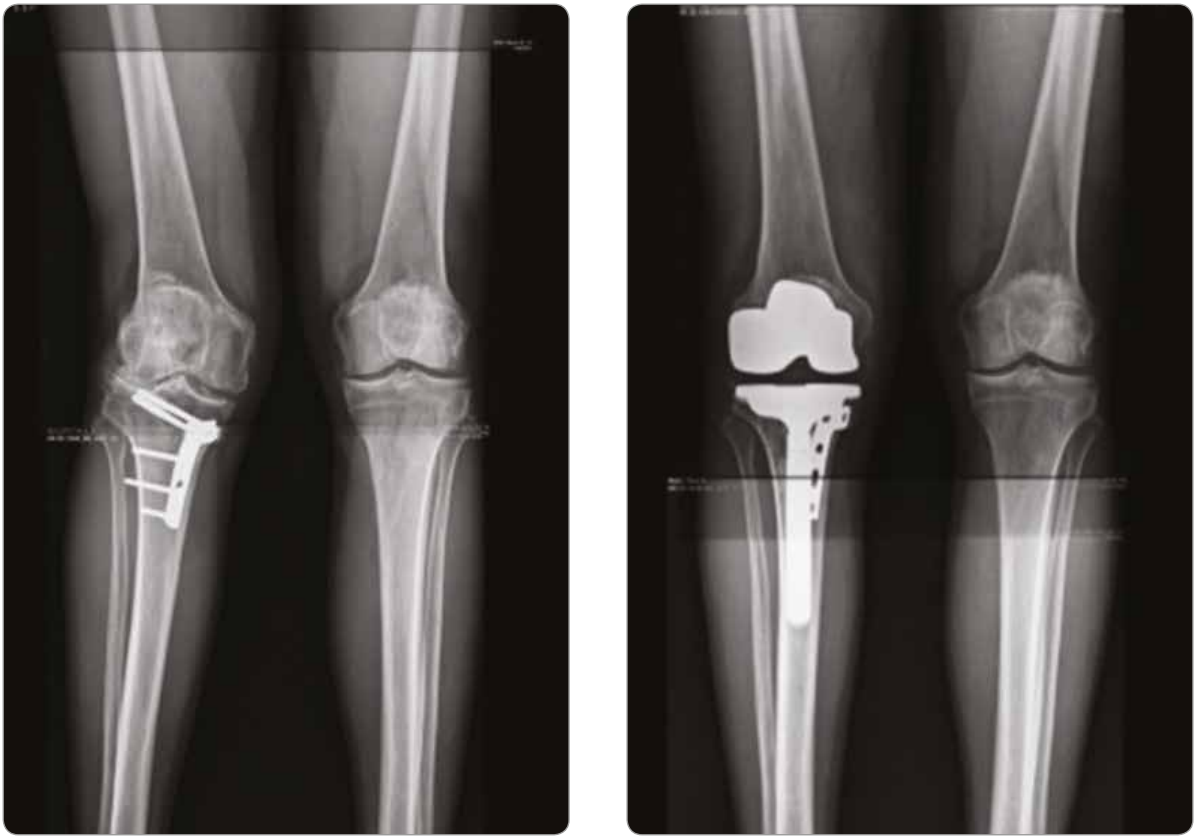
The MyKnee technology allowed a perfect integration between GMK Primary with revision stem and the plate, restoring the joint function and the alignment of the mechanical axis. The patient was really satisfied with the results of TKA: off cane and pain pills in just 4 weeks with a post-operative ROM of 0-115° (20° greater than the pre-operative ROM).

TYLER GOLDBERG, MD - North Austin Medical Center, Austin, TX, United States

- Post-operative CT Scan



- Pre-operative vs post-operative mechanical alignment



CASE 8:

Unicompartimental implant revision

HELMUT KATTNER, MD - *LKH Villach, Villach, Kärnten, Austria*

1. PRE-OPERATIVE

- Patient Details

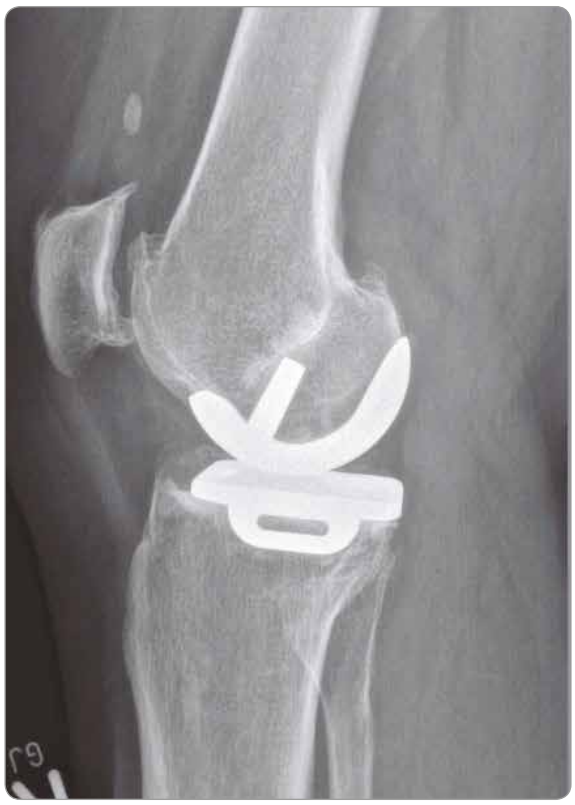
Age	58 years
Sex	Female
Disease	5° varus right knee with an unicompartmental implant in place (medial compartment).

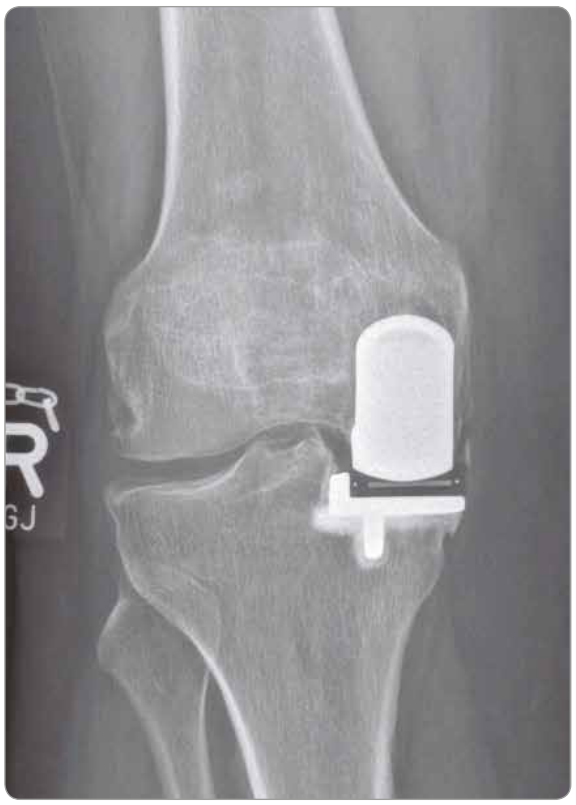
The MyKnee technology allows to replace an unicompartmental implant with a primary implant with excellent results. Moreover, it permits to satisfy the surgeon requests of higher stability, using a medial tibial wedge and an extension stem.

- Pre-operative Data [°]

HKA	175.0
Femur Valgus (from bone)	5.5
Tibia Varus (from bone)	8.0
Tibia Posterior Slope	4.5
Femoral Rotation (Epicondyles vs Posterior Condyles)	3.0

- Pre-operative CT Scan



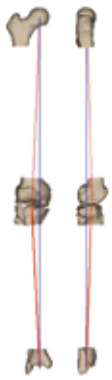


MyKnee CT BASED REV.0 – 10-May-2013

MyKnee Surgical Planning Report

CASE CODE	C_TRO_RTK_HK_20121955
SURGEON	Helmut Kattner
SURGERY DATE	27 May 2013
SURGICAL APPROACH	Medial
PRODUCT	GMK Primary
CUTTING BLOCKS	STD

LONG AXIS



CAUTION
This case is based on CT data:

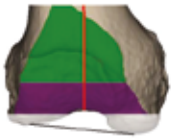
REMOVE FROM THE BONE THE CARTILAGE AND SOFT TISSUES COVERING THE CUTTING BLOCK CONTACT AREAS.

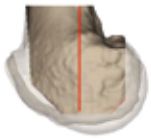
All measurements shown are from the bone and do not include the thickness of the cartilage.

PREOPERATIVE DATA [°]	
HKA	175.0
Femur Valgus (from bone)	5.5
Tibia Varus (from bone)	8.0
Tibia Posterior Slope	4.5
Epic Axis vs Post Cond	4.0

RIGHT TOTAL KNEE	DEFAULT	CHANGED
Femoral Implant Size	3	
Tibial Implant Size	3	

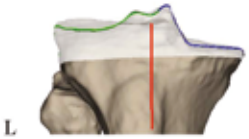
FEMUR

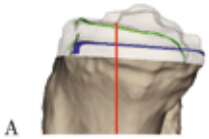




FEMORAL RESECTIONS [mm]	DEFAULT	CHANGED	COMMENTS
Lateral Posterior Cut	7.5		
Medial Posterior Cut	11.0		
Lateral Distal Cut	5.0		
Medial Distal Cut	10.0		
FEMORAL ANGLES [°]			
Valgus	0.0		
Extension	0.0		
ROTATION[°]			
External Rotation vs. epicondyles	0.0		

TIBIA





TIBIAL RESECTIONS [mm]	DEFAULT	CHANGED
Lateral Tibial Cut	13.5	
Medial Tibial Cut	6.0	
TIBIAL ANGLES [°]		
Valgus	2.0	
Posterior Slope	4.0	

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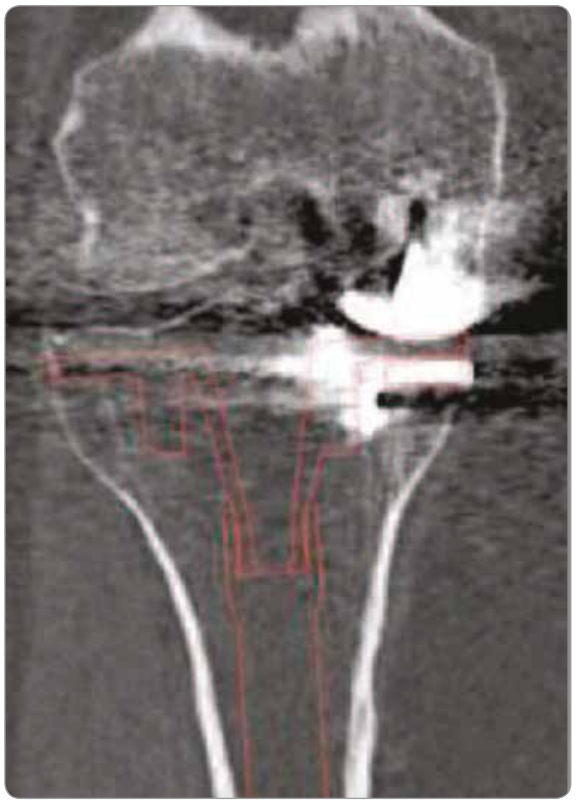
2. MYKNEE ANALYSIS

Before removing the unicompartimental implant, the MyKnee team proposed to the surgeon to place the MyKnee cutting block on the device and fix it on the anterior part of the femur. After drilling the holes for the MyKnee cutting block, the surgeon could remove the block and proceed to remove the implant. Following the complete removal of the implant, the MyKnee block was positioned on the pins and the resections could be performed. Concerning the tibial planning, the MyKnee team realized a planning, in accordance with the surgeon requests, to evaluate the use of a 5 mm medial wedge (images below). Moreover, in order to increase the stability of the tibial implant they proposed to use an extension stem.



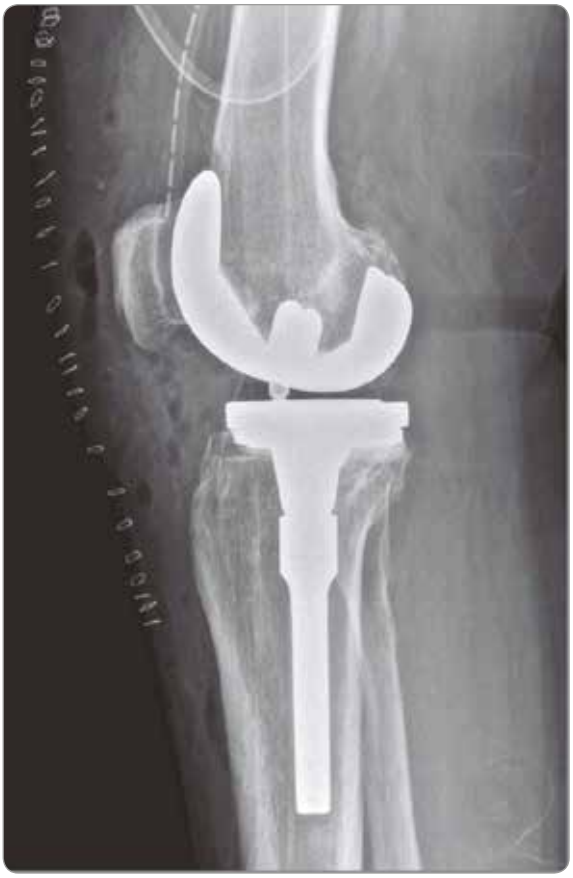
The tibial MyKnee cutting block was positioned on the tibia with the UNI implant in place and used as pin positioner for the GMK Revision metal tibial cutting block, suitable for wedge preparation.

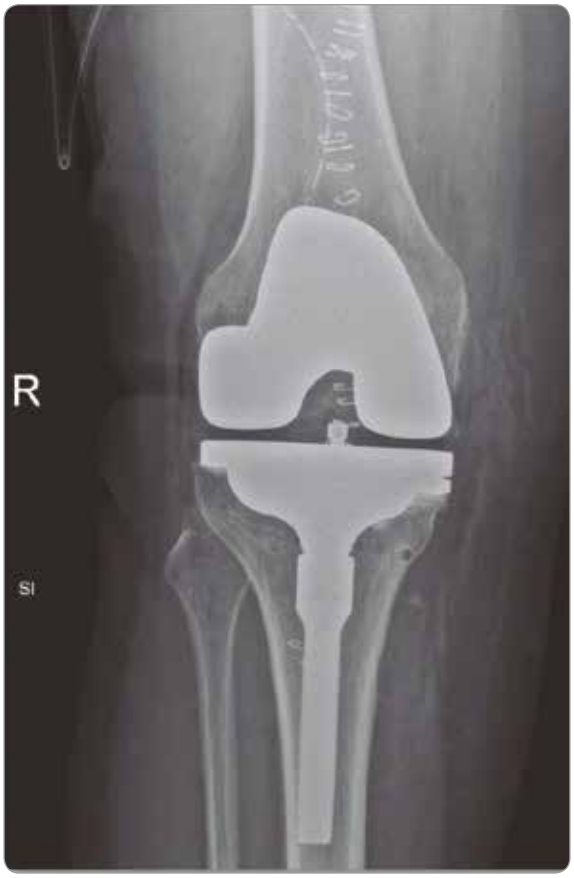
HELMUT KATTNER, MD - LKH Villach, Villach, Kärnten, Austria

3. POST-OPERATIVE

The surgeon deeply appreciated the effectiveness of the MyKnee technology. The pre-operative planning allowed to obtain a perfect revision of the unicompartimental implant: the stability and function were restored through GMK Primary with tibial augments and extension stem.

- Post-operative CT Scan





CASE 9:

Patello-femoral joint implant revision

MARKUS PISAN, MD - *Kantonsspital Winterthur, Winterthur, ZH, Switzerland*

1. PRE-OPERATIVE

- Patient Details

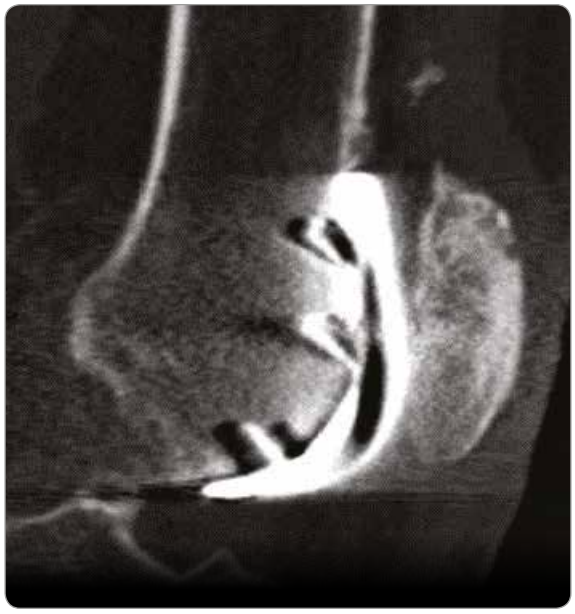
Age	59 years
Sex	Male
Disease	6° valgus left knee with patello femoral implant in place.

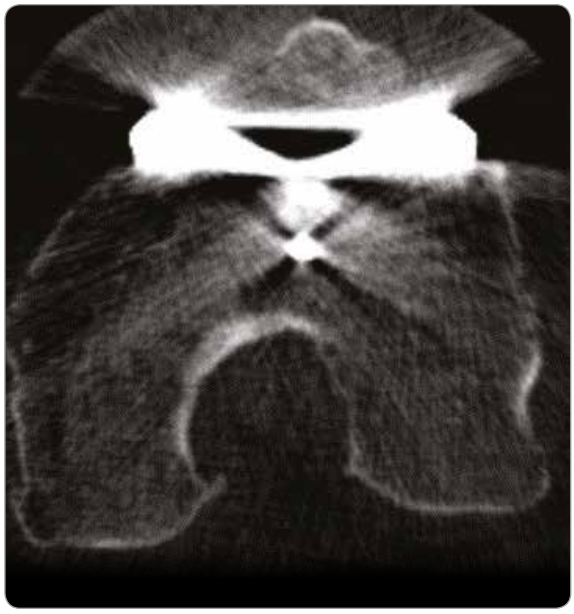
The CT-based MyKnee technology allows to smoothly reconstruct the knee joint with the PF implant in place. The MyKnee team, in collaboration with the surgeon, planned the resection levels and defined the optimal positioning of femoral and tibial components to restore the bony alignment. The cutting block was placed directly onto the patello-femoral joint.

- Pre-operative Data [°]

HKA	184.0
Femur Valgus (from bone)	6.0
Tibia Varus (from bone)	1.5
Tibia Posterior Slope	7.5
Femoral Rotation (Epicondyles vs Posterior Condyles)	5.5

- Pre-operative CT Scan





MyKnee CT BASED REV.0 – 11-Apr-2012

MyKnee Surgical Planning Report

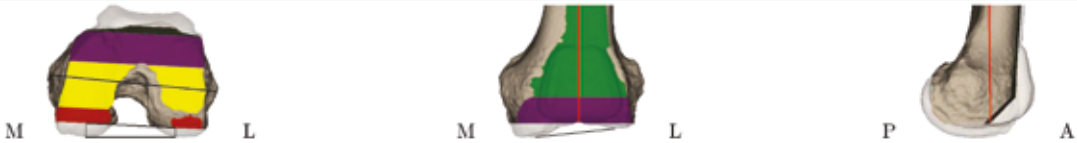
CASE CODE	U_EIG_LTK_MP_09111953
SURGEON	Markus Pisan
SURGERY DATE	19 Jun 2012
SURGICAL APPROACH	Medial

LONG AXIS VIEW

PREOPERATIVE DATA [°]	
HKA	184.0
Femur Valgus (from bone)	6.0
Tibia Varus (from bone)	1.5
Tibia Posterior Slope	7.5
Epic Axis vs Post Cond	5.5

LEFT TOTAL KNEE	DEFAULT	CHANGED
Femoral Implant Size	5	
Tibial Implant Size	5	

FEMUR



FEMORAL RESECTIONS [mm]	DEFAULT	CHANGED
Lateral Posterior Cut	5.5	
Medial Posterior Cut	8.0	
Lateral Distal Cut	3.5	
Medial Distal Cut	9.0	
FEMORAL ANGLES [°]		
Valgus	0.0	
Extension	0.0	
ROTATION[°]		
External Rotation vs. post. cond.	3.0	

CAUTION
This case is based on CT data! All measurements are shown from bone and do not include any cartilage thickness.

TIBIA

TIBIAL RESECTIONS [mm]	DEFAULT	CHANGED
Lateral Tibial Cut	9.0	
Medial Tibial Cut	7.0	
TIBIAL ANGLES [°]		
Valgus	0.0	
Posterior Slope	5.0	

CAUTION
This case is based on CT data! All measurements are shown from bone and do not include any cartilage thickness.

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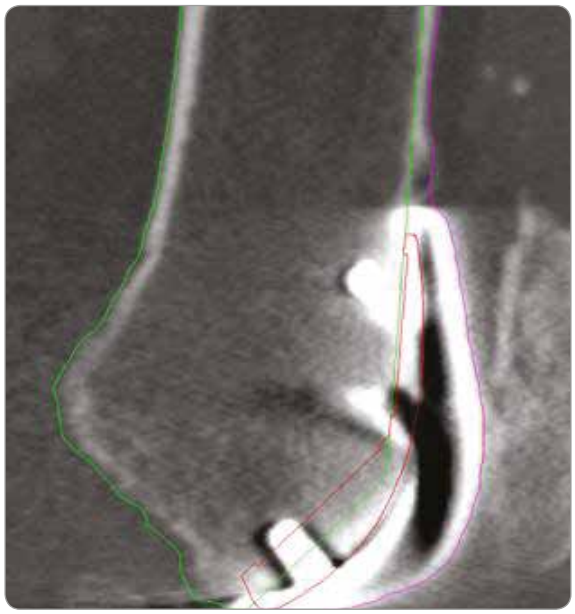
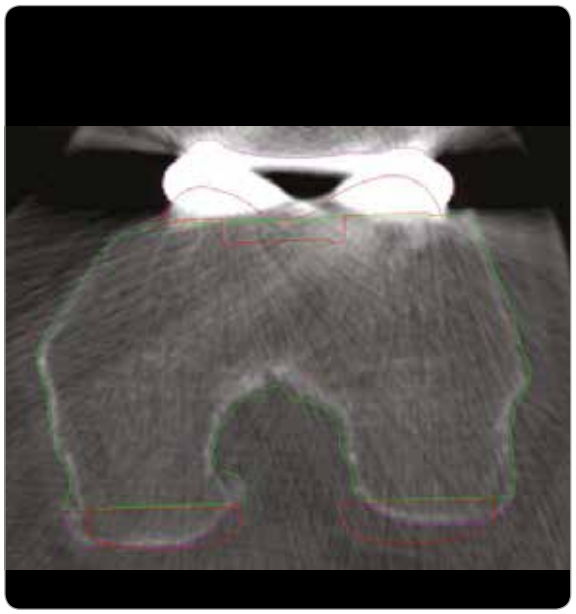
CASE 9: Patello-femoral joint implant revision

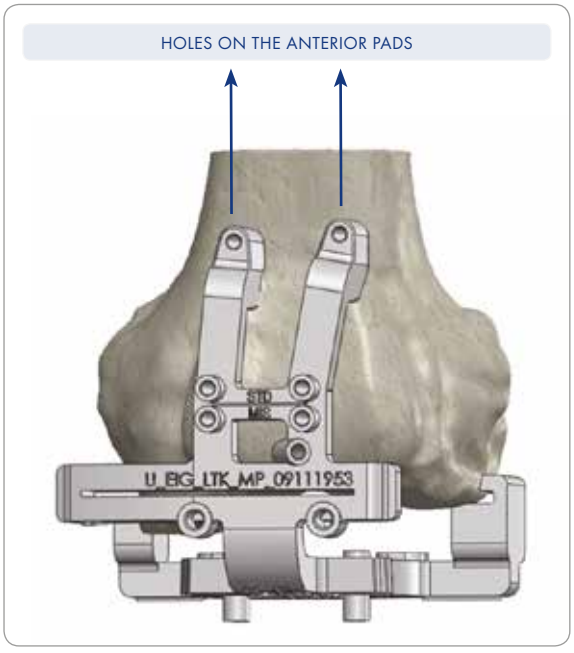
2. MYKNEE ANALYSIS

The following images show the CT Scan of patient's knee with a pre-operative planning of implant positioning (red line: final GMK Primary implant; green line: bone cuts; pink line: original bone and patello-femoral implant).





In order to allow the positioning of the MyKnee femoral cutting block on the preexisting PF implant, the MyKnee team added on the anterior pads of the MyKnee block 2 special fixation holes. The surgeon fixed the MyKnee cutting block on the PF device using the two special pin holes on the anterior pads. The PFJ implant was removed.

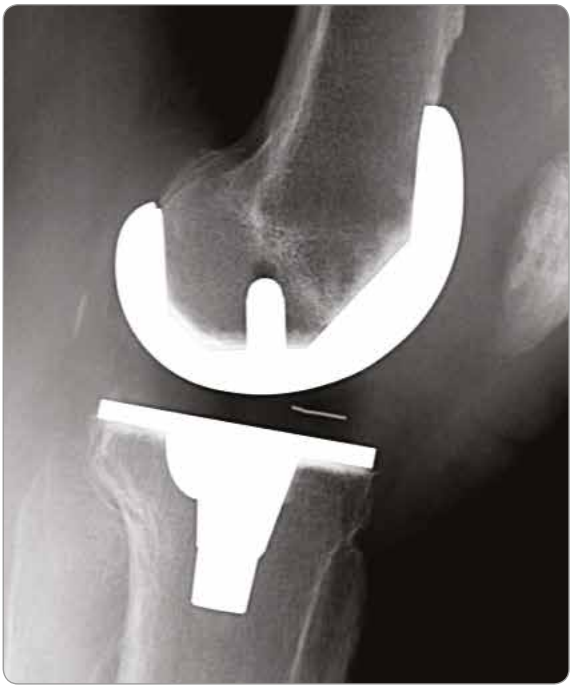


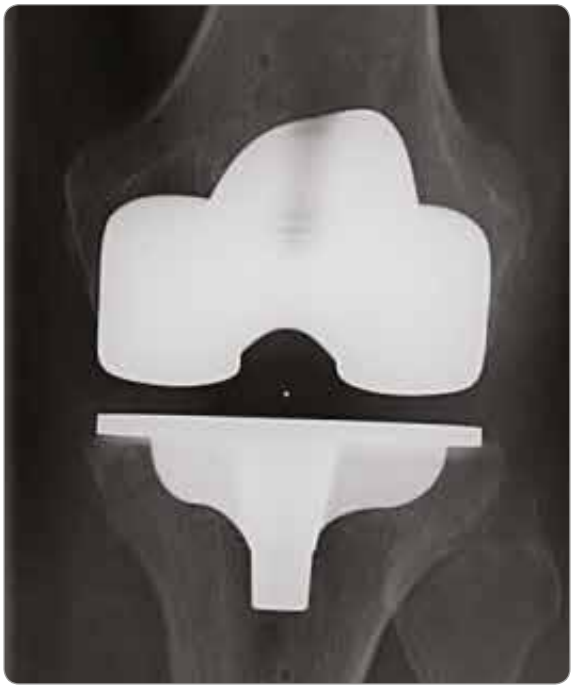
MARKUS PISAN, MD - *Kantonsspital Winterthur, Winterthur, ZH, Switzerland*

3. POST-OPERATIVE

The surgeon appreciated the good stability of the MyKnee cutting blocks. The femoral size and bone cuts were in line with the planning and the neutral mechanical axis was restored. The surgical steps performed by the surgeon followed the MyKnee team pre-operative planning.

- Post-operative CT Scan





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